



Fakulteta za logistiko

A Framework for Managing Future Supply Chains Trends

Utilization of lean, agile, and leagile strategies

Doctoral dissertation

Candidate: Waleed Rashad

Mentor: Assoc. Prof. Dr. Zlatko Nedelko

Co-mentor: Prof. Dr. Vojko Potočan

Celje, 2020

ACKNOWLEDGMENTS

I would like to thank the difficult events which took place in my life and pushed me to chase my PhD degree. Without these events, I do not think that I could be able to complete this dissertation. The difficult events in my life gave me the power and motivation to continue regardless of the challenging circumstances.

Special thanks to Prof. Dr. Zlatko Nedelko and Prof. Dr. Vojko Potočan for their guidance and support throughout this dissertation, I am grateful for their help.



Fakulteta za logistiko

Mariborska cesta 7
3000 Celje, Slovenija

IZJAVA DOKTORSKEGA KANDIDATA

Podpisani-a _____ **Waleed Rashad** _____, vpisna številka _____ 21004223 _____

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Utilization of lean, agile, and leagile strategies

Okvir za management prihodnjih trendov v oskrbovalnih verigah – uporaba vitke, agilne in leagilne strategije

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List of Abbreviations	
MRP	Material Resource planning
MRP II	Material Resource planning II
ERP	Enterprise Resource Planning
JIT	Just in Time
TPS	Toyota Production system
IRMO	International Resources Management Organization
IT	Information Technology
UN	United Nations
IMS	International monetary system
GATT	General Agreement on Tariffs and Trade

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Povzetek

Management oskrbovalne verige v sodobnih razmerah delovanja organizacij pridobiva na pomenu. Pri tem velja izpostaviti, da se udeleženci oskrbovalnih verig skozi zgodovino trudijo najti najboljše možne rešitve za delovanje organizacij in oskrbovalnih verig v okviru katerih delujejo organizacije. Nadalje velja, da se koncept delovanja organizacij in oskrbovalnih verig razvija, prav tako pa se razvijajo tudi rešitve, prakse, metodologije in tehnike delovanja in poslovanja, ki se uporabljajo v okviru managementa oskrbovalnih verig.

Ta razvoj je tako vodil tudi do razvoja koncepta oskrbovalne verige, kasneje pa je postalo ključnega pomena izbor in uporaba ustrezne strategije za management oskrbovalne verige. Razvoj trgov, globalizacija in nove tehnologije so postale odločilen dejavnik za razvoj katere koli oskrbovalne verige in razvijanje njene strategije, vendar se lahko zgodijo številni drugi dogodki, ki bi lahko prisilili odločevalce v oskrbovalni verigi, da spremenijo obstoječi management oskrbovalne verige.

Dinamično poslovno okolje in možni prihodnji trendi globalnih trgov predstavljajo na področju razvoja koncepta oskrbovalnih verig in pri uporabi ustreznih strategij za management oskrbovalnih verig vedno nove izzive, kot so potreba pa vitkosti, agilnosti in leagilnosti. Tako se postavi vprašanje, ali je ključnega pomena oceniti, v koliki meri so različne možne strategije za management oskrbovalne verige oz. tudi organizacije, še primerne za prihodnje delovanje oskrbovalnih verig. To predstavlja izhodišče za raziskovanje, kako je oskrbovalna veriga

pripravljena na različne prihodnje scenarije, gledano iz vidika uporabe strategij za management oskrbovalne verige.

Za dosego cilja, tj. priprave oskrbovalne verige na prihodnost z ustreznimi strategijami, je bila izvedena poglobljena študija glede uporabe vitkosti, agilnosti ter leagilnosti v različnih prihodnjih okoliščinah delovanja oskrbovalnih verig. Tri izpostavljene strategije obravnavajo najpomembnejša dejavnika v oskrbovalnih verigah - čas in stroške; glavni razlog za izbiro teh strategij se nahaja v dejstvu, da se le-te ukvarjajo z izboljšanjem učinkovitosti in odzivnosti v oskrbovalni verigi, kar je ključnega pomena za sedanje in prihodnje delovanje oskrbovalnih verig.

V nalogi smo preučevali uporabo treh izbranih strategij v okviru treh možnih prihodnjih scenarijev za primere pomanjkanja energije in naraščanju cene nafte, novega mednarodnega denarnega sistema ter vojne. Razlog za razvijanje teh določenih scenarijev je v tem, da le-ti zajemo in odsevajo najpomembnejše politične in gospodarske dogodke, ki bi se lahko zgodili, in bi tako vplivali na oskrbovalne verige, na njihov management ter na njihovo delovanje v prihodnosti (EY, 2013; Cook, 2006; Sokov, 2015).

Namen teh scenarijev je poskus predvidevanja možnih izzivov, s katerimi bi se utegnili soočiti v okviru managementa in delovanja oskrbovalnih verig v prihodnosti in tako oceniti ustreznost strategij oskrbovalne verige za podobne prihodnje scenarije. Anketo smo izvedli med 150 strokovnjaki, ki trenutno delujejo na področju managementa oskrbovalne verige in predstavljajo ključno izhodišče za našo raziskavo. Raziskava je potekala v dveh fazah.

Prva faza raziskave se osredotoča na prepoznavanje mnenj anketiranih strokovnjakov oskrbovalne verige glede uporabe izbranih strategij managementa oskrbovalne verige. Na podlagi teoretičnega znanja iz znanstvene literature, ki je bila proučena za to raziskavo, predlaganih scenarijev ter povratne informacije strokovnjakov v anketi je postalo jasno, da potrebujejo managerji za management oskrbovalne verige ustrezen okvir, ki bo podpiral izboljšanje trenutnega in prihodnjega managementa oskrbovalne verige.

S pomočjo uporabe utemeljene teorije (ang. Grounded theory) smo razvili nov teoretični okvir, v katerega osnovna ideja je izboljšati svetovno prakso pridobivanja virov, ki bo

posledično omogočala izboljšanje managementa oskrbovalne verige glede na izbrane scenarije.

Druga faza ankete je bila izvedena z namenom, da se strokovnjakom v oskrbovalnih verigah predstavi predlagan okvir za management oskrbovalnih verig v prihodnje. Predlagani okvir izpostavlja pomen vključevanja zunanjih izvajalcev, hkrati pa krepi sodelovanje znotraj oskrbovalne verige in pomaga podpirati ter upoštevati izbrane strategije oskrbovalne verige – tj. vitkost, agilnost in leagilnost za boljše delovanje in management oskrbovalnih verig v prihodnje, v različnih okoliščinah.

Predlagan okvir predstavlja znanstveni prispevek k uporabi strategij oskrbovalne verige v različnih okoliščinah delovanja oskrbovalnih verig. Rezultati te disertacije bodo evidentno zapolnili vrzel, ki so jo v anketi poudarili strokovnjaki, ki delujejo v okviru oskrbovalnih verig. Poudarili so namreč bistveno potrebo po izboljšanju sodelovanja v okviru oskrbovalne verige na svetovni ravni. Tako bo razviti okvir osrednjega pomena za podporo managementu oskrbovalnih verig v morebitnih različnih okoliščinah delovanja. Trudimo se razviti dodatna znanja za management oskrbovalnih verig v prihodnje in razvijati pojem od »managementa oskrbovalne verige« do »managementa svetovnih virov«.

Rezultati te raziskave kažejo potrebo po znatnem izboljšanju globalnega procesa pridobivanja virov, ki bo igral pomembno vlogo pri uporabi strategij oskrbovalne verige za management oskrbovalnih verig v prihodnjih scenarijih. V tej raziskavi je tako v okviru za management oskrbovalnih verig predlagano izboljšanje globalnega procesa pridobivanja virov s pomočjo ustanovitve mednarodne organizacije za management virov (ang. International resource management organization - IRMO) za nadzor virov oskrbovalnih verig po vsem svetu in izboljšanja postopka pridobivanja virov.

Opis problema

Globalno poslovno okolje je danes postalo zelo zapleteno zaradi globalizacije in močne konkurence med podjetji po vsem svetu (Fischer, 2003; Kalafus, 2014; Banu in Rao, 2015; Sangari in drugi, 2015; Wu in drugi, 2019; Milovanović in Popović, 2019). Zaradi tega so poslovni odnosi v središču pozornosti in predstavljajo pomemben dejavnik v okviru vodenja katerega koli podjetja. V skladu s tem je ključni dejavnik uspeha vsakega podjetja način

managementa in sodelovanja na področju dejavnosti oskrbovalne verige znotraj in zunaj organizacije, kot tudi s svojimi poslovnimi partnerji.

Koncept oskrbovalne verige je bil razvit kot dobra praksa poslovanja; razvil se je skozi desetletja ter postal pomemben del vsakega podjetja (Stevens in drugi, 1989; Chopra in Meindl, 2001; Christopher, 2016). V oskrbovalni verigi gre za omrežja, procese in povezave (Christopher 1992, p. 17). Medtem ko poslovno okolje postaja iz dneva v dan bolj zapleteno, postajajo omrežja oskrbovalnih verig osrednjega pomena v trenutnem poslovnem okolju. V prihodnje je pričakovati rast trenda zapletenih poslovnih okolij, v kolikor se bo tudi poslovno okolje nenehno spreminjalo (Oláh in drugi, 2018). Če se ne bodo razvili novi odnosi in nove rešitve sodelovanja v oskrbovalni verigi, bo v prihodnje katerokoli podjetje težko preživel, v kolikor ne bo člen v oskrbovalni verigi (Ross, 2016). Preden se osredotočimo na opisovanje osrednjega problema, bomo najprej bolj podrobno razložili pojem oskrbovalne verige in njen management.

Podjetja so pogosto pod pritiskom, saj si prizadevajo izogniti se kompromisu, s katerim se soočajo v oskrbovalnih verigah – biti stroškovno učinkovit ali odziven (Slack in Lewis, 2008). To poskušajo dosegati tako s stroškovno učinkovitostjo kot tudi odzivnostjo na zahteve kupcev (Oláh in drugi, 2018). Ta pritisk je v negotovem poslovnem okolju toliko večji, saj je težko predvideti spremembe na trgih, povrh tega pa je potrebno nenehno usklajevati delovanje oskrbovalne verige s temi spremembami (Slack in Lewis, 2008), kar se odvija v zelo konkurenčnem okolju (Kalafus, 2014; Fan in drugi, 2016; Wu in drugi, 2019; Milovanović in Popović, 2019).

Uspeh katerekoli oskrbovalne verige je odvisen od zadovoljstva končnih kupcev s pomočjo pravočasne dobave, konkurenčnih cen ter visoke kakovosti izdelkov. Zato je zelo pomembno preučiti zahteve končnih uporabnikov in razumeti zahteve trga.

Danes tako vsaki oskrbovalni verigi predstavlja izziv, kako hkrati biti odziven ter učinkovit. Zato morajo sodobne oskrbovalne verige uravnotežiti svoje strategije in jih umestiti v okvir odzivnosti ter učinkovitosti (Christopher, 2016). Odzivnost omogoča hitro reakcijo oskrbovalnih verig na spremembe trgov in zadovoljevanje kupcev, medtem ko je učinkovitost zelo pomembna za popoln nadzor stroškov oskrbovalne verige. V skladu s tem je ravnotežje med obema – to pomeni med učinkovitostjo in odzivnostjo (Gunasekaran in drugi, 2008) -

končni cilj oskrbovalne verige, vendar lahko dajanje prednosti eni pred drugo vodi do težav pri delovanju oskrbovalne verige (Slack in Lewis, 2008).

Številni avtorji, kot so Nel in Badenhorst-Weiss (2015), Christopher (2016), Soltan in Mostafa (2015), sklepajo, da je doseganje učinkovitosti in odzivnosti možno, če je oskrbovalna veriga podprta s strategijami vitkosti, agilnosti ter leagilnosti (Christopher, 1992). Na osnovi spoznanj iz literature in poslovne prakse lahko izpostavimo tri ključne strategije: vitkost, agilnost in leagilnost. Razlog za izbiro teh treh strategij je ta, da so idealne za doseganje ravnovesja med odzivnostjo in učinkovitostjo znotraj oskrbovalne verige (Simchi-Levi, in drugi, 2009; Nel in Badenhorst-Weiss, 2015; Christopher, 2016).

Strategija vitkosti je bila razvita za obvladovanje učinkovitosti oskrbovalne verige, medtem ko se strategija agilnosti ukvarja s časom znotraj oskrbovalne verige (Gunasekaran in drugi, 2008) in tako obravnava odzivnost (Christopher, 1992; Gunasekaran in drugi, 2008). Strategija leagilnosti si prizadeva doseči ravnovesje med zgoraj omenjenima strategijama z namenom povečati konkurenčnost oskrbovalne verige (Christopher, 2005; Soltan in Mostafa, 2015; Gligor in drugi, 2015; Wu in drugi, 2017).

Vsaka oskrbovalna veriga, če ima preveč balasta, se ne more hitro prilagoditi, da bi se odzvala na velike spremembe na trgih (Basnet in Seuring, 2016). Tako obstaja negativna povezava med sposobnostjo oskrbovalne verige, da se hitro odzove na trg ter količino balasta, ki ga je moč zaznati v okviru oskrbovalne verige. Količina balasta tako predstavlja odločilno vlogo pri uporabi strategije vitkosti (Womack in drugi, 1990; Bhamu in Singh, 2014).

Oskrbovalna veriga, da bi dosegla najboljše rezultate, nenehno sklepa kompromise med odzivnostjo in učinkovitostjo (Slack in Lewis, 2008). V vsakdanjem poslovanju mnoge odločitve odražajo kompromise, kot so kompromisi med dobavnim rokom in stroški prevoza ter ravno zalog in denarnim ciklom (Basnet in Seuring, 2016). V resnici gre pri teh primerih za kompromis med odzivnostjo in učinkovitostjo in najboljša praksa za zagotavljanje stalne ustreznosti oskrbovalne verige je uspeti hkrati uravnotežiti oboje – odzivnost in učinkovitost. Managerji v okviru vsake oskrbovalne verige so tako nenehno v iskanju optimalnih rešitev. Te optimalne rešitve je mogoče zmeraj doseči z uravnoteženjem stroškov izvajanja dejavnosti v oskrbovalni verigi in časa, ki ga potrebujemo za opravljanje teh dejavnosti, to pa hkrati odraža tako učinkovitost kot tudi odzivnost (Slack, 2018).

Oskrbovalna veriga si zmeraj prizadeva doseči »razpoložljivost« tako, da ima pravi produkt ob pravem času za pravo ceno na pravem mestu (Jones in drugi, 2000). Tu in tam pa nekatera podjetja, da bi dosegla to razpoložljivost na trgu, uporabljajo čisto strategijo vitkosti za doseg stroškovne učinkovitosti, in druga podjetja čisto strategijo agilnosti s poudarkom na odzivnosti, medtem ko sta dejansko obe navedeni strategiji potrebni kot bistvena predpogoja za konkurenco na današnjem trgu (Christopher, 2005; Wu in drugi, 2017).

Posledično je za managerje oskrbovalnih verig zelo pomembno, da razumejo osrednji koncept strategij vitkosti in agilnosti, in kako se lahko vitkost in agilnost združita v skupno strategijo leagilnosti (Christopher, 1992; Naylor in drugi, 1999). Poleg razumevanja različnih strategij oskrbovalne verige moramo prav tako razumeti prihodnje trende svetovnih trgov in načine, kako le-ti določajo, ali bodo te strategije »preživele in delovale« v različnih okoliščinah v prihodnosti ali ne. Zlasti v času krize ali kakršnihkoli pomembnih sprememb gospodarskih razmer trenutne strategije morda niso optimalne za podporo podjetju, zato potrebujemo inovativen pristop za razvoj in delovanje novih generacij oskrbovalnih verig (Christopher in Ryals, 2014; John, 2015).

Leta 2015 je bila s strani »SCM World« izvedena raziskava z več kot 600 izvajalci o izzivih, ki jih pričakujejo glede naravnih virov v naslednjem desetletju (John, 2015), »podatki kažejo, da so stroški v zvezi s surovinami in rudninami največja težava v vseh panogah industrije. Enako velja za energijo, ki je skupno zasedla prvo mesto glede na izzive na področju naravnih virov za strategijo oskrbovalne verige« (John, 2015, str. 8).

Spremembe globalnih trgov predstavljajo pravi izziv za vsako podjetje (Banu in Rao, 2015). Kljub temu se globalna mreža oskrbovalnih verig iz dneva v dan širi v tujino in nobeno posamezno podjetje ne more več samo izvajati strategij vitkosti, agilnosti in leagilnosti, ne da bi v to strategijo vključevalo tudi svoje poslovne partnerje. To vključevanje zagotavlja skupno sodelovanje vseh strani in zmanjšanje dobavnih rokov (Angkiriwang in drugi, 2014). Prednosti vsake strategije ostajajo omejene, razen če je strategija propagirana in uporabljena v celotni oskrbovalni verigi in ne samo v posameznih podjetjih znotraj oskrbovalne verige.

Negotovost povpraševanja je povezana s trenutnimi hitrimi spremembami svetovnih trgov (Christopher, 2005; Wetherly in Otter, 2014; Hill in Hult, 2015; Li in drugi, 2019). Situacija bo še težja, če pride do različnih scenarijev z dramatičnimi spremembami, kot je sprememba

monetarnega sistema, poraba zalog nafte ali nevarnost novih (lokalnih) vojn (Oláh in drugi, 2018). Da bi oskrbovalne verige lahko preživele v takšnih razmerah, bi potrebovale novo inovativno strategijo, saj jim trenutne strategije morda ne pomagajo premagovati takšnih dramatičnih sprememb na trgih, razen, če jih okrepimo z inovativnim razumevanjem in upoštevanjem oskrbovalnih verig ter njihovih strategij (Kavilal in drugi, 2014). Ta inovativni pristop bi lahko spremenil naravo samega koncepta oskrbovalne verige za razvoj novih generacij oskrbovalnih verig (Von See in Kalogerakis, 2015).

Na osnovi zgornjih spoznanj lahko poudarimo, da je osrednji problem te naloge povezan z uporabo strategij vitkosti, agilnosti in leagilnosti za management oskrbovalnih verig v različnih okoliščinah v prihodnosti. Trenutna literatura tako ne ponuja nobenega vpogleda v to, kako se lahko našteje tri strategije – vitkosti, agilnosti ter leagilnosti – uporabljajo za uspešno podporo managementa oskrbovalne verige v prihodnje, v pomembno različnih okoliščinah.

Namen in cilji naloge

Temeljni namen te naloge je razviti okvir za uporabo strategij vitkosti, agilnosti in leagilnosti za management oskrbovalnih verig v okviru različnih možnih prihodnjih scenarijev katerih bo oskrbovalna veriga delovala in bo potekal management oskrbovalnih verig. Znotraj tega okvira poskušamo doseči najboljši način uporabe strategij vitkosti, agilnosti in leagilnosti glede na izbrane scenarije za prihodnje delo oskrbovalnih verig in posledično izboljšanje uporabe teh treh strategij ter rezultatov managementa oskrbovalnih verig.

V današnjem poslovnem okolju je na svetovnih trgih veliko sprememb, ki vplivajo na uporabo in razvoj strategij oskrbovalne verige (McCullen in Towill, 2000; Wetherly in Otter, 2014; Wu in drugi, 2019; Milovanović in Popović, 2019). Te spremembe lahko pomembno vplivajo na uspeh podjetja v prihodnosti ter odločitve o izbiri ustrezne strategije oskrbovalne verige – tj. vitkosti, agilnosti ali leagilnosti (Christopher in Towil, 2002; Gligor in drugi, 2015; Wu in drugi, 2017).

Vrste ovir in preprek, s katerimi se oskrbovalne verige soočajo, se sčasoma spreminjajo, vendar pa negotovost narašča in posledično je postalo zelo težko načrtovati prihodnost (Simangunsong in drugi, 2012). Nenehne spremembe na svetovnih trgih so mnoge oskrbovalne verige prisilile k spremembi njihovih strategij, saj je postalo zelo pomembno biti

maksimalno prilagodljiv in slediti novim spremembam trgov (Shri in Anil, 2016; Cohen in Lee, 2020).

Naša raziskava poskuša analizirati trenutne razmere v oskrbovalni verigi, predvideti različne scenarije v prihodnosti, v katerih bo potekal management oskrbovalne verige in razviti okvir za management oskrbovalnih verig v prihodnje – tj. z opisom, kako uporabiti strategije vitkosti, agilnosti in leagilnosti v različnih prihodnjih okoliščinah v okviru managementa oskrbovalne verige.

Glavni cilji in podcilji te naloge so:

- Razvoj novega okvira za uporabo ključnih strategij v oskrbovalnih verigah v okviru različnih prihodnjih opredeljenih scenarijev.
- razumevanje trenutnih strategij oskrbovalne verige.
- napovedovanje prihodnjih gibanj trgov in s tem povezanih trendov in scenarijev.
- preveriti uporabnost strategij vitkosti, agilnosti in leagilnosti v oskrbovalnih verigah v predvidenih scenarijih.

a) Razvoj novega pojmovnega okvira za uporabo ključnih strategij v oskrbovalnih verigah v okviru različnih prihodnjih opredeljenih scenarijev

Prvi cilj, ki odraža glavni namen te naloge, je razviti okvir, ki bo povzel uporabo izbranih ključnih strategij za management oskrbovalnih verig, in sicer vitkosti, agilnosti in leagilnosti, v okviru različnih prihodnjih opredeljenih scenarijev. Predlagani scenariji bodo pokazali, koliko te ključne strategije odražajo cilje oskrbovalne verige – tj. vitkosti, agilnosti in leagilnosti – in se lahko uporabijo v različnih scenarijih prihodnjega delovanja oskrbovalnih verig. Poleg tega pa ta okvir zagotavlja smernice za globalno pridobivanje virov in skupno sodelovanje oskrbovalnih verig ter njihovih udeležencev.

Prihodnji razvoj in delovanje oskrbovalne verige se nanaša na nekatere napredne tipe sodelovanja in partnerstev (Adams in drugi, 2014). Globalno poslovno okolje in zapleteni odnosi bodo vplivali na temeljni koncept oskrbovalne verige zaradi velikega števila sodelujočih po vsem svetu. Ti odnosi bodo odigrali osrednjo vlogo pri pretvorbi oskrbovalne verige v "globalno verigo" (Tomas in drugi, 2014).

b) Razumevanje trenutnih strategij oskrbovalne verige

Razvoj novega okvira ni možen brez ustreznega razumevanja trenutnih strategij oskrbovalne verige in trenutne uporabe teh strategij v okviru oskrbovalnih verig (Naylor in drugi, 1999; Christopher, 2005; Purvis in drugi, 2014). Zato je namen znotraj tega cilja raziskati, kako se te strategije uporabljajo v okviru managementa oskrbovalnih verig. Nov okvir temelji na širši analizi trenutnega znanja, poudari zaznane pomanjkljivosti in razvije nov pristop za odpravljanje teh pomanjkljivosti.

c) Napovedovanje prihodnjih gibanj trgov ter s tem povezanih trendov in scenarijev

V luči tega cilja bomo napovedali prihodnja srednjeročna in dolgoročna gibanja trgov na podlagi trenutnih okoliščin svetovnih trgov. To lahko pomaga odločevalcem v oskrbovalnih verigah uspešno prilagoditi strategijo oskrbovalnih verig in tako ustrezno optimizirati delovanje in management oskrbovalnih verig v prihodnje (Shri in Anil, 2016; Wu in drugi, 2017). Za prihodnje oskrbovalne verige je zelo pomembno, da nenehno usklajujejo svoje strategije glede na spremembe na trgu, medtem ko to ni mogoče brez namigov o prihodnjih gibanjih trgov. Management mora biti tako pozoren na gibanja trgov, saj jim le-ti omogočajo ustrezno pripravo oskrbovalnih verig na prihodnje spremembe. Ta podcilj neposredno prispeva h glavnemu cilju te naloge – razviti okvir – saj je nesmiselno razpravljati o predlogih za izboljšanje managementa oskrbovalnih verig brez predvidevanja prihodnosti – tj. o uporabi strategij managementa oskrbovalne verige v različnih scenarijih.

d) Preveriti uporabnost strategij vitkosti, agilnosti in leagilnosti v oskrbovalnih verigah v predvidenih scenarijih

Zadnji podcilj te naloge je preveriti uporabnost strategij vitkosti, agilnosti in leagilnosti za posebej predvidene scenarije velikih sprememb na svetovnih trgih, z namenom določiti primernost teh strategij za management oskrbovalnih verig v različnih okoliščinah. To bo neposredno prispevalo h glavnemu cilju te naloge, saj razen, če proučimo te strategije v različnih scenarijih, ne moremo potrditi, ali so primerne za prihodnja gibanja trgov ali ne ter ali posledično podpirajo management oskrbovalne verige v prihodnosti.

Hipoteze naloge

V skladu z namenom in cilji te naloge smo razvili naslednje hipoteze.

Hipoteza 1: Razviti okvir za management prihodnjih oskrbovalnih verig bo omogočal izboljšanje managementa oskrbovalnih verig glede na tri predvidene scenarije.

Trije napovedani scenariji svetovnih trgov neposredno vplivajo na oskrbovalne verige in njihovo delovanje in management ter zahtevajo, da se oskrbovalne verige v prihodnosti spopadejo s trendi, zlasti s tistimi, ki so povezani s spremembami gospodarskih in političnih dejavnikov. Ta odnos je v tej raziskavi jasno opredeljen v treh prihodnjih scenarijih. Prihodnje spremembe na svetovnih trgih bodo tako vplivale na prihodnje trende oskrbovalne verige.

Predlagani okvir za management oskrbovalnih verig bo pomagal obvladati prihodnje spremembe in izzive v oskrbovalnih verigah. Omogočil bo management za boljše shajanje s prihodnjimi gospodarskimi in političnimi izzivi oskrbovalnih verig. Med drugim bo poudaril uporabo strategij vitkosti, agilnosti in leagilnosti za boljše delovanje oskrbovalnih verig v okviru različnih scenarijev ter se soočil s pričakovanimi spremembami na svetovnih trgih. Izboljšana uporaba teh strategij se bo odražala v poenostavitvi pridobivanja svetovnih virov, da bo lažji, hitrejši in bolj zanesljiv. Izboljšan postopek bo oskrbovalnim verigam omogočil, da bodo dosegle pomembno izboljšanje delovanja v skupnem sodelovanju, ki je bistvena sestavina uspeha za obvladovanje pričakovanih sprememb na trgu.

Ta hipoteza je povezana z glavnim ciljem te naloge – razviti nov okvir za management oskrbovalnih verig in zagotoviti, da lahko ta okvir doda vrednost managementu oskrbovalne verige v prihodnosti. Prva hipoteza je prav tako povezana s tretjim ciljem te naloge, ki si prizadeva preveriti uporabnost strategij vitkosti, agilnosti in leagilnosti glede na prihodnje scenarije ter zagotoviti, izboljšan management oskrbovalnih verig in posledično delovanja oskrbovalnih verig, z uporabo predlaganega okvira. Glede na prvo hipotezo, bomo v naslednjih dveh hipotezah obravnavali dva ključna gradnika predlaganega okvira, tj. izbranih ključnih strategij vitkosti, agilnosti in leagilnosti ter treh opredeljenih prihodnjih scenarijev.

Hipoteza 2: Za management oskrbovalnih verig je potreben okvir, ki bo podpiral izboljševanje oskrbovalnih verig v treh izbranih scenarijih.

Vitkost, agilnost in leagilnost so strategije za oskrbovalne verige, ki lahko na podlagi iskanja svetovnih virov z novim okvirom, izboljšajo sodelovanje znotraj oskrbovalne verige in sledijo predvidenim prihodnjim scenarijem svetovnih trgov. Optimalna uporaba razvitega okvira zahteva izbor ustreznih strategij za prihodnje delovanje in management oskrbovalnih verig.

Ta izbira je torej zelo pomembna odločitev v oskrbovalnih verigah (Cebi in Bayraktar 2003; Gligor in drugi, 2015; Wu in drugi, 2017).

Ta hipoteza neposredno prispeva h glavnemu cilju te naloge – k »razvoju novega okvira« - in je prav tako povezana s prvim podciljem, tako da raziskuje uporabo strategij vitkosti, agilnosti in leagilnosti v okviru oskrbovalnih verig.

Dokler se globalno poslovno okolje neprestano spreminja, je zmeraj potrebno načrtovati tudi za prihodnost. Da bi to lahko storili, moramo ustvariti možne prihodnje scenarije, ki lahko vplivajo na oskrbovalno verigo in jo usmerjajo proti določenim trendom. Medtem ko trenutne poznane strategije oskrbovalnih verig niso optimalne za delovanje in management oskrbovalnih verig v prihodnjih scenarijih, bo za njihovo podporo potreben nov okvir. To nas vodi do naslednje hipoteze.

Hipoteza 3: Nenehne spremembe in razvoj poslovnega okolja od oskrbovalnih verig zahtevajo uporabo ustreznih poslovnih strategij za management le-teh.

Razvoj poslovnega okolja bo pomembno vplival na uporabo opredeljenih strategij za management oskrbovalnih verig. Globalni trgi se bodo v prihodnosti zelo spreminjali in te spremembe bodo odločilno vplivale na trenutno poznane strategije oskrbovalnih verig, še posebno pa na njihovo uporabo ter rezultate njihove uporabe. Uporaba ključnih strategij oskrbovalnih verig se bo spremenila, dokler se bo spreminjalo tudi zunanje poslovno okolje.

Hipoteza 3 je povezana z glavnim ciljem raziskave, tako da predstavi potrebe novega okvira za management oskrbovalnih verig za podporo strategijam – vitkosti, agilnosti in leagilnosti – z namenom dohajati pričakovane spremembe na globalnih trgih.

Hipoteza 3 je prav tako povezana z drugim ciljem te naloge, torej s predvidevanjem prihodnjih gibanj trgov in razvojem različnih prihodnjih scenarijev.

Znanstveni prispevek

V skladu z namenom raziskave, so spodaj predstavljeni najpomembnejši znanstveni prispevki naše raziskave k literaturi.

Prvič, s to nalogo bomo razvili nov okvir za management oskrbovalnih verig, ki bo povzel uporabo ključnih izbranih strategij – namreč vitkosti, agilnosti in leagilnosti – za primere

različnih prihodnjih opredeljenih scenarijev v katerih se bo lahko odvijal management oskrbovalnih verig. Ta okvir lahko obravnavanim strategijam vitkosti, agilnosti in leagilnosti doda novo razsežnost v prihodnjih spremenjenih okoliščinah, kjer bo potekal management oskrbovalnih verig. Glede na to, da je prilagodljivost ključni dejavnik uspeha, in da bi dosegli visoko stopnjo prilagodljivosti, mora biti oskrbovalna veriga vitka brez veliko »balasta« in prav tako prožna, da se lahko hitro in enostavno prilagodi spremenjenim okoliščinam. Poleg tega mora oskrbovalna veriga upoštevati možnost učinkovite izrabe zunanjih izvajalcev oz. partnerjev v oskrbovalni verigi (Adnan in drugi, 2013; Gligor in drugi, 2015; Wu in drugi, 2017).

Drugič, naloga z razvitim okvirom za management prihodnjih globalnih oskrbovalnih verig prispeva k sedanjemu znanju, saj upošteva različne možne okoliščine v prihodnosti, ki lahko vodijo do velikih sprememb svetovnega poslovnega okolja in posledično igrajo pomembno vlogo pri preoblikovanju osrednjega koncepta oskrbovalnih verig v prihodnosti in njihovega managementa.

Tretjič, naloga prispeva k obstoječi literaturi s povzemanjem uporabe izbranih treh strategij – vitkosti, agilnosti in leagilnosti – v okviru trenutnih in prihodnjih oskrbovalnih verig skozi objektivne treh različnih scenarijev.

Naloga med drugimi pomembnimi prispevki prav tako izboljšuje uporabo utemeljene teorije v okviru raziskovanja managementa oskrbovalnih verig in na splošno prispeva k ustvarjanju teoretičnih temeljev, ki se lahko uporabijo za prihodnje raziskave na tem raziskovalnem področju.

Ovrednotenje razvitega okvira je še en pomemben prispevek, saj raziskovalci, ki uporabljajo utemeljeno teorijo za razvoj novega modela, v okviru raziskav o managementu oskrbovalnih verig ne zagotavljajo celovite potrditve in možne spremembe predlaganega modela, glede na povratne informacije s strani potencialnih uporabnikov (Manuj in Sahin, 2011; Speier in drugi, 2011). Ta naloga zagotavlja ovrednotenje uporabnosti predlaganega okvira s strani strokovnjakov, ki delujejo znotraj oskrbovalne verige in tako presega že razširjeno raziskovalno prakso.

Skozi prizmo postavljenih hipotez so v nalogi predstavljeni naslednji znanstveni prispevki.

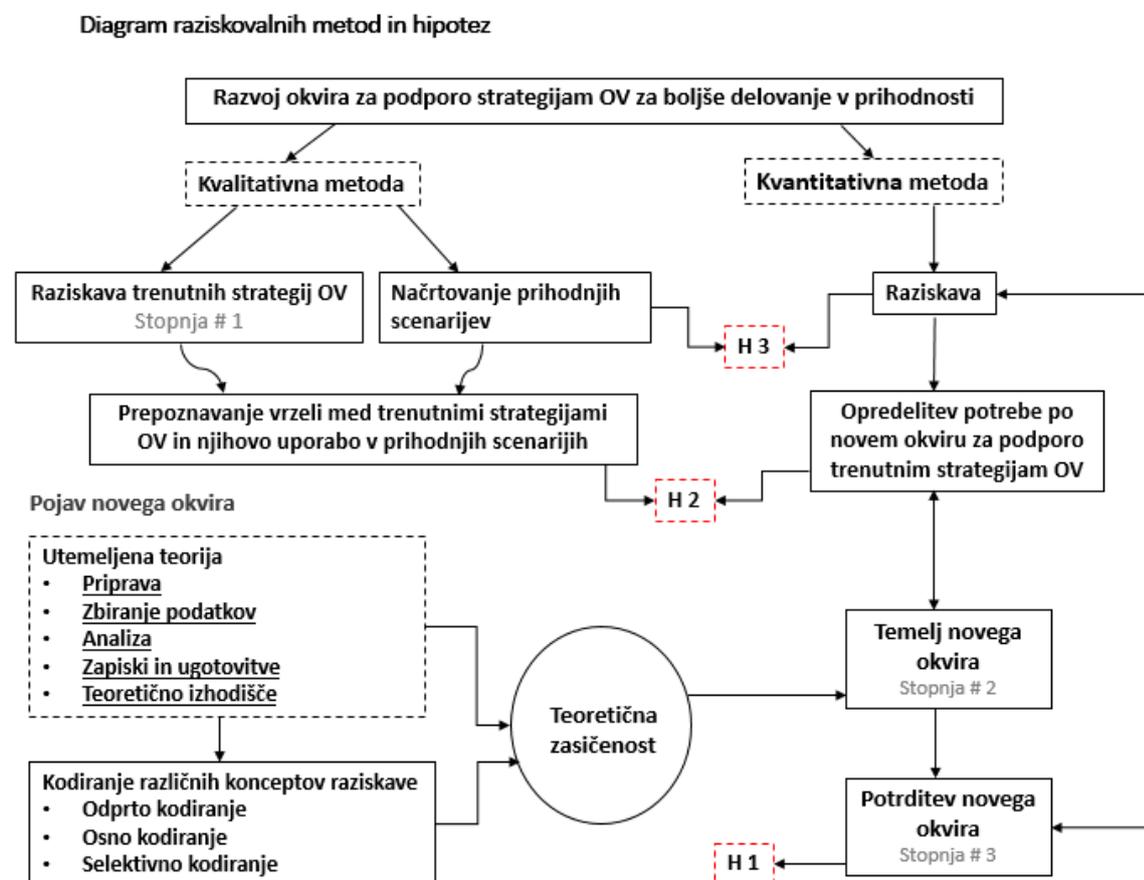
Prva hipoteza naj bi prispevala k obsegu znanja z razvojem in uporabo okvira za management oskrbovalnih verig, tako da bi pomagala oskrbovalnim verigam izboljšati management in

delovanje v prihodnosti, kljub soočanju z različnimi okoliščinami, ki jih določajo izbrani scenariji. Prispevek druge hipoteze se z uporabo predlaganega okvira osredotoča na izboljšanje uporabe trenutnih in prihodnjih strategij oskrbovalnih verig. Tretja hipoteza prispeva k razvoju poslovnega okolja z najboljšo možno uporabo strategij oskrbovalne verige in uporabo prednosti vsake strategije za popolno podporo managementa oskrbovalnih verig v različnih prihodnjih okoliščinah.

Uporabljene metode raziskovanja

V naslednjem diagramu predstavljamo raziskovalne metode, ki so razvrščene v kvalitativne in kvantitativne pristope ter povezane z posamezno hipotezo.

Diagram 1: Raziskovalni pristop



Vir: Diagram ustvaril avtor naloge; (OV – oskrbovalna veriga).

Omenjene stopnje raziskave so podrobneje pojasnjene v nadaljevanju.

Raziskovalna faza 1 – pregled literature

V tej nalogi smo zaradi njene opisne narave uporabili kvalitativno raziskovalno metodologijo, saj pomaga razumeti trenutne strategije oskrbovalnih verig, da bi bolje videli, kako se lahko prilagodijo prihodnjemu poslovnemu okolju. Narava raziskave je igrala pomembno vlogo pri izbiri tega tipa raziskovalne metodologije. Kot sta pojasnila Denzin in Lincoln (1984), bi narava raziskovalnega problema morala voditi izbiro raziskovalne strategije.

Kvalitativna naloga lahko pomaga avtorju opisati in pojasniti različne strategije oskrbovalnih verig, jih oceniti in prav tako pojasniti njihove variacije. Avtor je zaradi razumevanja trenutnih strategij oskrbovalnih verig – vitkosti, agilnosti in leagilnosti – opravil poglobljen pregled literature. Poleg tega je, da bi lahko ustrezno predvidel prihodnji položaj oskrbovalnih verig, analiziral različne dejavnike, ki vplivajo na globalno poslovno okolje 21. stoletja. V tem primeru je kvalitativna metoda zelo primerna, saj nam pomaga predstaviti, kako bodo prihodnji scenariji vplivali na strategije oskrbovalnih verig in management oskrbovalnih verig ter kakšno vizijo imajo strokovnjaki oskrbovalnih verig v zvezi s tem.

Načrtovanje scenarijev

Glede na to, da je ta naloga usmerjena v prihodnost, je načrtovanje scenarijev zanjo ravno pravi pristop. Namen je napovedati, kako bo izgledala prihodnost. Scenariji se nanašajo na prihodnje zgodbe, kot je menil Schwartz (1991) s svojo »The Art of the Long View«¹. Načrtovanje scenarijev nam morda ne bo dalo natančnega stanja prihodnosti, gre pa za sistematično metodologijo razmišljanja in organiziranja zamisli o prihodnosti, ki avtorju nudi prožnost ter prilagodljivost za ustvarjalno delo na področju različnih predvidevanj okoliščin.

Načrtovanje scenarijev je metoda, ko o prihodnosti razmišljamo dolgoročno (Schwartz, 1991), zato smo uporabili to metodo »načrtovanja scenarijev« za lažje premagovanje negotovosti prihodnosti in za stalno pripravljenost z ustreznimi strategijami oskrbovalnih verig za delovanje v različnih scenarijih.

Avtor je ustvaril tri izbrane scenarije za prihodnje dogodke, ki bi lahko vplivali na oskrbovalne verige v prihodnosti, in sicer:

- Prvi scenarij: pomanjkanje energije in vrhunec cen nafte.

¹ »Umetnost dolgoročnega pogleda« (naslov njegove knjige, ki še ni prevedena v SLO), pripomba prevajalke.

- Drugi scenarij: nov mednarodni denarni sistem.
- Tretji scenarij: vojne.

Raziskovalna faza 2 – razvoj okvira

Glavni rezultat druge raziskovalne faze naše raziskave je razviti okvir managementa oskrbovalne verige s pomočjo uporabe pristopa utemeljene teorije. Najprej bomo predstavili nekaj izhodišč za razumevanje osnov utemeljene teorije, nato pa bomo opredelili, kako se utemeljena teorija lahko uporablja v okviru raziskovanja oskrbovalnih verig. Nazadnje bomo predstavili razloge za uporabo utemeljene teorije in razvoj novega okvira.

Raziskovalna faza 3 – potrditev okvira

V obeh fazah empiričnega dela raziskave je sodelovalo istih 150 udeležencev. V drugi stopnji smo zbrali mnenja s strani strokovnjakov v oskrbovalnih verigah glede vitkosti, agilnosti in leagilnosti ter glede njihove uporabe in prihodnjih izzivov. V tretji stopnji raziskave smo razviti okvir predstavili istim 150 strokovnjakom iz oskrbovalnih verig, z namenom, da ocenijo njegovo uporabnost in dodano vrednost. To predstavlja ključno točko za zagotovitev veljavnosti okvira, saj so morali vsi tisti udeleženci, ki so v drugi stopnji raziskave pokazali potrebo po novem okviru za podporo strategijam oskrbovalnih verig, potrditi, da lahko razviti okvir iz tretje stopnje zadovolji njihove potrebe in dobro podpira uporabo strategije oskrbovalnih verig v različnih predvidenih prihodnjih okoliščinah delovanja. Raziskava brez te točke ne bi bila veljavna oz. bi bila njena vrednost zmanjšana, če bi skupina strokovnjakov v drugi stopnji problem izpostavila, druga skupina udeležencev pa bi o predlaganem okviru te raziskave podala svoje mnenje.

Rezultati

Okvir za management prihodnjih oskrbovalnih verig, ki temelji na globalnem sodelovanju

Strokovnjaki oskrbovalnih verig so podali mnogo predlogov glede tega, kako podpreti uporabo strategij oskrbovalnih verig v prihodnosti za lažje obvladovanje prihodnjih izzivov. Po ureditvi odzivov pridobljenih pri intervjujih, je postalo očitno, da si strokovnjaki v okviru oskrbovalnih verig najbolj želijo izboljšati proces pridobivanja globalnih virov, saj verjamejo, da bi izboljšava tega procesa igrala odločilno vlogo pri podpori uporabe strategij oskrbovalne verige za soočanje s prihodnjimi izzivi.

Poleg tega, kar smo izvedeli od strokovnjakov oskrbovalne verige, ki so poudarili pomembnost razvoja novega okvira strategij oskrbovalnih verig, smo prav tako analizirali vse podatke iz raziskave s pomočjo uporabe metode utemeljene teorije, da bi razvili novi okvir. Ugotovili smo, da je sodelovanje v tej raziskavi selektivna koda, na kateri bi morali graditi naš okvir.

Razviti scenariji v tej raziskavi predstavljajo izredno visoko stopnjo negotovosti in samo sodelovanje lahko pomaga obvladati vnaprej predvidene okoliščine (Hoyt in Huq, 2000).

Omejeno sodelovanje oskrbovalnih verig ne bo omogočilo preživetja podjetja v težkih razmerah, vendar mora obstajati nekakšno globalno sodelovanje v velikem obsegu. To je osrednji koncept predlaganega okvira te raziskave. Predlagani okvir za management oskrbovalnih verig bo v raznolikih prihodnjih okoliščinah dodal dodatno vrednost glede uporabe strategij oskrbovalne verige in izboljšane managementa in delovanja oskrbovalnih verig. Razvit okvir bo tako zapolnil prepoznano vrzel z ureditvijo vseh svetovnih virov na sistematičen način in pod pravnim okriljem.

Zgoraj omenjena spoznanja nam sedaj dovoljujejo razviti okvir za management oskrbovalnih verig v prihodnosti z uporabo strategij vitkosti, agilnosti in leagilnosti. Kot je bilo pojasnjeno v prejšnjih razdelkih, smo sedaj izpostavili osrednjo idejo predlaganega okvira, ki ga moramo ustvariti na podlagi analize, narejene za kodiranje intervjujev. Potrebujemo okvir za izboljšanje globalnega procesa sodelovanja, ki bo igral ključno vlogo pri izboljšanju uporabe strategij oskrbovalnih verig v prihodnosti, kot so pri intervjujih jasno pokazali strokovnjaki oskrbovalnih verig. V nadaljevanju predstavljamo osrednjo idejo našega predlaganega okvira.

Predlagani okvir obravnava izboljšanje globalnega sodelovanja v mednarodnem poslovanju, ki je ključ za boljše delovanje oskrbovalnih verig v prihodnosti, zlasti v primeru treh opredeljenih scenarijev.

Naš predlagani okvir sestavljajo temeljni elementi spreminjanja tradicionalne prakse sodelovanja oskrbovalne verige z ustanovitvijo nove mednarodne organizacije za management globalnih virov. Z njim skušamo povezati strategije oskrbovalne verige z razmerami na trgih in spodbuditi sodelovanje na mednarodnem nivoju ter poenotiti kanal za globalni management tega sodelovanja.

Okvir, ki ga predlagamo, je »mednarodna organizacija za management virov« - t.i. IRMO – ki bi si prizadevala izboljšati globalno sodelovanje med oskrbovalnimi verigami, kar so kot

osrednji cilj za izboljšanje prihodnje uporabe strategij oskrbovalnih verig v intervjujih jasno opredelili strokovnjaki. Tako razvoj okvirja temelji tudi na skrbno preučenih spoznanjih iz literature, podprtih z vidiki strokovnjakov oskrbovalne verige v intervjujih. Posledično se globalno sodelovanje opredeljuje kot selektivna koda v prakticiranju utemeljene teorije, ki smo ji sledili. To daje organizaciji IRMO potrebno zasnovo za prileganje predlaganemu okviru v tej doktorski disertaciji.

Potreba po novi svetovni ureditvi

Trenutno znana orodja za sodelovanje v oskrbovalnih verigah se običajno uporabljajo v različnih oblikah, kot so:

- Urejeni odnosi med organizacijo in nekaterimi njenimi partnerji (Ralston, 2014);
- Odnosi med dvema oskrbovalnima verigama - ne med posameznimi organizacijami;
- Nekatera poslovna združenja za vsako panogo, ki se jim lahko podjetja priključujejo za pridobivanje boljših orodij za sodelovanje. Eno takšnih združenj je npr. Elemica za kemično industrijo, ki omogoča sodelujočim podjetjem integracijo njihovih različnih ERP sistemov (Rashad in Gumzej, 2014);
- Gospodarske zbornice v vsaki državi predstavljajo neko vrsto sodelovanja, saj se lahko podjetja v njihovem okrilju srečujejo in sodelujejo;
- Prav tako lahko razumemo sindikate kot neke vrste obliko sodelovanja v podjetjih.

Predlagati želimo novo vrsto sodelovanja, za katero menimo, da bi bila najbolj učinkovita. S tem predlogom merimo na ustanovitev enotne organizacije v okviru IRMO.

Masson, in drugi (2007) verjamejo, da je v veliki negotovosti poslovnega okolja za oskrbovalne verige ključnega pomena, da ohranijo širok nabor dobaviteljev, zato da si zagotovijo stalno dostopnost materialov. Predlagana organizacija IRMO bi tukaj lahko popolno odigrala svojo vlogo tako, da bi oskrbovalnim verigam z najvišjo mero zanesljivosti omogočila hitro izbiranje svojih poslovnih partnerjev. Posledično bi lahko pravočasno ukrepala, da bi se odzvala na spremembe na trgu (Prater, in drugi, 2001).

Če si katera oskrbovalna veriga prizadeva izboljšati odziv na nepredvidene dogodke na trgih in spremembe zahtev kupcev, mora razvijati odnose sodelovanja z dobavitelji (Bruce in Daly, 2011). Kot je že bilo pojasnjeno prej, se sodelovanje šteje kot selektivna koda v raziskavi. Pomemben izziv pri sodelovanju je povezan z izbiro ustreznih poslovnih partnerjev (Barratt,

2004; Sabath in Fontanella, 2002). IRMO je namenjena temu, da oskrbovalnim verigam to nalogo olajša.

Mnogi avtorji so prepričani, da je vzpostavljanje sodelovalnih in zaupanja vrednih poslovnih odnosov ključno za premagovanje negotovosti (Monczka in drugi, 1998; Peters in Hogensen, 1999; Chandra in Kumar, 2001). Zato je za to vlogo potrebna IRMO, da omogoči oskrbovalnim verigam izboljšano uporabo strategij ter tako premagovanje prihodnjih izzivov, ki jih je povzročila skrajna stopnja negotovosti.

Namen in cilji organizacije IRMO

Glavni namen ustanovitve IRMO je delovati kot banka podatkov za vso svetovno poslovanje, ki podjetjem s pomočjo zanesljivega kanala omogoča hitro dosegljivost med seboj. To bo igralo pomembno vlogo pri uporabi strategij vitkosti, agilnosti in leagilnosti v oskrbovalnih verigah za boljše delovanje v prihodnosti ter izboljšanje sodelovanja med udeleženci oskrbovalne verige, ki bi ga lahko dosegla IRMO. Kot že prej omenjeno, je izboljšanje globalnega sodelovanja med oskrbovalnimi verigami selektivna koda v tej raziskavi, ki predstavlja ključ do izboljšanja uporabe strategij oskrbovalne verige. Na to se sedaj osredotočamo, da bi v skladu s tem zagotovili izboljšanje globalnega sodelovanja oskrbovalnih verig, medtem ko razvijamo IRMO.

Vloga te organizacije je spremeniti tradicionalno sodelovanje, ki ga poznamo sedaj, reformirati odnose med kupci in dobavitelji ter vključevati vse partnerje v enotno globalno omrežje, kjer vsi člani komunicirajo učinkovito in odzivno.

Z drugimi besedami, ta predlog bo prispeval k izboljšanju učinkovitosti strategije vitkosti, hkrati pa bo z globalnim sodelovanjem vseh poslovnih partnerjev pomagal izboljšati odzivnost oskrbovalnih verig, kar bo vsekakor igralo zelo pomembno vlogo pri krepitvi strategije agilnosti v oskrbovalnih verigah. Strategija leagilnosti bi lahko s pomočjo tega predloga prav tako delovala bolje, a vseeno bi globalno sodelovanje, ki bi ga lahko dosegla IRMO, omogočilo oskrbovalnim verigam doseči potrebno ravnovesje med vitkostjo in agilnostjo za uspešno uresničitev strategije leagilnosti.

V času hitrih sprememb na trgih ni možno preživeti brez zaveznitva z drugimi partnerji. S tem se lahko tveganja spremenijo v priložnosti in izboljšajo se lahko konkurenčne prednosti oskrbovalne verige (Devor in drugi, 1997). IRMO bi si prizadevala pomagati oskrbovalnim

verigam skleniti takšno zavezništvo z zanesljivimi partnerji. V tem trenutku ni organizacije, ki bi igrala takšno vlogo, a podjetja si vedno in na različne načine prizadevajo iskati prekomorske partnerje, kot so:

- Spletno iskanje podjetij, ki prodajajo ali kupujejo njihove proizvode;
- Priporočilo drugih poslovnih partnerjev za sodelovanje z določenim podjetjem glede na pretekle izkušnje;
- Poslovna potovanja na druge lokacije zaradi obiskovanja podjetij, ki iščejo partnerstvo;
- Udeležba v združenjih, ki združujejo podjetja enake panoge.

Trenutno poskušajo nekatera podjetja delovati kot banke podatkov, ki med seboj povezujejo podjetja, kot so npr. Ali-Baba, Amazon ali E-bay. Žal pa nobeno od njih ne združuje vseh informacij, ki so potrebne po vsem svetu, saj bodisi delujejo na lokalni in regionalni ravni bodisi na svetovni ravni, a samo z nekaterimi informacijami. Še posebej lahko takšno vrsto združevanja podatkov najdemo na spletnih straneh za elektronsko oddajo naročil.

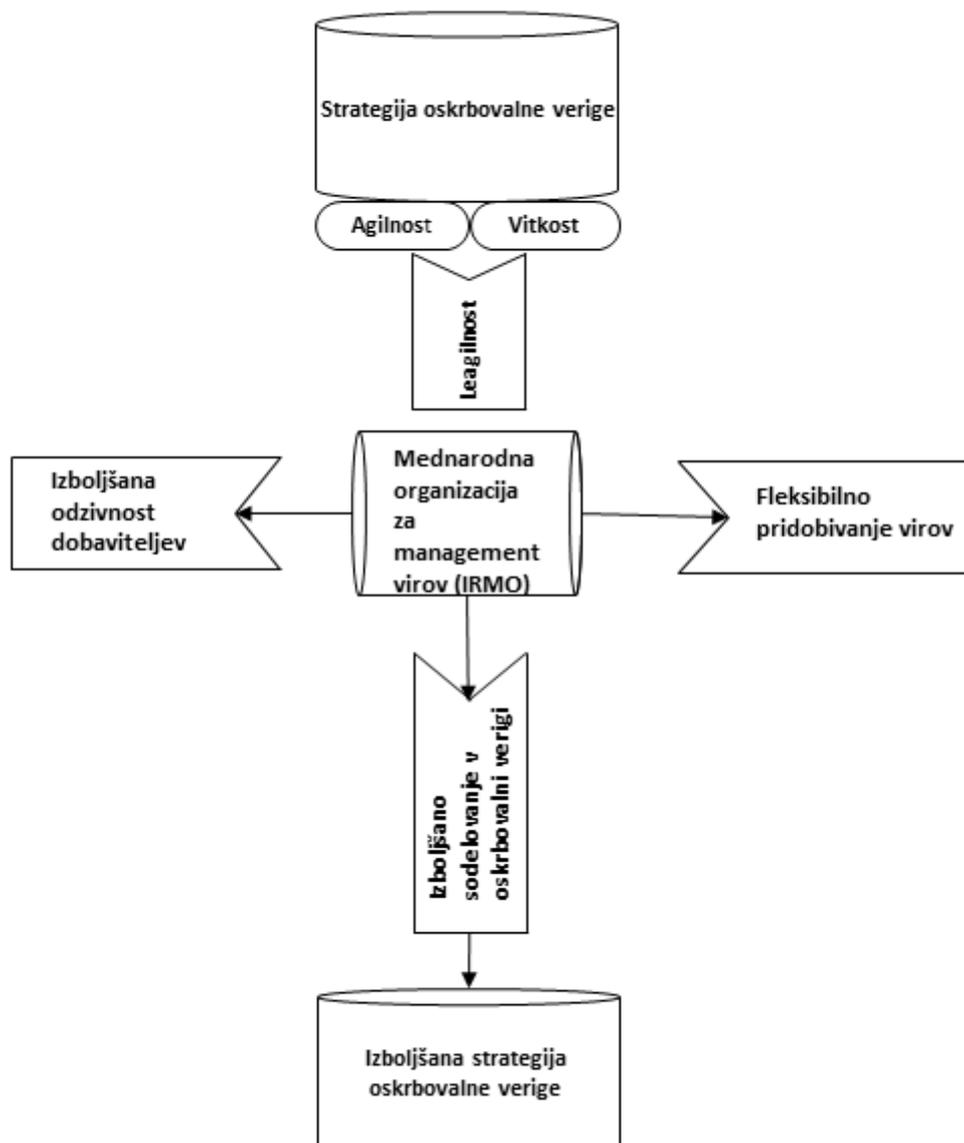
Te številne možnosti koriščenja zunanjih izvajalcev ter pridobivanja podatkov o partnerjih in proizvodih za oskrbovalne verige niso učinkovite, saj so razpoložljivi podatki zmeraj omejeni v primerjavi s celotnimi svetovnimi poslovnimi podatki. Nobeno od združenj ali spletnih strani za elektronsko naročanje nima vseh podatkov o podjetjih, proizvodih ali cenah po vsem svetu, zato podjetja običajno s pomočjo različnih kanalov iščejo, kar potrebujejo in to je zelo dolgotrajen postopek, ki zahteva veliko truda.

V nasprotju s tem pa ima IRMO pomembno prednost – omogočiti oskrbovalnim verigam, da se lahko brez težav zanesejo na številne vire. Vseeno je zelo tvegano zanašati se samo na en vir ali na omejene vire. Nekateri oskrbovalni verige se zanašajo na možnost omejenih virov kot posledico težav pri postopku sestavljanja zanesljivih partnerstev. Toda, če jim ta postopek olajšamo, se bodo oskrbovalne verige lahko zanesle na možnosti številnih zanesljivih virov, kar bi lahko igralo pomembno vlogo pri varovanju oskrbovalne verige pred katerikoli nenadnim vplivom v prihodnosti.

Cilj organizacije IRMO (glej Diagram 2) je izboljšati uporabo strategij oskrbovalnih verig s prihrankom njihovega časa in vloženega truda ter imeti vse informacije v eni sami banki podatkov. Te informacije so zanesljive in zaupanja vredne ter pridobljene le pri pravnih družbah po vsem svetu. Zaupanje predstavlja zelo pomembno točko partnerstva in ga

praktično gledano ni lahko doseči (McCutcheon in Stewart, 2000), toda s pomočjo IRMO bo to enostavneje.

Diagram 2: IRMO in uporaba strategij oskrbovalnih verig



Vir: Diagram ustvaril avtor naloge.

Edinstven značaj organizacije IRMO

Vse druge opisane organizacije in združenja so drugačne od predlagane organizacije IRMO. Svetovna trgovinska organizacija ali Mednarodna trgovinska zbornica na primer, ne igrata enake vloge, kot je bila opisana zgoraj, saj imata druge funkcije in cilje. IRMO se prav tako razlikuje od spletnih strani za elektronsko oddajo naročil z različnih področij, namreč:

- IRMO je pravni organ pod okriljem Združenih narodov, medtem ko so spletne strani za elektronsko oddajo naročil v zasebnem upravljanju;
- IRMO je neprofitna organizacija financirana s strani Združenih narodov. Spletne strani za elektronsko oddajo naročil večinoma delujejo za dobiček, so odvisne od naročil, odstotkov od vsake ponudbe in oglaševalskih priložnosti spletnega mesta;
- IRMO ni kraj za sklepanje poslov, temveč le banka podatkov, v nasprotju s spletnimi stranmi za nakup in prodajo proizvodov, kot so npr. E-bay, Amazon ali Alibaba;
- IRMO deluje globalno, da ustvarja podatke za podjetja po vsem svetu, saj njena baza podatkov temelji na vključevanju vseh informacij, ki jih zagotavljajo vlade o vseh družbah, ki zakonito poslujejo v vsaki državi. Na spletnih straneh za elektronsko oddajo naročil se morajo podjetja odločiti, ali želijo naročnino, zaradi česar so te strani zmeraj omejene z vidika udeležencev;
- O odgovornosti podjetij, ki sodelujejo na spletnih straneh za elektronsko oddajo naročil, ni nobenega jamstva. Registrirajo se lahko tudi lažna podjetja in ljudi preslepijo. IRMO je organizacija Združenih narodov. Zato so vanjo uvrščena samo podjetja, ki v vseh državah poslujejo zakonito. Tako ni nobenega tveganja, da bi poslovali z lažnimi ali zavajajočimi podjetji, saj so vsi udeleženci resnična podjetja, ki delujejo zakonito.

IRMO bi morala uporabiti razvoj informacijske tehnologije za ustvarjanje svoje baze podatkov in urediti ogromno količino podatkov, prejetih iz vseh koncev sveta. To bi uporabnikom v nekaj minutah v sistemu omogočilo inovativne funkcije med iskanjem, natančnejšim določanjem ter povzemanjem podatkov, ki jih potrebujejo.

Naloge organizacije IRMO

V zvezi z opredeljenimi nalogami IRMO povzemamo izboljšanje uporabe strategij oskrbovalne verige z omogočanjem sodelovanja, pravne funkcije ter delovanja globalne banke podatkov. Te naloge so podrobneje opisane v nadaljevanju.

Izboljšanje uporabe strategij oskrbovalne verige z omogočanjem sodelovanja

Organizacija IRMO lahko igra zelo pomembno vlogo pri izboljšanju uporabe strategij vitkosti, agilnosti in leagilnosti v oskrbovalnih verigah. To je mogoče storiti z omogočanjem globalnega sodelovanja med vsemi oskrbovalnimi verigami po vsem svetu. Oblikovana bi morala biti tako,

da bi omogočala sodelovanje na svetovni ravni z beleženjem vseh podatkov podjetij v vseh panogah po svetu, in da bi podjetjem omogočala, da se le-ta poznajo v smislu proizvodov, storitev in cen.

Pravna funkcija

S spremembo informacijske tehnologije se je spremenila praksa pridobivanja virov v prekomorskih državah, s tem pa se je povečalo tudi tveganje za trgovinske goljufije, še posebej gre za podjetja, ki delujejo nezakonito, ali pa gre za goljufije na področju kvalitete proizvodov in storitev ter finančnih transakcij, ki se opravljajo po vsem svetu.

IRMO bo zbirala vse podatke le za zakonito delujoča podjetja, nezakonito delujoča podjetja v tej organizaciji ne bodo mogla sodelovati. Definicija zakonitega poslovanja je delovanje v skladu z lokalnim pravom države, kjer podjetje deluje. S tem je zagotovljena odgovornost trgovanja med strankami in onemogočena konkurenca med nezakonitim ter zakonitim poslovanjem.

Organizacija IRMO bi morala biti povezana z Združenimi narodi in delovati kot njihova specializirana agencija, saj je večina držav po svetu tudi članic Združenih narodov. Naloga organizacije IRMO je omogočiti podjetjem pridobivanje zanesljivih podatkov drug o drugem ter prihraniti čas, ki so ga vse oskrbovalne verige zmeraj porabile za iskanje ustreznih rešitev za potrebe po zunanjih izvajalcih oz. partnerjih. Vse informacije bodo morebitnim poslovnim partnerjem jasno predstavljene, da bodo lahko podjetja med seboj odlično komunicirala in se sporazumevala.

Globalna banka podatkov

Organizacijo IRMO bo delovala kot celovita banka podatkov za vsa podjetja na svetu. Predstavljala bo uradni vir informacij, na katere se lahko oskrbovalne verige pri svojem delovanju zanesle. To ne bo zasebno podjetje, temveč neprofitna organizacija, ki bo delovala pod okriljem Združenih narodov. Združeni narodi imajo trenutno veliko specializiranih agencij, kot sta Svetovna zdravstvena organizacija in Mednarodna organizacija dela. IRMO bi morala delovati kot specializirana agencija Združenih narodov, ki se prav tako ukvarja z izboljšanjem postopka globalnega pridobivanja virov, kar bo na koncu vsem državam doprineslo dodatno vrednost.

Predpogoji za ustanovitev organizacije IRMO

Glede na listino OZN (Združenih narodov), ki je temeljna pogodba OZN, je Ekonomsko-socialni svet OZN, ki deluje na podlagi členov 57 in 63, odgovoren za vključitev nove agencije v OZN. Kot je navedeno v členu 63 (OZN, 2020):

- Ekonomsko-socialni svet OZN lahko sklepa sporazume s katerokoli agencijo, ki je navedena v 57. členu, tako da določi pogoje, pod katerimi bo omenjena agencija vstopila v razmerje z OZN. Takšni sporazumi morajo biti odobreni s strani Generalne skupščine;
- Lahko koordinira dejavnosti specializiranih agencij s posvetovanjem s temi agencijami in priporočili le-tem, ter s priporočili Generalni skupščini in članom Združenih narodov.

Seznam vseh specializiranih agencij pod okriljem OZN, h kateremu predlagamo priključitev organizacije IRMO, je dosegljiv na spletni strani OZN na tej povezavi <https://www.un.org/en/sections/about-un/funds-programmes-specialized-agencies-and-others/index.html>.

Struktura organizacije IRMO

Avtor predlaga ustanovitev te organizacije pod okriljem Organizacije združenih narodov. Sedež bi se lahko nahajal v New York-u, ZDA, z regionalnimi uradi na vsaki celini, kot sledi:

- Evropa: Antwerpen – Belgija,
- Severna Amerika: Houston – ZDA,
- Južna Amerika: Rio de Janeiro – Brazilija,
- Afrika: Kaapstad – Južna Afrika,
- Azija: Šanghaj – Kitajska,
- Avstralija: Sydney.

Ta mesta smo predlagali, ker vsako od njih predstavlja središče mednarodnega poslovanja v svoji regiji, še posebej z vidika dejavnosti oskrbovalnih verig.

Prav tako bo v vsaki državi po svetu pisarna za zbiranje vseh potrebnih informacij. Ta državna pisarna bi se morala povezati z lokalnimi gospodarskimi zbornicami za stalno pridobivanje novih informacij. Gospodarske zbornice so bile predlagane, ker predstavljajo zanesljiv vir informacij v vsaki državi, saj so bile ustanovljene, da pod nadzorom vlad povezujejo vsa zakonito delujoča podjetja pod enim okriljem.

Ključni postopki v organizaciji IRMO

Glede na to, da je organizacija IRMO globalnega značaja, bi se proces oblikovanja moral najprej začeti pri posameznih državah članicah. Potrebno bi ga bilo izpopolniti in preveriti zanesljivost informacij pred nadaljevanjem na mednarodnem nivoju, kjer se nahajajo osrednji podatki vseh zakonito delujočih podjetij po svetu.

Namen teh procesov je omogočiti zbiranje podatkov in doseči največje možne koristi za vse člane organizacije IRMO za popolno uporabo teh podatkov. Ti procesi bodo neposredno doprinesli k doseganju potrebnega globalnega sodelovanja in interakcije med vsemi svetovnimi oskrbovalnimi verigami in njihovimi udeleženci. Uporaba strategij oskrbovalnih verig se bo neposredno izboljšala, ko bo to globalno sodelovanje optimizirano, kar so bo kazalo v izboljšanjem delovanju oskrbovalnih verig.

Financiranje organizacije IRMO

Ob pogledu na velikost organizacije IRMO, vključno z vsemi njenimi enotami po vsem svetu (tj. z njenimi pisarnami v vseh državah), ugotovimo, da bo za vzpostavitev in delovanje takšne organizacije potrebno veliko kapitala. Vendar, kot se spomnimo, bi ta organizacija morala pripadati OZN, ki bi prevzela glavnino finančne podpore IRMO.

Vse države članice OZN plačujejo svoj delež za članstvo in OZN uporabi ta kapital za financiranje vseh svojih dejavnosti. IRMO bo postala del teh aktivnosti, podobno kot druge organizacije, ki trenutno delujejo pod okriljem ZN.

IRMO bo neprofitna organizacija, ki bo delovala kot agencija Združenih narodov, zato bo financirana s strani OZN. Za storitve, ki jih bo zagotavljala svetovnemu gospodarstvu, ne pričakujemo dobička.

Potrditev razvitega okvira

V tem delu predstavljamo ugotovitve raziskave iz tretje faze raziskave, kjer smo izvedli drugi krog intervjujev med strokovnjaki oskrbovalne verige, ki so želeli oceniti predlagani okvir in povezano organizacijo IRMO. V vprašanjih še zlasti jasno obravnavamo predloge, da dobimo povratno informacijo strokovnjakov oskrbovalne verige o predlaganem okviru, ki je bil razvit posebej za podporo uporabi strategij oskrbovalne verige v okviru prihodnjih predvidenih pogojev delovanja.

Tako smo izvedli še drugo fazo intervjujev z enakimi udeleženci kot v prvi fazi. Tako smo jim okvir predstavili, da ga ocenijo. Ugotovili smo, da ima naš okvir veliko podporo, kar mu dejansko pritrjuje potrebo, pomembnost in vrednost.

Učinek okvira na uporabo strategij vitkosti, agilnosti in leagilnosti

V tem razdelku opisujemo učinek predlaganega okvira na uporabo strategij vitkosti, agilnosti in leagilnosti v okviru managementa oskrbovalne verige.

Na podlagi ugotovitev iz naše raziskave postane jasno, da so strategije vitkosti, agilnosti in leagilnosti ključne pri managementu oskrbovalne verige. Za podjetje je tukaj izziv razviti oz. uporabiti eno samo strategijo, ki se lahko uporabi globalno in podpira posamezne strategije v vsaki državi posebej (Yip, 2002). IRMO predstavlja ta globalni okvir za podporo uporabe strategij vitkosti, agilnosti in leagilnosti, ki ga lahko uporabijo posamezne organizacije po vsem svetu.

Zou in Cavusgil (2002) menita, da bi z razvojem globalne strategije prav tako morali standardizirati pravila in jih izvajati v vseh državah. Iz tega centraliziranega koncepta izpeljana ugotovitev je, da predlagani okvir deluje znotraj organizacije kot standardiziranje postopka globalnega pridobivanja virov, omogoča sodelovanje in uporablja enak pristop pri podjetjih kot podporno orodje za uporabo strategij vitkosti, agilnosti in leagilnosti.

Vonderembse in drugi (2006) menijo, da je glavni poudarek agilne oskrbovalne verige na vzpostavljanju ustreznega vmesnika med oskrbovalno verigo in trgi. Kot je bilo opisano v prej navedenih točkah, bo okvir prispeval k stroškovni učinkovitosti oskrbovalne verige, to pa je osrednja ideja strategije vitkosti.

Ključni dejavnik nadzora stroškov v prihodnosti je neposredno povezan s sposobnostjo oskrbovalne verige, kako najti cenejše vire surovin. Zato se vsa multinacionalna podjetja za koriščenje zunanjih virov danes osredotočajo na Kitajsko in Indijo, včasih pa tam ustanovijo tudi proizvodne obrate, da poleg poceni surovin koristijo tudi poceni delovno silo.

V literaturi so mnogi avtorji prepričani, da strategija vitkosti potrebuje posebno vrsto partnerstva z dobavitelji in prizadevno sodelovanje (Sako in drugi, 1995; Rich in Hines, 1997; Ikeda, 2000). Nov okvir si prizadeva udejanjiti to osrednjo zamisel.

Za strategijo agilnosti bo okvir odigral ključno vlogo pri pospešitvi dejavnosti oskrbovalnih verig. Najprej bo hitreje potekal postopek pridobivanja zunanjih izvajalcev oz. partnerjev, saj je to trenutno zelo zamudno opravilo. Vendar lahko, dokler oskrbovalna veriga ne najde virov oskrbe, jih oceni in izbere zanesljive partnerje, raven zalog v večini primerov postane kritična, dokler ne prispe nova pošiljka zalog. To posledično vpliva na sposobnost podjetja pravočasno dobavljati in kot rezultat zamujanja pri dobavah zmeraj obstaja možnost izgube dela trga zaradi konkurence. IRMO lahko oskrbovalnim verigam pomaga premagati to tveganje in jim hkrati zmeraj omogoči dobavljanje ob pravem času, saj skrajša čas potreben za pridobivanje zunanjih izvajalcev oz. partnerjev in posledično pospešuje tudi vse druge funkcije oskrbovalne verige. Če so surovine pravočasno na voljo, lahko tudi druge funkcije oskrbovalne verige, kot so proizvodnja, prodaja in distribucija, delujejo brez napak in zastojev.

Pri strategiji leagilnosti lahko okvir zelo učinkovito pomaga izpeljati metodo odloga. Kot opisano zgoraj, lahko oskrbovalne verige umaknejo stanje zalog, saj so vsi viri oskrbe vedno na voljo in na osnovi tega lahko vsako podjetje odloži prevzem do zadnjega trenutka, medtem ko povpraševanje nastopi kasneje v oskrbovalni verigi.

Možne koristi organizacije IRMO za oskrbovalne verige in svetovno gospodarstvo

Predlagani okvir in povezana organizacija IRMO obetata na splošno veliko koristi za svetovno gospodarstvo, še posebej pa za delovanje oskrbovalnih verig zaradi številnih možnosti zanesljivih virov, ki bodo izboljšale fleksibilnost med oskrbovalnimi verigami in posledično tudi dobavne roke (Ramasesh in drugi, 1991; Chopra in Sodhi, 2014). Spodaj so naštetje številne prednosti, ki jih omogočata novi okvir in povezana organizacija IRMO:

Prednosti za industrijo

- Odpravila bosta čas, potreben za iskanje poslovnih partnerjev, in zagotovila zelo širok nabor dobaviteljev in/ali kupcev v vsaki panogi, saj bo banka podatkov vsebovala vse potrebne informacije o podjetjih po svetu;
- Skrajšala bosta čas, potreben za vzpostavitev zaupanja med dvema partnerjema, saj bodo vsa registrirana podjetja v bazi podatkov morala biti zakonito delujoča podjetja. Tako tveganja zaradi nepoznanih partnerjev ne bo, saj bodo v bazi podatkov registrirana le zakonito delujoča in zanesljiva podjetja;

- Oskrbovalnim verigam bosta pomagala doseči najvišji možni nivo sodelovanja z izbranimi poslovnimi partnerji;
- Glede na dejstvo, da lahko vse oskrbovalne verige po svetu vzdržujejo nižji nivo zalog, ne bo tveganja, da bi dobavitelji ostali brez zalog surovin. V bazi podatkov bodo vedno na voljo alternativne možnosti za takojšnjo dobavo. To lahko sčasoma predstavlja alternativne kanale virov, oskrbovalne verige pa lahko znižajo nivo zalog in svoje varnostne zaloge;
- Oskrbovalne verige lahko delujejo učinkoviteje s čim večjo odpravo stroškov. Baza podatkov bo vsakemu podjetju v vseh panogah ponudila proizvode in cene, da bo odločevalec zmeraj lahko izbral najbolj gospodarno možnost;
- Svetovnemu gospodarstvu bosta pomagala doseči prakso pravične konkurence, vseeno pa si lahko vsa podjetja pravično konkurirajo tako, da predstavijo svoje proizvode in cene v bazi podatkov za vse kupce, ki se na koncu odločijo za njim najbolj ustrezno možnost;
- Oskrbovalnim verigam ne bo pomagalo znižati samo stroškov surovin, temveč tudi operativne stroške dejavnosti oskrbovalne verige. Odpravljen bo čas, ki je bil potreben za iskanje zanesljivih poslovnih partnerjev in iskanje zunanjih izvajalcev. Tako bodo lahko oskrbovalne verige najele omejeno število zaposlenih na področju dobave in naročil, zato bodo znižani tudi stroški za človeške vire;
- Nadzor cen blaga po svetu bo igral zelo pomembno vlogo. Organizacija IRMO tega sprva ne bo izvajala, saj ne bo imela dovolj vpliva, da bi podjetjem naročila, naj določijo cene svojim izdelkom, a to se bo uredilo samodejno kot rezultat hude konkurence med vsemi podjetji po svetu. Vsa podjetja bodo spoznala, da baza podatkov IRMO vsebuje vse njihove konkurente - ne samo regionalne, temveč tudi svetovne - in tako bodo tekmovala za pridobitev naročil. Kupci bodo zmeraj imeli zelo veliko izbiro, in kadar prodajalec ne bo ponudil konkurenčnih cen, bo kupec lahko surovine zlahka naročil pri drugem viru. Ta konkurenca bo vedno delovala kot (avtomatski nadzorni) agent za cene;
- Pomagata lahko doseči pomembno izboljšanje mednarodne trgovine. Veliko podjetij je desetletja pridobivalo svoje surovine pri uveljavljenih virih oskrbe, nezavedajoč se, da obstaja toliko drugih virov oskrbe, ki bi lahko bili za njih precej bolj ekonomični.

Nekatera uveljavljena podjetja prav tako ne želijo tvegati s preizkušanjem novih dobaviteljev, ali pa za iskanje le-teh nimajo časa. Kočno lahko ugotovijo, da novi dobavitelji niso tako zanesljivi, zato dajejo prednost uveljavljenim virom, s katerimi poslujejo že leta, da bi se izognili takšnemu tveganju. Z obstojem IRMO bo postopek iskanja virov precej lažji in podjetja bodo zmeraj lahko izbirala najboljše vire oskrbe, to pa bo svetovnemu gospodarstvu pomagalo z veliko rastjo mednarodne trgovine;

- Z izboljšanjem mednarodne trgovine bi lahko največ pridobila logistična panoga. Premikanje surovin na lokalni in mednarodni ravni bo pripomoglo k hitri rasti logistične panoge. Če podjetja dobijo cenejše vire surovin v tujini, kot jih imajo lokalno, lahko v tem primeru tudi pomorska industrija doseže bistveno izboljšanje.

Prednosti za družbo in svetovno gospodarstvo

Prednosti IRMO za družbo in svetovno gospodarstvo so predvidoma naslednje:

- Organizacija IRMO bo optimizirala globalno uporabo virov z boljšo ureditvijo kanalov pridobivanja zunanjih virov. Omejeni viri, zlasti v težkih časih, potrebujejo popoln nadzor, da bi si jih lahko skupaj delili (Dyer in Singh, 1998);
- Svetu bo pomagala, da čim bolje izkoristimo naravne vire, ki so dosegljivi človeštvu. Dejansko smo dandanes zaradi nasprotujočih si ciljev različnih držav in tisočev oskrbovalnih verig z viri preveč potratni. Vsaka stran išče samo svojo takojšnjo korist, ne da bi jo skrbelo za celotne vire na našem planetu. Ko imamo eno samo organizacijo, ki združuje vse strani v eno entiteto, lahko omejene vire na našem planetu vsekakor uporabimo na optimalnejši način;
- Z ustvarjanjem novih delovnih mest zaradi izboljšanja mednarodne trgovine tudi pomagamo svetovnemu gospodarstvu. Svetovno gospodarstvo je veriga dejavnosti, ki neposredno in posredno vplivajo ena na drugo. Če se bo izboljšala mednarodna trgovina, bo to vplivalo tudi na izboljšanje proizvodnje in logistike. Posledično se bo ustvarilo več delovnih mest in narasla bo kupna moč na trgih, saj bodo prihodki od novih zaposlitev ponovno porabljeni na trgih. To bo v celoti povečalo skupno povpraševanje svetovnega gospodarstva. Gre za sklenjen krog, saj lahko podoben koncept oskrbovalne verige uporabimo tudi pri svetovnem gospodarstvu.

S tem je v svetovnem gospodarstvu mogoče preprečiti tudi nezakonito poslovanje. Kakor hitro bomo imeli eno samo bazo podatkov za zakonito delujoča podjetja, bomo zlahka prepoznali katerokoli nezakonito poslovanje. Registracija v IRMO bo potekala kot predkvalifikacija za katerokoli podjetje na svetu, tako da nezakonito delujoča podjetja ne bodo imela možnosti delovanja v velikem merilu. Vsekakor bodo nezakonita podjetja zmeraj obstajala, a ne bodo več tako močna, kot so sedaj. IRMO bo igral pomembno vlogo pri bistvenem zmanjšanju obsega nezakonitega poslovanja.

Izjava o hipotezah

Pomembnost hipotez v tej raziskavi je zelo očitna, saj so povezane z napovedmi in osrednja zamisel te naloge je povezana z napovedmi prihodnjih scenarijev ter njihovim vplivom na uporabo strategij v okviru managementa oskrbovalnih verig v prihodnosti s pomočjo organizacije IRMO in okvirom, ki je bil ustvarjen v ta namen. Tri zastavljene hipoteze niso bile ustvarjene kot konstante, temveč kot spremenljivke, predvsem tiste, ki so povezane s prihodnjimi scenariji.

Glede na to, da so spremenljivke merljive, je bila v tej raziskavi predstavljena raziskava zelo uporabno orodje za merjenje teh spremenljivk. To še posebej velja za podobnosti in razlike pri uporabi strategij oskrbovalne verige, različne prihodnje scenarije in za merjenje uporabnosti teh strategij za management oskrbovalnih verig v okviru izbranih prihodnjih scenarijev.

Po predstavitvi teh treh hipotez v tej raziskavi, smo lahko razumeli strategije oskrbovalne verige, namreč vitkosti, agilnosti in leagilnosti. Dobili smo jasno predstavo o prihodnjih izzivih na svetovnih trgih in o tem, kaj bi se lahko zgodilo v predstavljenih scenarijih, in prav tako sliko o tem, kakšen bi lahko bil vpliv scenarijev na strategije oskrbovalne verige in njihov managementa in na globalno poslovanje na splošno.

Tri hipoteze v tej doktorski disertaciji smo dokazati na podlagi analize, pri kateri smo uporabili utemeljeno teorijo, in dve fazi anketiranja. Ugotovili smo, da so naše hipoteze veljavne in ustrezno smo vse tri zastavljene hipoteze tudi potrdili. Tako smo potrdili naslednje hipoteze.

- **Hipoteza 1: Razviti okvir za management prihodnjih oskrbovalnih verig bo omogočal izboljšanje managementa oskrbovalnih verig glede na tri predvidene scenarije.**

- **Hipoteza 2: Za management oskrbovalnih verig je potreben okvir, ki bo podpiral izboljševanje oskrbovalnih verig v treh izbranih scenarijih.**
- **Hipoteza 3: Nenehne spremembe in razvoj poslovnega okolja od oskrbovalnih verig zahtevajo uporabo ustreznih poslovnih strategij za management le-teh.**

Abstract

The supply chain has become essential to run businesses nowadays. Throughout the history of business, the professionals have been trying to find out the best practices of business. However, as the business concepts evolved, the practices, methodologies and techniques of doing the business also have been evolved.

This evolution led to the emergence of the concept of the supply chain, which later became essential for the businesses to have a strategy for the supply chain. The evolution of the markets, globalization, and new technologies became very decisive subjects for building and developing any supply chain strategy. However, many other events take place, which forces the supply chain decision-makers to enhance the current approach of running their business. The dynamic business environment and the possible future trends of the global markets represent a real challenge for the development of appropriate supply chain strategies, like lean, agility, and leagility. Therefore, it is very important to assess how suitable are different possible strategies for future changes in the markets. This practice enables the supply chain to be prepared with adequate strategies for different future scenarios.

To achieve this aim of preparing the supply chains for the future with adequate strategies, an in-depth study is done to examine lean, agility and leagility, explaining the similarities and differences of these concepts. These strategies are dealing with the most important factors in supply chains; the time and the cost. The key reason for selecting these particular strategies lies in the fact that they are concerned with improving the effectiveness and responsiveness in the supply chain, which are extremely important for the future.

We continued study of these strategies by the development of three possible future scenarios for energy scarcity, a new international monetary system, and wars. The reason of developing these particular scenarios is that they are concerned with the most important political and economic events that could happen and affect the supply chains in the future (EY, 2013; Cook, 2006; Sokov, 2015). These scenarios are established to anticipate the possible challenges which could face the supply chain strategies in the future and to evaluate the suitability of supply chain strategies for such future scenarios.

A survey of 150 supply chain professionals, who are working currently in the field of supply chain management, is done in two phases. The first phase focused on recognition of the opinions of surveyed supply chain professionals towards the supply chain strategies and their

utilization. Based on the theoretical knowledge of the academic literature reviewed in this research, proposed scenarios, and the feedback of professionals in the survey, it was evident that supply chains' managers need an adequate framework, which will support the improvement of current and future supply chain management.

Therefore, the grounded theory methodology is used to create a new conceptual framework. The core idea of the proposed framework is to improve the global sourcing practice, which consequently will enable improving the management of supply chains according to the predicted scenarios.

The second phase of the survey is conducted to present the proposed framework for the supply chain professionals for evaluation. The proposed framework adds value to the global sourcing process, which enhances the supply chain collaboration. It also supports the selected supply chain strategies for consideration – i.e., lean, agility, and leagility, to work better in the future.

The proposed framework represents a scientific contribution to the supply chain strategies utilization in practice. The results of this contribution are obviously to fill the gap highlighted by the supply chain professionals in the survey. It was highlighted by the supply chain professionals that there is an essential need for improvement in the supply chain collaboration globally, which will support the businesses during any future changes. The collaboration of the businesses through a global alliance of resources to work systematically will serve the supply chains better in normal circumstances, especially in the time of crisis. This research developed additional knowledge for future generations of supply chains, and evolved the concept from “supply chain management” to “global resources management”.

The results of this research show the need for significant improvement to the global sourcing process, which will play a very important role to support the supply chain strategies to handle future scenarios. This improvement of the global sourcing process is proposed in this research by creating “International resources management organization” (IRMO) to control the resources of the supply chains globally and facilitate the sourcing process.

Keywords: supply chain strategies, lean, agility, leagility, supply chain future trends, supply chain management, grounded theory, scenario planning, supply chain collaboration, sourcing.

1. Introduction

1.1. Definition of the research problem

1.1.1. Description of the problem

Nowadays, the global business environment has become very complex due to the globalization and fierce competition between the organizations (Fischer, 2003; Kalafus, 2014; Banu & Rao, 2015; Sangari et al., 2015; Wu et al., 2019; Milovanović & Popović, 2019). This situation has brought business relationships in the centre of attention to smoothly run the business. Accordingly, the key success factor of any business is the way of collaboratively managing the supply chains activities, both inside and outside the organization, i.e., with its business partners (Omar et al., 2012; Adams et al., 2014; Banu & Rao, 2015; Ross, 2016). The supply chain can be identified as a “network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce and deliver value - in the form of products and services – to the ultimate consumer” (Christopher, 1992, p. 17).

The supply chain concept is developed as a best practice of doing business; it is evolved through decades of researching and its implementation has become an essential requirement for any business (Stevens et al., 1989; Chopra & Meindl, 2001; Christopher, 2011). As described in the above-mentioned definition of the supply chain by Christopher (1992, p. 17), the supply chain is all about networks, processes, and linkages. As the business environment gets much complicated day by day, the supply chain networks have become an essential practice. This trend of complicated business environment is expected to grow in the future as long as the business environment is in continuous change (Slack & Jones, 2018). Unless new relations and solutions of supply chain collaborations are developed, it will become very difficult for any business to survive in the future without being a member of the supply chain (Ross, 2016). Before focusing on describing the core problem, we will first explain the concept of the supply chain and its management, comprehensively.

Striving for the typical trade-off, companies are usually under the pressure to be cost-effective and respond to the customer’s requirements at the same time (Slack & Lewis, 2008; Slack & Jones, 2018). This pressure is increased in the uncertain business environment, since it is difficult to predict the changes, occurring in the market conditions, and to adjust supply chain

operations with the market changes and rising competitive environment (Slack & Lewis, 2008; Kalafus, 2014; Fan et al., 2016; Wu et al., 2019; Milovanović & Popović, 2019).

The success of any supply chain is determined by the satisfaction of the end-customers through on-time delivery, competitive prices, and high quality of products (oliver & Webber, 1982). Therefore, it is very important to study the requirements of the end- customers, while also understanding the crucial criteria of the market.

It is a challenge for any supply chain nowadays, to match supply and demand responsively and effectively at the same time. Hence, modern supply chains must balance their strategies and position them in a framework of responsiveness and effectiveness (Christopher, 2011). The responsiveness enables supply chains to quickly respond to the market changes while satisfying the customers. However, effectiveness is very important to control the cost of the supply chain perfectly. Accordingly, the balance between both – i.e. responsiveness and effectiveness, is the ultimate aim of the supply chain (Gunasekaran et al., 2008). However, prioritizing one against the other can lead to an unbalanced strategy (Slack & Lewis, 2008).

As suggested by several authors – like Nel & Badenhorst-Weiss (2015), Christopher (2016), Soltan & Mostafa (2015), the achievement of effective and responsive approach is possible, if the supply chain is supported with adequate lean, agile, and leagility strategies (Christopher, 1992). Based on cognitions from the literature and business practice, we emphasize three key strategies, i.e., lean, agility, and leagility. The reason for selecting these three strategies is that they are ideal for achieving the required balance of responsiveness and effectiveness within the supply chain (Simchi-Levi, et al., 2009; Nel & Badenhorst-Weiss, 2015; Christopher, 2011).

The lean strategy is developed to deal with the effectiveness of the supply chain, while the agile strategy is concerned with the time of activities within the supply chain (Gunasekaran et al., 2008). This indicates that an agile strategy deals with responsiveness (Christopher, 1992; Gunasekaran et al., 2008). The leagile strategy aims to achieve the balance between both mentioned strategies to enhance the competitiveness of the supply chain (Christopher, 2005; Soltan & Mostafa, 2015; Gligor et al., 2015; Wu et al., 2017).

Any supply chain cannot adjust its resources rapidly to respond to the major changes in the markets if it carries too much waste (Basnet & Seuring, 2016). Thus, there is a link between the ability of the supply chain to respond quickly to the market and the number of resources it

carries, and whether there is waste among these resources or not – this is the role of lean strategy (Womack et al., 1990; Bhamu & Singh, 2014).

The supply chain always trades off between the responsiveness and effectiveness to achieve the best results (Slack & Lewis, 2008). In the day-to-day operations, many decisions are reflecting this trade-off practice, such as the trade-off between lead-time and transportation cost, inventory level, and cash cycle (Basnet & Seuring, 2016). These examples of trade-off decisions are in fact all about trading off between the responsiveness and effectiveness, and the best practice is to balance both of them together to enable the supply chain to be fit always. Thus, the decision-makers – in any supply chain – are always seeking for the optimal decisions. These optimal decisions can be easily achieved by balancing the cost of doing the activities in the supply chain and the time that is needed to conduct the same activities. This reflects effectiveness and responsiveness at the same time (Slack, 2018).

Some supply chains prioritize lean to be most effective regardless of their responsiveness and other companies prefer agile strategy to respond on time to the customers, regardless of their effectiveness (Christopher, 2005). It always depends on the demand, i.e., in case of certain demands it is optimal to use lean. However, in the case of uncertain demands, it is appropriate to use an agile strategy.

However, what about if the lead-time is long and the demand is volatile? Under such circumstances, a combination of lean and agility is a suitable strategy. The combination of lean and agile strategies is related to the ‘bullwhip effect’, where demand is fluctuating up and down and at the same time, there are various lead times for the materials which should be taken in consideration while trading off between lean and agility (Wu & Barnes, 2018).

The supply chain is always seeking to achieve ‘the availability’ by having the right product at the right time and the right price (Jones et al., 2000). To achieve this availability in the market, many companies implement a pure lean strategy to be cost-effective and other companies implement a pure agile strategy to enhance the responsiveness. It is important to note that both strategies are required as essential prerequisites for the competition in today’s market (Christopher, 2005; Wu et al., 2017).

This combination of lean and agility is not commonly used nowadays, due to the following reasons:

- It is a fairly new concept which, combine lean and agility individual strategies, as some authors developed the leagility strategy, to combine the benefits of both strategies in a single strategy (Cai & Zhu, 2013).
- It is not easy to be implemented, as it requires continuous liaising between two different strategies – i.e. lean and agility (Purvis et al., 2014).
- There are not many practical examples of simultaneously utilizing lean and agility in the supply chains and the organizations always prefer to see similar experiments to follow them.
- The concept of using lean and agile strategies together is still not clear for some companies and that is why they do not take the initiative to implement it (Cai & Zhu, 2013).
- Some companies are loyal to their traditional strategy and hesitate to introduce a new strategy, even though the new strategy can offer them numerous benefits (Khan & Hashim, 2014)

Therefore, it is very important for supply chain professionals to understand the core concept of lean and agile strategies and how they can be merged to generate leagile strategy (Christopher, 1992; Naylor et al., 1999). However, besides understanding various strategies of the supply chain, it is also important to understand the future trends of the global markets while determining if these strategies can “survive and work” under different circumstances in the future. Especially at the time of crisis or any significant changes in economic circumstances, the current strategies may not be suitable to support the business, most optimally. Consequently, an innovative approach is needed for the development and operating of new generations of supply chains (Christopher & Ryals, 2014; John, 2015).

In 2015, a survey was conducted by “SCM World” with more than 600 practitioners about the challenges that they anticipate around natural resources in the next decade (John, 2015). The findings of the survey show that in the case of materials and minerals, the cost is the biggest issue for all industry sectors. The same is true for energy, which ranked first in terms of natural resource challenges for supply chain strategy (John, 2015, p. 8).

The changes of the global markets represent a real challenge for any company (Banu & Rao, 2015). However, the global supply chain network is gradually extended overseas and any single

company cannot implement lean, agile, or leagile strategies without engaging its business partners in the same strategy. This engagement ensures that all the parties can work collaboratively to reduce the lead time (Angkiriwang et al., 2014). The benefits of any strategy always remain limited, unless the strategy is promoted and utilized in the entire supply chain, not only by the individual company in the supply chain.

The uncertainty of the demand is related to the changes of the global markets that are currently very fast (Christopher, 2005; Wetherly & Otter, 2014; Hill & Hult, 2015; Li et al., 2019). The situation will be more difficult if different scenarios are imagined with dramatic changes, such as new monetary system, running out of oil, or thread of new local wars (Slack & Jones, 2018). For ensuring the survival of supply chains in these situations, there should be new innovative strategy because the current strategies may not be effective in overcoming such dramatic market changes unless they are enhanced by the innovative understanding and consideration of supply chains and their strategies (Kavilal et al., 2014). This innovative approach may change the nature of the concept of the supply chain itself to develop new generations of business management (Von See & Kalogerakis, 2015).

Based on the above-outlined cognitions, we can emphasize that the main problem of this dissertation is related to the utilization of lean, agile, and leagile strategies, under different circumstances in the future business environment. The current literature does not provide any insight, how three outlined strategies – lean, agile and leagile – can be used under different business circumstances to successfully support supply chain management in the future.

1.1.2. Examination of the problem in the literature

Building upon the above-presented description of main concepts used in this dissertation and outlined the problem, we can state that the literature about supply chain management reports that considered strategies - (i.e., lean, agility, leagility) - increase supply chain effectiveness and responsiveness (Womack et al., 1990; Christopher, 2005; Gunasekaran et al., 2008). In that context, the authors emphasized that lean is a very powerful strategy to operate the supply chain effectively (Myerson, 2012). However, agility is an essential strategy to increase the responsiveness of the supply chain (Jones et al., 2000; Christopher & Towill, 2001; Gligor et al., 2015). Utilization of lean and agile strategies at the same time in the supply chain is not a common practice (Christopher, 1992; Naylor et al., 1999; Naim & Gosling, 2011).

Several studies also reported about the balance between effectiveness and responsiveness, as the ultimate aim of any supply chain (Chopra & Meindl, 2001; Gunasekaran et al., 2008). To realize that, we need to understand how to deal with the uncertainty and the unexpected circumstances that may affect the supply chain operations and their results. It is also crucial to understand the business environment in which supply chains operate and to recognize its continuous changes to timely take the required actions (Shukla et al., 2010).

The effectiveness of the supply chain has been converted throughout the years in the literature to develop the “lean supply chain” (Vanichchinchai, 2019). The lean supply chain originates in the “lean manufacturing” which is extended to the entire supply chain (Naylor et al., 1999; Christopher, 2011; Myerson, 2012). The lean strategy has initiated with the Toyota production system (Ohno, 1988). Toyota production system classified seven types of wastes to be removed from the supply chain to achieve the best practice of lean strategy. These seven types of waste include overproduction, waiting, transport, inappropriate processing, unnecessary inventory, unnecessary motion, and defects. A similar approach to the lean strategy was introduced by Hayes and Pisano (1994). For instance, Womack and Jones (1996) revealed that lean strategy will change the world (Bhamu & Singh, 2014).

Later the agility concept appeared, with the focus on the speed and flexibility and emphasized that it is not important only to be lean and effective, but it is also crucial to be agile and responsive at the same time. This combination is introduced by many authors who highlighted the impact of flexibility and cost – i.e. see for instance Yusuf et al. (2004). In that framework, Christopher (2005) focused on the examination of the value, which can be delivered to the customers by cost reduction or flexible logistics network to minimize the lead time and shift the operation rapidly between the effectiveness upstream and the responsiveness downstream. Gerwin (1993) revealed that the flexibility concept was the factor to be considered to keep up with the changes in the marketplace. Additionally, Sharafi and Zhang (1999) exposed “speed” as an additional element to the agility.

Both, flexibility and speed, support and enable a high level of responsiveness of supply chain (Bower & Hout, 1988; Stalk, 1988). Additionally, Booth (1996) saw the agility as a modern practice, which can replace the lean strategy. While Van Hoek (2001) and Richards (1996) considered lean as a pre-perquisite for any supply chain, aiming to achieve an agile strategy.

Recently, some authors tried to combine the benefits of lean and agility, together. They used various methods such as Parteo curve, decoupling points, and the concept of base and surge demand to achieve this goal (Christopher & Towill, 2001; Jones et al., 2000; Naylor et al., 1999). They emphasized on the implementation of these strategies, depending on the holistic strategy of the supply chain itself. Christopher (2000) reported that “the word holistic is derived from the Greek word “οἰον”, which means (whole) when all parts of the studied system are modelled in similar detail and are linked via feedback mechanisms”.

Nalbantis et al. (2011, p. 744) outlined that the degree of uncertainty of the market plays a very important role in identifying the selected strategy; however, lean is required in certain situations and agility is suitable for uncertainties.

In the above-outlined cognitions about utilization and possibility to implement lean and agile strategies and few attempts of deploying leagile strategy into the supply chain, none of the evidences has been found that could help in identifying if these strategies would be fruitful in future. The future is vague and it is important to see if any future changes in the global markets will affect the supply chain strategies. Besides, it is also unclear that what could be done to support the supply chain strategies to face the emerging challenges of the markets in the future.

The utilization of three considered strategies for managing supply chains – namely lean, agile and leagility, has already got a lot of scholarly attention, especially the first and second strategy, while the latest received considerably less attention. What is more, the literature does not provide an answer regarding the utilization of the three considered key strategies for managing supply chains, under different future circumstances, despite the current turbulent environment and vague future trends. Thus, the literature fails to present how three outlined strategies may be used in the frame of different possible future scenarios that might occur in future.

1.1.3. Challenges of chosen scientific subject for further research

According to the above-outlined cognitions and the stated problem of the dissertation, a fundamental challenge of conducting this research is to answer the question, i.e., how to develop a framework that could facilitate successful utilization of three key selected supply chain strategies – i.e., lean, agile and leagile, for future supply chain management (Kersten et al., 2015). Moreover, some authors are calling for deeper examination of agile and leagility

strategy in the supply chain, due to the scarcity of research on this topic. For instance, Wu et al. (2017) emphasize the utilization of agility under uncertainty. Furthermore, Gligor et al. (2015) examined the association between supply chain agility, cost efficiency, and customer effectiveness across various environmental situations. These examples reveal different circumstances in which supply chain management occurs that might assist in examining the supply chain agility in different circumstances.

In line with the above-outlined cognitions, the challenge of the chosen scientific subject is twofold. The first challenge is to determine possible future scenarios, which will reflect future conditions, in which supply chain management will occur. However, the second one is to develop a conceptual framework that outline utilization of key strategies in frame of supply chains – namely lean, agile and leagile strategy, in the future identified scenarios.

First, turning to the determination of future scenarios, the challenge is related to the dynamic nature of the business environment, since it is changing permanently and sometimes these changes are rather radical (Soosay et al., 2008). This requires scientists to use a creative approach for the creation of most probable scenarios for the future (Qais, 2012).

Turning to the above challenges, developing a new conceptual framework which could be defined as “a conceptual framework is an interconnected set of ideas (theories) about how a particular phenomenon functions or is related to its parts” (Svinicki, 2010). It is complex, since the question is how to study several and sometimes contently diversified concepts of the supply chain while recognizing the vision of various researchers, who developed the three supply chain strategies (Naylor et al., 1999; Jones et al., 2000; Christopher & Towill, 2001; Chopra & Meindl, 2001; Naim & Gosling, 2011; Myerson, 2012).

Coupled with the above challenges, another challenge of the research is the amount and quality of information needed for preparing, studying, comparing, and presenting the results – related to various supply chain strategies (Christopher, 2005). It is because the information has to be successfully compiled to get an accurate insight into the field. This is in addition to conducting a comprehensive literature review to give a clear overview of the current supply chain strategies, lean, agile, and leagility (Boote & Beile, 2005). succinctly, it can be affirmed that gathering necessary data from the available sources and comparing them with each other to

record the similarities and differences of the supply chain strategies is another important challenge for this research (Peter, 2008).

Additionally, it is not just important to know the current strategies of the supply chain, but it is also crucial to consider appropriate strategies, which can fit best in the future. Moreover, it is also required to creatively think for developing such framework that could support these strategies in several possible future scenarios; hence, achieving strategic fit between the supply chain and the marketplace (Slack & Lewis, 2008). The proposed framework should represent additional value to the supply chain management, utilization of key strategies, and enhancing those strategies to work better under different scenarios.

There is also a challenge related to the process of creating the proposed framework for managing future supply chains to ensure that it can bridge the gap between the current supply chain strategies and the ability of these strategies to work in the future - under different conditions. This will be done through grounded theory and will be explained in detail in the research methodology section of this chapter. Coupled with the challenge of the proposed framework, validation is also required for which a field survey is conducted for obtaining the opinions of 150 supply chain professional about the established framework. The entire process needs to be very selective in terms of the participants and the design of the questions. It is because it would help in achieving better results - relevant to the objectives of the dissertation.

Another challenge lies in the used approach to study and develop a new framework for managing supply chains under different scenarios. This research will be based on principles of grounded theory as proposed by Strauss & Corbin (1990). Grounded theory is a methodology appropriate for theory formulation and examination of a phenomenon with and inadequate theoretical base (Manuj & Mentzer, 2008); this is certainly the case in this dissertation.

To sum up, the key challenge of the dissertation is to develop a conceptual framework that outline utilization of key selected strategies – namely lean, agile and leagile, in the frame of different identified future scenarios that might occur in supply chain management.

1.2. Purpose, goals, hypotheses and scientific contribution of the dissertation

1.2.1. Purpose and goals of dissertation

The main purpose of this dissertation is to develop a framework for utilizing lean, agile, and leagile strategies in supply chains under different scenarios. In that framework, we try to achieve the best utilization of the lean, agile, and leagile strategies - according to the selected scenarios for the future supply chains – while improving the utilization of these three strategies and overall outcomes of supply chain management.

In today's business environment, numerous changes are occurring that are affecting the application and development of the supply chain strategies (McCullen & Towill, 2000; Wetherly & Otter, 2014; Wu et al., 2019; Milovanović & Popović, 2019). These changes can determine the success of any business in the future while affecting the decision of the stakeholders to select the suitable supply chain strategy – i.e., lean, agile, or leagile (Christopher & Towil, 2002; Gligor et al., 2015; Wu et al., 2017).

The types of barriers and obstacles that are being faced by the supply chains are changing over time; however, the uncertainty has increased and consequently, it has become very difficult to plan for the future (Simangunsong et al., 2012). The continuous changes in the global markets have pushed many supply chains to change their strategies, as it became very crucial to have the maximum possible flexibility to keep up with the new market changes (Shri & Anil, 2016; Cohen & Lee, 2020).

This study aims to analyze the current supply chain activities, predict various future scenarios in which supply chain management will occur, and develop an adequate framework for future supply chains. In this account, research also demonstrates the use of lean, agile and leagile strategies in developing an adequate framework that would be used under different circumstances in supply chain management.

The above-outlined objectives and building blocks for the postulated hypotheses of this dissertation are depicted in figure 1 (author's own work).

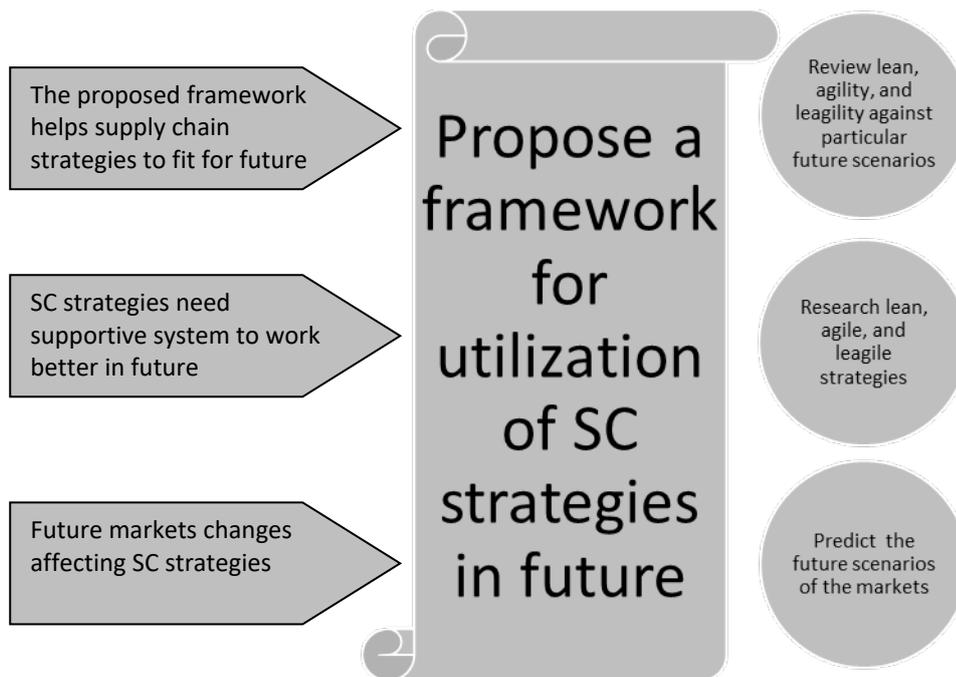


Figure 1: The objectives of the dissertation.

According to the above-outlined cognitions, selected research area, and identified research problem, the following objectives and sub-objectives have been developed.

- Development of a new conceptual framework for the utilization of key selected strategies in supply chains in the frame of different identified future scenarios.

The first objective – which reflects the main purpose of this dissertation – is to develop a conceptual framework that outline utilization of key selected strategies – i.e., lean, agile and leagile - for managing supply chains in different identified future scenarios. This proposed framework will show how these key strategies reflect supply chain goals – i.e., lean, agile and leagility, and can be used in different future scenarios, related to supply chains operations. Furthermore, the framework provides guidelines for global sourcing and collaboration of supply chain companies and their stakeholders.

The future supply chain development and operation involves advanced types of collaborations and partnerships (Adams et al., 2014). It is expected that in future, global business environment and the complicated relationships will influence the core concept of the supply chain because of the presence of various parties across the globe. These relationships will play an obvious role in converting the supply chain to be “global chain” (Tomas et al., 2014).

- Understanding the current strategies of supply chain

Development of a new framework is not possible without an adequate understanding of the current supply chain strategies and the current utilization of these strategies (Naylor et al., 1999; Christopher, 2005; Purvis et al., 2014). In reference to this objective, the purpose is to gain an understanding how these strategies are utilized in supply chains operations. The new framework can be originated from the broader analysis of the current knowledge while highlighting its shortcomings and searching for new approaches to overcome them.

- Predicting the future trends of the markets

In the context of this objective, the research will predict the future market trends, in medium and long terms, while considering the current circumstances of the global markets. This can help the supply chain decision-makers to successfully adjust the existing strategy and operations while optimizing the future supply chain planning (Shri & Anil, 2016; Wu et al., 2017). It is important for the future supply chains to continuously align their strategies, as per the changes occurring in the marketplace. However, this alignment is not possible without knowing the future market trends. This knowledge alerts the decision-makers to prepare their supply chains for the future changes. This sub-objective directly contributes to the main objective of the dissertation – to develop a framework – because, without anticipation of the future, it is meaningless to propose strategies of improving the business in the future – i.e. utilization of supply chain management strategies under different scenarios.

- Examining the utilization of lean, agile, and leagile strategies in supply chains under predicted scenarios

The final sub-objective is to examine and assess the utilization of lean, agility, and leagility strategies for the particular predicted scenario of major changes in the global markets. This would help in determining the suitability of implementing these strategies in different circumstances. The purpose of this sub-objective is to assess their capacity to work in considered scenarios. This will have a direct contribution to the main objective of the dissertation because unless we review these strategies against future scenarios, we cannot confirm if they are suitable for the future market trends and supply chain management activities.

1.2.2. Dissertation Hypotheses

In general, developing new research should start with hypotheses, which are derived from the analysis of selected literature and selected concepts of the research (Mourougan & Sethuraman, 2017). The hypotheses are used for analyzing the relationships between two types of variables. We considered two types of variables in our research – i.e. independent and dependent.

The independent variable is the dynamic one which is changing and it is the subject of testing. The effect of this change is the dependent variable, so the relationship between these two variables portray the cause and effect relationship.

For the researching of hypotheses, we first define the following research questions (RQ):

RQ 1 – What is the impact of the business environment on supply chain management?

RQ 2 - What is the current utilization of the selected supply chain strategies, namely lean, agility, and leagility in the supply chain management?

RQ 3 – How can we select the appropriate strategy for the supply chain?

RQ 4 – What are the key factors for determining the future trends of supply chains management?

RQ 5 – Can consider supply chain strategies stand in front of the continuous changes in the global business environment?

RQ 6 – Which strategies are more suitable for managing the supply chains, specifically in the future market trends?

RQ 7 – What are the future scenarios which could affect the business environment and supply chain strategies?

These research questions present the foundation for hypotheses development in our research. Hypotheses are originated in the above-postulated research questions. The author tries to gather all the relevant information, related to the research subject, to contribute in creating hypotheses accordingly.

By answering the above-mentioned research questions, the dissertation gives us a better understanding about the current utilization of the selected supply chain strategies – i.e., lean,

agile, and leagility to clarify the best practice. Moreover, it would also help in understanding the future trends of the global markets as well as the impact of the expected changes of the global business environment on the supply chain strategy. It would also act as a building block for the development of a new framework of supply chain management, which is suitable for the future supply chain management, based on global sourcing and collaboration.

Based on the above-mentioned cognitions – drawn based on literature – and the above-mentioned starting points of the research and outlined research questions, following hypotheses are devised.

Hypothesis 1: The developed framework for managing future supply chains will contribute in improving management of supply chains, according to the three predicted scenarios.

The three predicted scenarios of the global markets directly influence the supply chains and require the supply chains to address future trends, specifically changes in economic and political factors. This relationship is clearly defined in this research - in the identified three future scenarios (for details, see section 1.4). The future supply chain trends are affected by future changes in the global markets.

The proposed framework for managing future supply chains will help to overcome the future changes and challenges in global supply chains. It will enable the management to better cope with future economic and political challenges of supply chains while emphasizing on the possible utilization of lean, agile, and leagile strategies to work better in different scenarios of the global markets. Better utilization of these strategies will assist in smoothing the global sourcing process while making it easier, faster, and reliable. This will enable the supply chains to achieve significant improvement in collaboration, which is the key success factor to overcome the expected changes in the markets.

This hypothesis is linked to the main objective of the dissertation, i.e., developing a new framework for managing the supply chains and to ensure that this new framework can add value to the future supply chain management practices. The first hypothesis is also linked to the third objective of the dissertation, which aims to examine lean, agile, and leagile strategies against the future scenarios and ensuring that these strategies can work better with the utilization of the proposed framework. According to hypothesis 1, in next two hypotheses we

address two building blocks of the proposed conceptual framework, i.e. selected key strategies – namely lean, agile and leagile and three identified future trends.

Hypothesis 2: For the management of supply chains, a framework is needed, which will support the supply chain improvement in the selected future scenarios

Lean, agile, and leagility are the supply chain strategies, which can work better in the future if they are supported with a new framework. The new framework is based on global sourcing that facilitates the supply chain collaboration and keep up with the predicted future scenarios of the global markets. The best utilization of the developed framework requires selection of appropriate business strategies for future operations of supply chain management. Thus, this selection is a very important decision in supply chains (Cebi & Bayraktar 2003; Gligor et al., 2015; Wu et al., 2017).

This hypothesis is contributing directly to the main objective of the dissertation, which is “development of the new framework”, and is linked as well to the first sub-objective, i.e., researching the use of lean, agile, and leagile strategies in supply chains.

As long as the global business environment is in continuous change, it is always needed to plan for the future. To do this, it is needed to create potential future scenarios, which can influence the supply chain and drive it towards specific trends. While the currently known supply chain strategies may not be suitable to work in the future scenarios and support of a new framework is needed. This aspect led to the development of the next hypothesis.

Hypothesis 3: The continuous changes and development of business environment requires from supply chains utilization of adequate business strategies for managing supply chains.

The development of the business environment will significantly influence the utilization of considered supply chain management strategies in the future. The global markets will change significantly in the future and these changes will inevitably affect the currently known supply chain strategies, specifically their utilization and the outcomes. The utilization of the key supply chain strategies will be different, with the change in the external business environment.

Hypothesis 3 is linked with the main objective of the research to present the needs of a new business management framework to support the current strategies, i.e., lean, agility, and leagility and keeping up with the expected changes that are occurring in the global markets.

Hypothesis 3 is also linked with the second objective of the dissertation, i.e., anticipating future market trends and developing different future scenario planning.

1.2.3. Expected scientific contribution

In line with the purpose of the research, it is expected that the findings of the research would make significant contributions to the current body of literature.

First, the dissertation will develop a new conceptual framework for managing supply chains, which will outline the utilization of key selected strategies – namely lean, agile and leagile for future identified scenarios. This can give a new dimension to the considered supply chain strategies – i.e., lean, agile, and leagile. Since flexibility is the key success factor and to achieve a high level of flexibility, the supply chain must be lean – i.e., without many assets – and also agile at the same time. In this way, it would be able to easily convert its operation from current to future practices, quickly and smoothly. Moreover, to be lean, the supply chain must follow an effective outsourcing strategy (Adnan et al., 2013; Gligor et al., 2015; Wu et al., 2017).

Secondly, the dissertation contributes to the current body of knowledge by drawing a suitable framework for the future global supply chains. It is because it considered several potential future circumstances and major changes that might occur in the global business environment and might reshape the future of supply chain concepts.

Third, the dissertation contributes to the current body of knowledge by outlining the utilization of selected three strategies, namely lean, agile and leagility in the context of current and future supply chains scenarios.

Among other significant contributions, the dissertation also enhances the usage of grounded theory in supply chain management research stream and contributes to the creation of the theoretical foundations. These developed theoretical foundations can be used for future examinations in this research area.

Another important contribution relates to the assessment of the proposed framework, as supply chain researches that have used grounded theory - for model/framework formulation – do not provide a comprehensive validation and possible modification of the proposed model (Manuj & Sahin, 2011; Speier et al., 2011). This dissertation provides an assessment of the

proposed framework's usability, by supply chain professionals; thus, going beyond prevalent research practice.

Looking through the lens of the postulated hypothesis, following scientific contributions can be outlined.

The first hypothesis is expected to contribute to the body of knowledge by developing and using a framework to help the supply chains to survive in the future, in spite of facing of different circumstances. The contribution of the second hypothesis is focused on improving the current and future supply chain practice by using the proposed framework. The third hypothesis contributes to the development of the operating business environment by the best utilization of the supply chains strategies and exploiting the benefits of each strategy, in terms of effectively managing supply chains.

The rationales for research selected topic

Any organization must have an appropriate strategy of managing its supply chain, as it assists in running and surviving in the everchanging global markets. The continuous changes of the global markets are one of the main reasons to select this research topic for the present study. Since future scenarios are always unpredictable and vague, the present research would contribute to making anticipation while preparing supply chain strategies to adequately handle future events.

The concept of balancing the supply chain strategy to the external business environment is another reason for conducting this research. However, after decades of the evolvement of the supply chain concept, the researches – related to best practices – have reached the saturation point (Spina et al., 2015). Therefore, it is the need of time to analyze and predict the future market conditions and the new trends that might influence supply chain activities (PWC, 2013).

The proposed framework is based on improving the global sourcing process by exchanging the information. However, the exchange should be done globally to ensure perfect and flawless interaction of the supply chains. In addition to this, it should also be done momentarily to keep the supply chains updated, as per the changing market conditions. Thus, it is not only important to have access to the information, but is also significant to ensure that all information is relevant and up-to-date. The information-sharing enables the supply chains to engage all the parties and

harmonizing them through an extended organization (Zailani et al., 2008; Msimangira & Venkatraman, 2014).

Although several publications demonstrate current supply chain concept and strategies, there are limited researches that could discover future supply chain practices and strategies that fit best in changing global markets (Christopher, 1992; Christopher, 2005; Womack et al., 1990; Christopher & Towill, 2001; Jones et al., 2000; Christopher & Towil, 2002; McCullen & Towill, 2000). These changes might include potential scarcity of energy resources, long-term financial crisis, etc. (Bala, 2014).

This research aims at investigating if the current supply chain strategies are adequate for the future business environment or there is a need of developing a new framework that could support the implementation of these strategies under different future circumstances. It has eventually compelled researchers to develop a new theory of the global supply chain that is suitable for the future. Currently, the organizations have started to acknowledge the importance of reviewing and revamping their supply chain strategies to keep up with the continuous market changes. In 2011, APICS research department conducted a survey with more than 9,000 operations management professionals to assess their supply chain strategies. The results of the survey reveal that 33 % of the participants confirmed that their supply chain strategy was adopted in the last 2 years, while 30% confirmed that it was adopted in the last 3 – 5 years (APICS, 2016).

1.3. Assumptions and limitations

1.3.1. Research Assumptions

The present research has considered various assumptions, which are as follows:

- (1) Focusing on three key strategies for managing supply chains, namely lean, agile and leagile strategy.
- (2) Identification of business scenarios, related to supply chain.
- (3) Need for the development of a new framework for managing future supply chains under different scenarios.
- (4) Qualitative research approach and proposed framework validation.

All of the above-mentioned research assumptions are discussed in the proceeding sub-sections.

- **Assumptions related to considered lean, agile, and leagile strategies**

Fundamentally, it is assumed in this dissertation that lean, agility, and leagility are key strategies for managing the supply chains (Christopher, 2005; Simchi-Levi et al., 2009; Naim & Gosling, 2011; Gligor et al., 2015). Additionally, it is also assumed that any successful supply chain must have an appropriate strategy that handles day-to-day supply chain activities (Slack & Lewis, 2008). These assumptions highlight the importance of this research, as the findings of the present research would contribute to managing future supply chains.

The research further assumes that lean strategy is examined and tried in many organizations with proven success stories; hence, anticipating that it is a useful supply chain strategy in maintaining the effectiveness of the business always (Womak & Jones, 1996; Simchi-Levi et al., 2009).

The research also assumes that an agile strategy is a well-researched area and is supported by numerous academic publications. Additionally, it is also assumed that agile strategy has been practically implemented and has helped companies in speeding up their supply chain activities and improving overall operations (Christopher, 2005; Gligor et al., 2015; Wu et al., 2017).

In the context of the first assumption, the research finally assumes, that the leagile strategy is the combination of lean and agile strategies and assists in achieving the benefits of both while overcoming the limitations of each strategy, if implemented separately (Christopher, 2005; Naim & Gosling, 2011).

- **Assumption related to the identification of scenarios of business environment**

The global business environment is continuously changing and is expected to experience more frequent changes in the next decades. These changes will have a direct impact on the concept and practices of the supply chain (Lee et al., 2009). This is an important assumption in this research as it assists in understanding the current status of the global business while developing scenarios that will compressively reflect future trends (Naim & Gosling, 2011). The dissertation also aims at predicting and understanding these future trends, while ensuring that the proposed framework can assist supply chain in overcoming expected changes in the global

markets. The existing supply chain strategies may work well in normal situations, but the changing external factors require the companies to revamp their current strategies. Barry (2004) also supported this idea by claiming that any enterprise may run well with lowest cost in the stable business environment; however, changes in the business environment might require organizations to reconsider their existing supply chain strategies.

- **Assumption related to the need for developing a new framework for managing future supply chains under different scenarios**

This assumption stems from the situation, where current best supply chain practices can become inadequate and/or obsolete, under different circumstances. After the presentation of current supply chain strategies, i.e., lean, agile, and leagility and explanation of the future global market trends, it has been analyzed that they might not be able to keep up with the expected global market changes (Gereffi, 2011). Therefore, a basic assumption has been made according to which a new framework is needed to be developed for effectively managing the supply chain. It is assumed that the framework would be suitable for future global market trends.

- **Assumptions related to the qualitative research approach and proposed framework validation**

The dissertation assumes that the approach taken to build the proposed framework is valid and well-accepted in the context of supply chain operations. For developing a framework, grounded theory has been used, as the mainstream of supply chain research has confirmed grounded theory as a suitable approach for developing models/frameworks (Manuj & Mentzer, 2008; Manuj & Sahin, 2011; Speier et al., 2011; Sangari et al., 2015). It can be assumed that grounded theory is an adequate approach to the current dissertation.

Next, it is assumed that data collection instruments are valid and that data is extracted from reliable sources; hence, resulting in such research work that meets the high research standards (Nahid, 2003). It is important to note that interviews are also conducted to develop a robust framework. In this account, it is also assumed that the data obtained from the interviews are relevant for the research (Margaret et al., 2009). Collecting data from various sources enables the researcher to study the subject of research from different areas and perspectives (triangulation) (Jick, 1979).

All outlined challenges of the dissertation require the author to have a creative mind to generate innovative business management approach that is suitable for the future global supply chain network (George, 2008).

1.3.2. The limitations of the research

For this research following limitations have been identified:

- **Limitation regarding the focus on selected supply chain strategies**

The main limitation of this research is related to the entire focus on three key strategies of the supply chain, i.e., lean, agility, and leagility. As explained in the literature review the lean strategy was developed initially to support the effectiveness of the supply chain, so it is the limited strategy to this specific area (Christopher, 2005). However, to cover the limitation of a lean strategy, the agile strategy was developed (Christopher, 2011). In particular, the agile strategy helps in dealing with the responsiveness of the supply chain (Gunasekaran et al., 2008). Afterwards, this concept is evolved to be “leagility” - combining the benefits of lean and agility together and balancing the effectiveness and the responsiveness of the supply chain. Based on the above findings it can be stated that the main limitation of this research lies in its overemphasis on the three most commonly used supply chain strategies while overlooking other possible strategies in the research. For instance: six sigma, total quality management, or customer relationship management could be considered in the research.

- **Limitation regarding identified future scenarios**

In the presentation dissertation, particular scenarios have been considered that are likely to happen in the future. Since the future is vague and new scenarios can be considered for potential research area (Ryan et al., 2017). However, this dissertation is limited to choose predicted selected specific future scenarios (Hannah & Robert, 2008). These scenarios are supported by interviews that are carried out with the supply chain professionals. The main objective behind conducting this activity is to ensure that the selected limited scenarios are representing a real concern of the supply chain professionals towards potential future changes (Hannah & Robert, 2008). Another limitation in that context is the self-assessment of future scenarios by supply chain professionals, which may have some implications for their perception about future scenarios.

This research is limited to several predicted future scenarios, which are as presented below. The research is limited to only those three scenarios, which are most relevant and concentrated on the research subject. The author intends not to consider several variables, as it usually results in complicating the research process and eventually create hurdles in achieving research aim and objectives. This is because the future is open to unlimited scenarios and possibilities, so it is impractical to record all the future scenarios. Therefore, specifically three scenarios have been considered that are the combination of political and economic factors as they are the main drivers of any business decision. It is important to note that these drivers relate to daily life – both current and future:

- **The first scenario:** energy scarcity and the rise in oil prices
- **The second scenario:** new international monetary system
- **The third scenario:** wars

The first scenario was selected due to the importance of the energy sources in our life and the availability of limited resources. Another reason for selecting the first scenario is the high dependency of industries energy that requires the investigation of future trends as energy scarcity might severely impact industrial operations. Besides, the second scenario is selected due to the continuous changes of the global economy that calls for analyzing how the supply chains could prepare for any sudden and major economic change. The third scenario is related to current political risks and the analysis of how supply chain operations can be managed to reduce the impact of any future war (Enyinda et al., 2008; Busch, 2010). Focusing only on three mentioned scenarios, leaves out the possible implication of diseases, new energy sources, commercial wars, etc. on future supply chain management.

- **Limitation on supply chain collaboration**

The proposed approach is focused on developing a new framework to support the supply chain strategies and their utilization in the future, but it is not designed to research the internal collaboration between the employees of any company. The research is limited to analyze global collaboration for developing a supportive framework for managing the global supply chains. If the framework is used with any of the existing supply chain strategies, i.e., lean, agile or leagility, they can better handle the future market trends (Hudnurkar et al., 2014). Another

limitation is that the data is collected from only one organization that restricts the researcher from generalizing the results/finding.

- **Timing limitation**

The research is conducted between the years 2013 to 2020, which indicates that it is limited to medium- and long-term market changes. It is not concerned with the short-term changes that are occurring in the global markets. This is in addition to the limited expected trends - presented by the scenario planning – that is likely to happen in the future.

- **Limitation regarding wars**

The war presented in the scenario should not be a nuclear war which can destroy mankind and logically there will not be any possibility to talk about supply chains or any business in general. Accordingly, this scenario is limited to regional wars – i.e. traditional or limited nuclear wars, as possible scenarios of future wars presented by several military experts (Shaw & Martin, 2000.; Nye & Joseph, 2004; Sokov, 2015).

1.4. Used research methods

1.4.1. Research procedures

The present dissertation is carried out by using the combination of both qualitative and quantitative research methodologies. The objective of utilizing this combination is to provide adequate theoretical background while developing and validating the proposed framework. In particular, the qualitative research method will be initially used to better understand the concept of the supply chain, the three key strategies of supply chains, as well as the future trends that might occur in the global markets (Denzin & Lincoln, 1984; Berg, 2001; Patton, 2002). Succinctly, the author tries to research what is written in the literature related to this specific area; therefore, the qualitative method exclusively is suitable to achieve this goal (Creswell, 1998).

For analyzing the findings of the interviews with supply chain professionals, the qualitative method is used. The rationale behind selecting qualitative method is that it possesses descriptive nature that assists in presenting and analyzing the collected data. Later on, the analyzed data contribute to building the proposed framework for future supply chain management. In the context of the present research work, the qualitative method is used –

along with grounded theory – to develop a framework that would support the selected supply chain strategies, despite the potential market changes.

In the current research work, it is quite challenging to develop a framework – using lean, agile, and leagile strategies – that could fully manage the future supply chain. In particular, various issues might occur regarding the utilization and implication of the strategies in possible future scenarios. Besides, considering the purpose of the dissertation – i.e., to develop a framework for managing future supply chains, using lean, agile and leagile strategies – a qualitative research design was chosen. However, since not much information is available on the utilization of the three selected strategies under different future scenarios, grounded theory approach is selected (Strauss & Corbin, 1990). It is because the grounded theory is an appropriate methodology for analyzing pertinent theories and formulating and examining the phenomenon under consideration (Manuj & Mentzer, (2008). Therefore, after considering all of these aspects, grounded theory has been considered in the present research (Manuj & Sahin, 2011). Based on the analysis of in-depth interviews as well as grounded theory, a framework is developed for appropriately managing future supply chains.

The second stage of the research contributed in testing the postulated hypotheses, since grounded theory enables the development of the framework, not testing the hypotheses (Manuj & Mentzer, 2008; Manuj & Sahin, 2011; Speier et al., 2011; Sangari et al., 2015). When the framework is developed, the validity and usability of the framework for supply chain professionals are tested by using the responses collected from qualitative research method (i.e., interviews). The entire process is discussed in the proceeding sections.

In line with above-discussed cognitions, this dissertation has the following research stages:

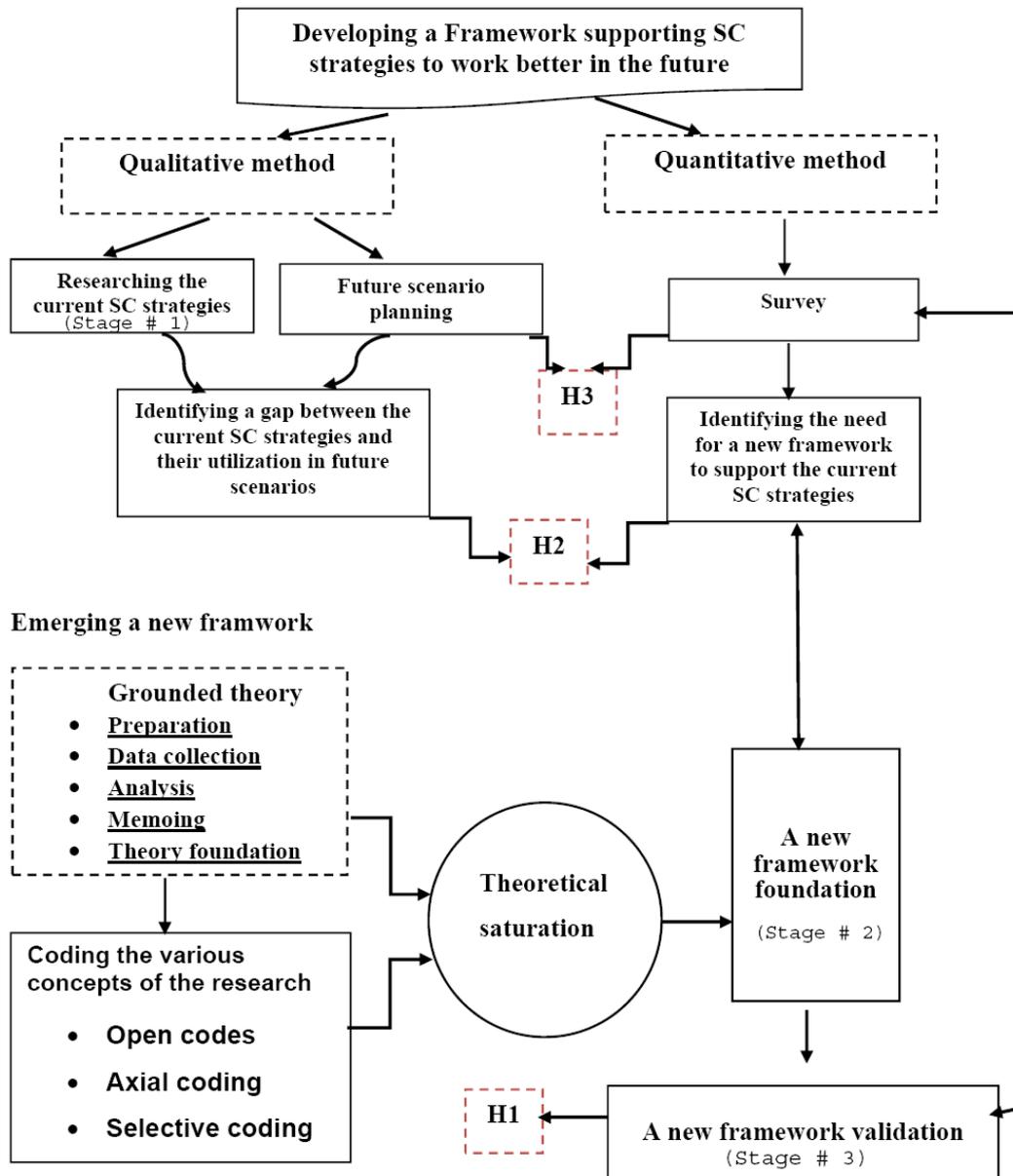
- **Stage 1** –providing a comprehensive literature review about the considered phenomena, like supply chain, considered three supply chain strategies, scenarios and collaboration in supply chains. Various qualitative methods are used at this research stage. Theoretical foundations are also outlined in chapters 2 and 3. Besides that, chapter 3 identifies the scenarios by using scenario planning.
- **Stage 2** – development of the framework for managing future supply chains by utilizing grounded theory approach. The stage also demonstrates the procedures of framework

development, while following the steps that were proposed by Struss and Corbin (1990). The detailed description of these steps is provided in chapter 4.

- **Stage 3** – This stage involves the validation of the developed framework. In particular, the stage is associated with analyzing the usability of the proposed framework, specifically in the light of responses that are given by supply chain professionals. The discussion about supply chain framework's validation and usability is provided in chapter 5.

The following figure presents the research methods, which are classified into qualitative and quantitative approaches. Besides, these methods are also linked with the hypotheses accordingly.

Chart of the research methodologies and hypotheses



Created by the author.

Figure 2: Research approach

The detailed demonstration of the outlined research stages is presented in the proceeding sections.

1.4.2. Research stage 1 – literature review

The qualitative research is a type of research that seek to answer specific questions while explaining the research subject (Denzin & Lincoln, 1984). It involves the practice of

systematically gathering the information and the experiences of the people to adequately understand specific research phenomena.

In the current dissertation, qualitative research methodology has been used. The reason behind selecting qualitative research method is that it has descriptive nature that is expected to understand how current supply chain strategies would suit the future business environment. It has been established from the research work of Denzin & Lincoln (1984) that the selection of the research methodology is heavily dependent on the nature of the research. Since the topic of the present research is associated with assessing how the current supply chain strategies would handle the future scenario, the qualitative methodology seems to be suitable as the topic requires an in-depth analysis that is only possible with this method.

The qualitative method can help the author to describe and explain various strategies of the supply chains while evaluating them and explaining the variations of these strategies. The author conducts an in-depth literature review for understanding the current strategies of the supply chains, i.e., lean, agility, and leagility. Furthermore, the author also analyzes different factors affecting the global business environment in the 21st century to anticipate the future supply chains scenarios. The qualitative method is highly suitable to conduct all of these activities, as the dissertation intends to investigate that how the supply chain strategies will be affected by the future scenarios and what supply chain professionals perceive in this regard.

In terms of literature review and providing an adequate background for later research stages, the following methods are used.

Descriptive method – with this method the description of the studied phenomena, like supply chain, lean, agile, and leagile strategies are discussed. In addition to this, a description of the supply chain collaboration and its importance in the supply chains are also provided. Afterwards, three future scenarios are presented. In particular, these future scenarios include energy scarcity, a new international monetary system, and scenario of war, while highlighting the supply chain collaboration role in developed scenarios.

Compilation method – with this method, cognitions from various authors are comprehensively presented in the dissertation. This method contributed to presenting the perspectives of different authors to have a perfect understanding of the core subject of the research. The compilation method helped the author to calculate and present the results of the interviews

since it is very important to accurately present the actual perspectives of the participants and effectively developing the proposed framework.

Comparative method – with the utilization of the comparative method, various perspectives about lean, and agility were compared. This activity was carried out for gaining a better understanding of the advantages and disadvantages of each strategy and moving to the leagile strategy, which is the combination of both.

The analysis of the information presented in the literature review as well as the results of the survey obtained in stage 2, will enable the author to formulate the proposed framework. The framework is expected to help the supply chain strategies to work better in the three presented future scenarios.

Certainly, the methods used for desk research in the first stage will also be used in other stages of the research as well as in the conclusion section. For instance, analysis, where answers of participants in the survey will be assessed, the comparative method will be used. At this stage, the results and academic literature will be compared.

As this research is associated with what is expected to happen in the future and the reaction of the supply chains accordingly, the qualitative method is more effective to provide findings which were not determined before. This methodology enables the researcher to generate more findings of the topic of study and this is a very important point in this research as it is related to futurology. Since no fixed scenarios are available and changes are continually occurring in the global business environment, the selected research approach would assist in drawing new findings.

The qualitative methodology has inductive nature, so it is suitable for the research topic as the existing supply chain strategies, i.e., lean, agility, and leagility may not be suitable for the future unless certain amendments are recommended for the future. In such cases, where the current strategies – i.e. lean, agility, leagility, are not able to explain the considered phenomena – i.e. future changes of the global markets, a “paradigm shift” should be created (Kuhn, 1962).

In the inductive approach, the researcher begins to observe a phenomenon, by thoroughly studying various concepts. If this observation highlights that the existing theories are not able to appropriately explain the research subject, tentative hypotheses are created in that case, and this could lead to the development of the new theory. In our case, several research

questions were formulated, which reflects the research aims of this dissertation. A qualitative research methodology is a systematic approach towards gathering the data to be used for answering the research questions. Later on, hypotheses were also developed. The hypothesis included the exploration of the future market changes and researching the current supply chain strategies; hence, enabling the author to create a new framework to support the supply chain strategies in the future market changes. The future circumstances are considered through the identified scenarios. Next, the present key starting points were presented - regarding the identification of three scenarios, used in the dissertation, to comprehensively capture future trends of supply chain's circumstances.

Scenario planning

Scenario planning is a research method that is associated with creatively discovering the potential future environments to understand how today's strategic decisions can affect the organizations, in the future (Freeman, 2009).

The scenarios are created always to overcome future uncertainties, so thinking always about "what if" can help the executive management to prepare well for the future (Van der, 2000). The scenarios are always generated based on the complexity of different factors in politics, economics, and society as well (Amer et al., 2013). The systematic collection of data - related to the past and the present - helps to predict the future market trends. As Ballou (2007, p.341) stated: "understanding the past and observing the present allows an extrapolation to what might be in store for logistics/supply chain management in the future". As this dissertation is future-oriented, scenario planning is an ideal approach for it. This is to forecast how the future looks like. The scenarios are all about future stories, as Schwartz (1991) described it as the art of the long view. The scenario planning may not give us the accurate status of the future, but it is a systematic methodology of thinking and organizing the ideas about the future. In short, it gives flexibility and adaptability to the author to work creatively on the various prediction of the circumstances.

Scenario planning is a useful method when we consider a long-term future (Schwartz, 1991). Therefore, this specific method, i.e., "scenario planning" is used to help to overcome the future uncertainties, while getting prepared with suitable supply chain strategies that can work under different scenarios.

The scenario planning helps to present the interaction between the supply chain and specific macro factors and this will help us to understand how these factors can influence the future supply chain operations.

The scenario planning is a powerful method that helps in examining the future and consequently, the author uses this method to identify the future trends of the global markets to propose the appropriate future supply chain strategy. This includes supply chain strategy alignment to suit the new trends of the markets and how they aligned strategies can be implemented in today's and future supply chain.

The author relies on scenario planning because it helps in investigating various factors that might affect the future of supply chains while illustrating the most appropriate supply chain strategy for these scenarios. The author tries to develop a new framework of supply chain management, suiting these scenarios. With this research, the author tries to participate in the efforts aiming to form the new generation of the global supply chains.

Before creating the scenarios, it is essential to review the history of the supply chain, while carefully studying the current status of the supply chain and utilization of its strategies. After identifying different variables and facts related to the past and present status of the supply chain strategies and the global markets, it is useful always to limit these variables to specific scenarios to focus on the subject of the research. Accordingly, the author creates three specific scenarios for future events, which are as follows:

- **The first scenario:** the energy scarcity and the peak of oil prices
- **The second scenario:** new international monetary system
- **The third scenario:** wars

To ensure that these scenarios are useful for the dissertation, they should contribute directly to the achievement of the main objective of the dissertation and answer the research questions. In this regard, each scenario should have “driving forces”, which are the elements that move the plot of a scenario (Schwartz, 1991). The understanding of these forces is extremely important to create successful scenarios. In the above-mentioned three scenarios, the driving forces are groups of political and economic factors, which are usually out of control and derived from the current political and economic status. These are the key variables that are related to the proposed scenarios.

In each scenario, the future trends of the supply chain are presented along with the status of the current strategies that include lean, agility, and leagility. This will be done to see how these strategies can work in changed circumstances or we may need a new approach and additional techniques to support these strategies. In addition to this, it is also considered if the supply chain strategies, i.e., lean, agility, and leagility are useful for the presented scenarios or any evolvment/change is needed. This will be the focal point for the proposed framework that is going to be developed in the current dissertation, based on global sourcing and collaboration.

The author creates three possible scenarios of future events that may affect the supply chains in the future. These scenarios are outlined in chapter 3. Literature review developed scenarios, and examination of the suitability of the selected current supply chain strategies represent key building blocks for new framework development. Thus, the next stage of the research is dedicated to the development of a new framework for managing supply chains under different scenarios.

1.4.3. Research stage 2 – Framework Development

The main outcome of the second research stage is the development of the framework for supply chain management, by utilizing grounded theory approach. Firstly, some starting points are provided for understanding the basics of grounded theory. Afterwards, the dissertation outlines how grounded theory is used in the frame of the broader supply chain research stream. Finally, the rationale for selecting grounded theory for the development of the new framework is provided in the dissertation.

Grounded theory

The research method is effective when there is a need of assessing the interaction of people with the event, impacts of those events on daily lives of people, and solution that could assist in avoiding/minimizing the adverse impacts of those events (McCallin, 2003). The grounded theory is a suitable methodology for drawing theoretical findings, specifically by systematically gathering and analyzing data (Strauss & Corbin, 1990). The grounded theory is an innovative approach, as it aims to generate new ideas. While using grounded theory, the researcher “implicitly assumes that the analyst will be creative” (Glaser, 1978, p. 20). The grounded theory does not only aim to observe a phenomenon, but it also intends to leverage the thinking of the researcher from just observation to analytically building a new theoretical framework (Burrell

& Morgan, 1979). The elements of grounded theory are presented in Figure 3 (adopted from Strauss & Corbin, 1990).

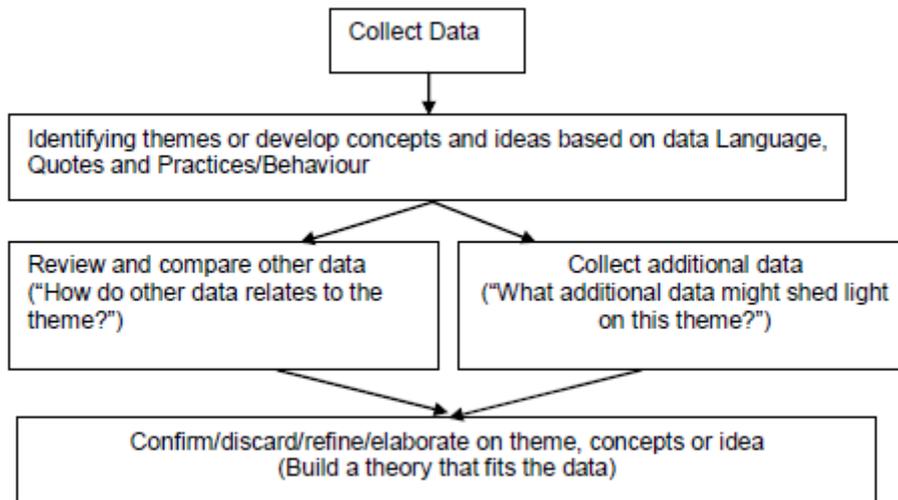


Figure 3: Elements of grounded theory.

There are several approaches to the grounded theory, however, Morse et al. (2009) believe that grounded theory is not a fixed research method, where all the researchers must follow the same approach. On the contrary, it is a flexible method that allows the researcher to tailor it, as per his/her own research needs.

This process of the grounded theory involves the collection and analysis of data that requires the researcher to conduct both of these activities in parallel. The grounded theory depends on a deep reading of the textual database – especially the literature review data – to generate new concepts out of that. This process can be done by re-reading the texts several times and highlighting the variables – that falls under the category of the present research. This practice eventually contributes to collecting valuable data that would help draw meaningful conclusions.

Once these variables are highlighted, the researcher should look for the interrelationships between such categories. The researcher should have “theoretical sensitivity” to discover the variability of the categories and their relationships accordingly. This theoretical sensitivity is the stage of converting the status of the research from being descriptive to analytical.

The grounded theory is the method of identifying different categories, linking them together, and integrating them to generate a final framework. Further, it depends on a tool for systematically organizing the ideas. This tool is called “coding”.

The coding process aims to systematically present the data to highlight the similarities and differences of the information – related to the subject of the research; hence, focusing on a single point of thinking after refining all codes. This single point of thinking is the core concept of the research, which the author should consider to develop his distinctive approach.

The grounded theory, the coding process is composed of three stages (Strauss & Corbin, 1990): (1) open coding, (2) axial coding, and (3) selective coding. These codes - according to Strauss and Corbin (1990) - should describe the dynamic events in the research. Before creating the codes of the research, it is important to have complete details about the nature of the codes. The proceeding paragraphs briefly explain the type of codes.

Open codes

This tool is created to identify important words while naming the categories to identify the subject of the research. The purpose of the open coding is to organize the ideas of the research in a systematic way to utilize the same in a later stage, specifically for axial codes and then selective codes.

Axial codes

This is the second process and it is designed to identify the relationships between the open codes, specifically to highlight the variability. These relationships will be recorded in the following frame (see Table 1).

Element	Description
Phenomenon	Concepts which are subject of interest
Casual conditions	The causes of the phenomenon
Context	Background of the events
Action strategies	This represents the actions to be taken against the phenomenon

Consequences	The consequences of the action strategies
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Table 1: Relationships between the codes

Selective coding

This process is designed to select one core subject and to establish the relationships between that subject and the categories. This is the essential process to focus on a single researching point, specifically to take the research towards the generation of the theory. This code can be generated by continuously reviewing the presented data and codes.

The codes cannot always be generated at once, but the researcher has to go back to the presented data in the research – several time – to review what he/she recorded as codes. This is the process of theoretical sampling (Glaser & Strauss, 1967).

After gathering the information from the supply chain professionals in the second phase of the research – about the key strategies of supply chains and the expected future changes of the global markets – this information will be carefully analyzed to identify the proper selective code of the research; hence, adequately designing the proposed framework.

Grounded theory and SCM research

The grounded theory is an inductive methodology that serves as a useful tool for exploratory research and qualitative data analysis (Sangari et al., 2015). There are several evidences, where the grounded theory was used for the development of new models or frameworks. For instance, Manuj & Mentzer (2008) utilized in-depth qualitative interviews by using grounded theory methodology. By using these methodological approaches, the Manuj and Mentzer developed a model of risk management strategies in global supply chains. Moreover, Speier et al., (2011) developed a framework to examine the threat of potential disruptions that are occurred in supply chain processes. Likewise, Sangari et al., (2015) developed a practical evaluation framework that helps in identifying the critical factors for achieving supply chain agility. Finally, Manuj & Sahin, (2011) developed a comprehensive supply chain model and supply chain decision-making complexity that provides an understanding about the drivers of supply chain complexity and strategies that could be used for managing supply chain and supply chain decision-making complexity and outcomes.

Based on the available literature, it can be summarized that grounded theory is appropriate for developing new models or frameworks, especially in the areas, where available literature is scarce regarding the considered phenomena – as in our case.

Next, the research proceeds towards the description of how the grounded theory was deployed for framework development.

Grounded theory utilization for framework development

This methodology is focused on presenting the similarities and differences of a particular phenomenon. This feature can help the author to explore the similarities and the differences of the various supply chain strategies; hence, developing such robust supply chain management framework that is suitable for the future supply chain trends and global business environment. The grounded theory is a useful method when there is a need to observe variabilities of specific phenomenon along with the identification of the ways on how these variabilities of supply chain strategies influence each other. In addition to this, the method also helps in assessing how the supply chain strategies interact with the outside environment at a macro level (Glaser, 1978).

The in-depth literature review section represents the key building block, which the author uses for developing a new framework. Therefore, for this creative nature of research, the grounded theory seems to be the most suitable methodology. The states of utilizing grounded theory – proposed by Simmons (2011) – are used in the present dissertation and are thoroughly discussed as follows:

- **Preparation**: This stage generally involves researching the current strategies, i.e., lean, agility, and leagility. Additionally, the stage also demonstrates the future trends of the supply chains.
- **Data collection**: This could be done by the rigorous literature review and utilizing the professional experience of the researcher in the global supply chains. The important part of this step is to conduct a series of interviews with supply chain professionals who are currently working in this business environment.
- **Analysis**: Starting the analysis by demonstrating the distinction between various supply chain strategies and the future trends of the global markets. This process is used to relate, compare, and link the ideas to each other. The tool, which is used for this purpose, involves coding and categorization of various ideas of the research. This

process enables the researcher to identify the core variable and the dimensions of the new emerged framework.

- **Memoing**: the memos can help the researchers to organize the data of the codes and identify the relationships. This process is very useful for extracting the core concepts of the emerged framework from the current body of knowledge, presented in the research. The concept of the emerged framework has to be integrated into the relevant literature review. This kind of theoretical integration is essentially required for generating a solid base framework. Thus, codes in this research are created based on the memos taken by the author initially to ensure that they represent clear and refined concepts.
- **Theory foundation**: the framework can emerge by sorting the data to create an outline, which needs to be reviewed and refined before writing up the draft.

The coding process that is composed of three stages is very suitable for the subject of this research. The process is fundamentally related to the future trends of the supply chain since the future is dynamic and changing over time. Therefore, the authors chose to use this methodology.

We have noted in the researches of grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1990) that the data collection process must be done systematically, where the researcher has to review each piece of information carefully and do the necessary analysis and coding. In that frame, it is important to present the theoretical sampling as well.

Theoretical sampling

The sampling process is an essential part of the grounded theory methodology. It is defined as “The process of data collection for generating theory, whereby the analyst jointly collects, codes and analyses his data and decides, which data to collect next and where to find them to develop his theory as it emerges” (Glaser & Strauss, 1967 p.45).

Strauss and Corbin (1998, p. 201) described the theoretical sampling as a mean to “maximize the opportunities to discover variations among concepts and to densify categories in terms of their properties and dimensions”. Based on these definitions, all the data presented in this research is reviewed carefully to identify the codes and ensure that these codes are relative to the core idea of the research. All these data, which will be coded, are presented in the literature

review. The outcome of this process is to reach to the main characteristics of the framework, as it will be developed.

Theoretical sampling is essential for data collection. The main purpose of the sampling process is to have the focus of research on specific ideas and identify the correlations between them accordingly. Refining and grouping the data systematically is very important to have clear categories. It is a continuous process throughout the research until the core category is saturated (Glaser, 1978). Therefore, this core category becomes dense enough, and new data will not lead to new results (Glaser & Strauss, 1967).

The process of theoretical sampling in this research is done in the line of suggestions of (Glaser, 1978; Strauss & Corbin, 1998; Manuj & Sahin, 2011):

Step 1

A deep review of the literature related to lean, agility, and leagility. The main purpose of this activity is to fully understand the nature of these strategies and how they work in the supply chains currently with all their similarities and differences. The collection of data in this step should be comprehensive to have an elaborated knowledge about these strategies.

Step 2

Creating three scenarios of events, which could happen in the future and affect the supply chain strategies. The collection of data in this stage depends on reviewing the literature related to this subject specifically concerned with the current political and economic factors faced by us. The outcome of this process leads to the creation of three possible future scenarios; energy scarcity, new monetary system, and the possibility of war.

Step 3

This step aims to integrate steps 1 and 2 to assess the ability of lean, agility, and leagility to work in the three presented scenarios. To perform this assessment, the author targeted the supply chain professionals who know this subject.

Step 4

Analyze the data collected in all the above mentioned three stages until a theoretical idea starts to emerge, which in our case is the need of a framework to support lean, agility, and leagility to work better within the three future scenarios. This framework is particularly focused on

improving the global sourcing process and collaboration of supply chains. Thus, this is the theoretical idea of this research emerged from categorizing the codes and data presented in the research according to the guidelines of the grounded theory.

Step 5

Data is collected based on the theoretical idea emerged in stage 4 and presenting the concept of the proposed framework to the supply chain professionals and, observe and record their feedback accordingly.

Step 6

This stage involves continuing step 4 and 5 again and again until attaining a theoretical saturation level where no new information can affect the initial results. This is the endpoint of grounded theory utilization.

It is predefined in the above paragraphs that this research comprises of interviewing and performing field research. The research conducts interviews with the supply chain officials to develop a grounding structure for the development of the comprehensive framework. The field research among the supply chain professionals helps in validating the model. The participants in this research have been recruited wisely to ensure that all of them hold in-depth knowledge regarding the supply chain strategies and proven records of field experience in the global business as well. It guarantees in acquiring meaningful and most relevant data to the subject of the research. The prominent criteria to recruit the ideal participants for the research included examining their academic degrees, professional experience, and job title.

Various types of business and associated roles within the supply chain sector have been assured before recruitment among the participants in terms of their organizations. This ensures that the research is conducted to examine the general business industry rather than targeting any specific organization or certain levels of management in the supply chain.

Before addressing the questions, all the participants were enlightened with a brief introduction explaining them with the general idea and the purpose of the interview. This process also involved presenting all the answers to the participants before the completion of the interview to verify the process. The participants verified the answers that led to minimizing the chance

of error and bias in the. It took approximately 20 to 30 minutes to collect the answers of each group of the questions.

It has been observed that the experience of the participants varies from senior to junior employees and managers. Most of the participants have a diverse experience of being engaged with multiple organizations with years of experience in the relevant field. However, some of them have been associated with one organization; thus, they hold a specific experience in one business sector only.

The research attained the theoretical saturation in the first phase of the survey after acquiring 150 responses of the participants who answered 20 questions. According to Manuj and Mentzer (2008), the authors always try to keep their knowledge and subject-related experience hidden from the participants to prevent any interference in their research process. Therefore, no further information or explanation was provided to the participants.

The interviews were conducted with the 150 supply chain professionals to record and maintain their feedback carefully. The saturation point was recognized when no addition in the value and no change in the results were observed after interviewing new participants. This saturation point happened after interviewing 150 participants.

More succinctly, it has been analyzed that the outcomes of the second stage of this research are relevantly appropriate to the proposed framework of the supply chain that supports lean, agility, and leagility to be fit for the future presented scenarios. These scenarios are constructed using a grounded theory research methodology based on interviewing supply chain professionals. The next stages of the research provide validation of the developed framework.

1.4.4. Research stage 3- framework validation

The participants were the same in both of the stages of empirical examination i-e in the interviewing phase and the surveying phase among the supply chain personnel. This was an essential point to ensure the validity of the framework because all the participants who highlighted the need of a new framework in the first phase must also confirm that the proposed framework in the second phase was ideal to accomplish their demands to support the supply chain strategies profoundly. Without understanding this point, the research cannot be considered *valid*. It will ultimately become invalid if a group of professionals highlight problems in the first phase but another group finds conflicts in the proposed framework of the research.

This section is designed to present the examination of framework usability. Therefore, it holds a substantial place in the research to summarize the usability of the framework based on the analysis conducted in this research and the feedback of the supply chain professionals in the survey.

During the interviews in the second stage, it became clear that the supply chain professionals had abundant knowledge about the supply chain strategies and they were fully aware of the challenges, which could be encountered within the supply chains in the future. Furthermore, it has also been found that there exist several challenges that supply chain professionals may face in the future with the increasing development of the business environment and global trends. Also, the current supply chain strategies are not enough to work in the future without an adequate amount of support – i.e. the proposed framework.

Once the framework of lean, agility and leagility strategies have been developed, it is critical to examine the usability of the proposed framework with the help of answers of supply chain professionals via field survey. The developed framework is presented to the supply chain professionals to obtain their feedback about it.

The new framework and the featured proposed organization (later named as IRMO) within the framework, were presented and explained well to the participants to obtain their feedback. Initially, the three hypotheses of the research were presented to the participants as questions to measure the primary perspective of the supply chain professionals regarding these hypotheses. This would help the authors to examine the usability of the framework and how it can work in practice. Then, the possible obstacles to implement the framework would be searched, and the suggestions of the professionals for modifications and improvement of the initially proposed framework would also be gathered.

The cognitions about framework validation and usability within supply chains are presented in chapter 5. This section presents the basic characteristic of this research stage.

The survey would use a quantitative method, specifically for the closed-end questions having multiple items for the participants. The results of this survey would be gathered as numbers and percentages to confirm the response of the participants and present the answers in an organized manner, as demonstrated by Mathiyazhagan and Deoki (2010). The survey would provide accurate results with the help of using this approach because it categorizes the answers

systematically in groups. And, each group represents the opinion of the participants related to the subject question.

At this stage, the framework would be presented to the participants during the field survey. Participants in the survey would express their attitudes and opinion about the possible success of the framework. To capture the most accurate perception, supply chain professionals with pure experience in this field would be considered as the primary participants. This stage provides “practical validity” to the proposed framework – not only theoretical – because all the participants in the survey are working practically currently in large global supply chains.

Besides testing the validity and usability of the framework, this research stage would also test three postulated hypotheses that would be discussed in the later paragraphs. To test the hypotheses, the quantitative method has been chosen because as per Kerlinger and Lee (2000), it as an approach that is concerned with the predictions and measuring of how the proposed hypotheses could be tested.

In the frame of the quantitative research approach – to validate and test the proposed framework – the research is comprehensively relying on surveying supply chain professionals. The framework is initially presented to the participants, and the authors have measured the percentage of the agreement that demonstrates whether or not the framework support the key strategies. Because the quantitative research methodology is scientific, it helps the author to analyze and evaluate the results of the survey to be acquainted with the visions of the participants. Furthermore, it also illustrates the suitability of supply chain strategies for the future. As this research is concerned with future trends, the surveying approach is found to be a substantial methodology here. Isaac and Michael (1997) also consider this approach to be a highly powerful method to analyze trends across time.

The objective of the survey is to present this framework to the supply chain professionals to validate, ensure the useful practice of the framework, and attain their opinions and any possibility of modifications.

The design of the survey questions

The questions in the survey are designed having multiple choices for the participants. The author has tried to include the potential answers in the multiple choices so that the respondents can select the most suitable and closest of the answers. First three questions are

directly related to the hypotheses testing while remaining questions are associated with tackling the three strategies, identified scenarios, and especially the developed framework. In this regard, the majority of the questions are dedicated to the framework assessment by supply chain professionals.

The Data Collection

The data collection is done using three modes; e-mails, face to face interviews, and telephonic interviews. The reason for choosing these three modes of data collection is that they ensure the prompt response from the participants. Thus, accurate information is gathered.

The study

Before conducting a full-scale survey, a pilot study should be conducted, including 20% of a full-scale survey of the participants. It is very important to make sure that the questions are fully understood and easily answerable by the participants. The pilot study is very useful as it indicates the primary results. Even though these results are not finalized, but they help the author to get a fundamental idea about the vision of the supply chain professionals regarding the supply chain strategies and the future trends of the markets. Also, it is very useful while preparing the other chapters of the research on a solid base.

The language of the questionnaire is English, and all the participants have also provided their answers in the English language.

The survey is conducted as per the following details:

- Sample size: 150 supply chain professionals in logistics and supply chain management field worldwide. The participants are all in key positions in their global supply chains that may include but not limited to directors, managers, supervisors and officers.
- The role of the author in the global logistics and supply chain industry is to accomplish his tasks in terms of contacting all the participants and ensuring that the participants provide responsive answers. The participants are selected based on their industry, functions, geography, and company size. All the participants are selected very carefully not randomly from different industries, functions, and companies. The author ensures that all the participants would have extensive experience in the supply chain so that the potential outcomes of the research survey can be accomplished.

- The author ensures that the participants represent various roles of the supply chain, so their answers can describe the exact situation of the current supply chain practices and the trends of the future from the perspectives of all the participants of the supply chain.
- Results are outlined using elements of descriptive statistics, like frequencies, as well as through charts to present the results of the survey.

1.4.5. Research methods for hypotheses

According to de Leeuw et al. (2008), any author who selects the survey as one of the methodologies to use in his/her research, he/she must understand the relationship between the survey method and hypotheses of the research as following:

- The hypotheses help the author to design his survey in terms of subject, sampling, type of questions, and even all details of the survey. The author must ensure that all the questions of the survey are directly helping him to answer the research questions, so they all must be focused on the core subject of the research problem.
- The survey helps the author to test his hypotheses, as the feedback of the participants in the survey is very helpful to give a tentative answer to the research problem. Also, it indicates if the presented hypotheses are valid or not and to what extent.

Research methods that are sorted based on the hypotheses are shown in table 2.

Method	H1	H 2	H3
	Grounded theory	Descriptive statistics	Scenario planning
	Field survey	Field survey	Field survey

Table 2: Research methods sorted according to the hypotheses

Hypothesis 1:

The developed framework for managing future supply chains would enable in improving the management of the supply chain.

The proposed framework by the author would help to overcome the future changes in global supply chains. It would enable the management to better cope with future trends of supply chains and support the utilization of lean, agile, and leagile strategies in terms of identified scenarios to work better in the future and face the expected changes of the global markets without any difficulty.

The survey among supply chain professionals – conducted in the frame of the third stage of the research – would help to validate the new framework. The survey ensures that it would be useful for the supply chain professionals and add real value to the supply chain strategies to make them solid in front of the future changes of the global markets. It is a significant point in the dissertation to understand that the proposed framework is useful for the supply chain professionals – while running their business – and it is not just theoretical research.

It can also be emphasized that the grounded theory would be indirectly used as a research methodology for testing this hypothesis since using grounded theory would enable the author to create his new framework. This framework is based on all the presented information in the research – i.e. second research step. Thus, generating this framework would be done specifically to cover the gap in the literature and support the current supply chain strategies to work better in the future under different circumstances.

Hypothesis 2:

For the management of the supply chain, a framework is needed for supporting the improvement of current and future supply chain management working.

Lean, agility and leagility are key strategies for the supply chains. They can work better in the future if they are supported by a new framework based on global sourcing and collaboration.

Testing this hypothesis is based on the theoretical body of knowledge, particularly to explain the core concept of each strategy, similarities and differences, and how they work in the current status of the markets. The author would leverage the theoretical thinking of the dissertation from studying these strategies in the current status of the markets to the future global trends and point out how these strategies can work better in the future.

The survey among supply chain professionals would again have a significant role in the process of testing hypothesis two. It would be tested through descriptive statistics. It would provide a

very clear picture of the vision of the supply chain professionals for lean, agility, and leagility from a practical perspective, and explain how these strategies can fit for the future.

Hypothesis 3:

Development of the business environment and management of supply chains would require utilization from supply chains of adequate business strategies.

The global markets would change significantly in the future, and these changes would affect the currently known strategies of supply chain and utilization of these strategies. Testing this hypothesis would be based on the scenario planning methodology to create future scenarios of the global markets and examining the current supply chain strategies against each scenario to reflect their suitability for these expected changes.

Again, the field survey among supply chain professionals would have a significant role in the process of testing the third hypothesis. It would highlight the perspective of the people towards the future scenarios and their visions related to the supply chain strategies in these scenarios. The descriptive statistics would help the author to analyze the data gathered from the survey, while systematically presenting them.

2. Development of Supply Chain Strategies

The goal of this chapter is to provide a comprehensive overview of selected supply chain strategies that are used to manage supply chains to gain a broader understanding of the key concepts of supply chain management. In line with that, the chapter first focuses on theoretical underpinning for understanding supply chains and its development phases. Next, the chapter focuses on three specific supply chain strategies, namely lean, agile, and leagile strategies. Finally, the chapter concludes with the notion to implement the strategies above in current business practices.

2.1. Supply Chain

2.1.1. Theoretical Understanding of Supply Chain

Previous literature has broadly defined the basic terminology of the supply chain and its underlying strategies through multivariate approaches (Jones et al., 2000; Christopher & Towill, 2001). Different definitions of the supply chain have evolved (Lambert et al., 1997; McCullen &

Towill, 2000; Christopher & Towil, 2002; Christopher, 2005; Chopra & Meindl, 2014) facilitating in building core concepts of the supply chain and its relevance in the present era.

Several definitions have been considered from the past literature focusing on the supply chain which has been the forefront of studies (McCullen & Towill, 2000; Christopher & Towil, 2002; Chopra & Meindl, 2014). Christopher (2005, p. 17) identified the supply chain as “Network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer”. Lee and Ng (1997, p. 191) defined supply chain as “a network of entities that start with the suppliers’ supplier and end with the customers’ customers for the production and delivery of goods and services”.

Other authors also focused their intentions on contrasting viewpoints of the supply chain. Chopra and Meindl (2001, p. 3), defined supply chain as “A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request”. Monczka and Morgan (1997, p. 69) defined supply chain as “An integrating philosophy to manage the total flow of a distribution channel from supplier to the ultimate customer”. Lummus and Alber (1997, p. 10) considered supply chain as “The network of entities through which material flows, where those entities may include suppliers, carriers, manufacturing sites, distribution centres, retailers, and customers”.

The scope of the supply chain is extended over time from organizational practice to the extended network as a result of globalization and increased focus on the prospects of outsourcing (Gereffi & Lee, 2012). This has led to the engagement of different activities under the umbrella of supply chain management. Accordingly, definitions of the supply chain have also evolved (Oliver & Webber, 1982; Christopher 1992; Monczka et al., 1998; Chopra & Meindl, 2001; Simchi-Levi et al., 2009). One of the most comprehensive definitions of the supply chain is proposed by Stock and Boyer (2009, p. 706) who studied 173 definitions of the supply chain. They defined supply chain as “The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing, and related systems that facilitate the forward and reverse flow of materials, services, finances, and information from the original producer to the final customer, with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction”. This definition is comprehensive

since it was developed through in-depth research after studying many publications, and it covers all the aspects of supply chain management.

The organizations operating within the framework of the supply chain need to understand the basic principles to comprehend these values within the routine business practices (Baker & Stock, 2015). How these efforts contributed to the body of knowledge about the supply chain? These are the additional questions for better understanding of the supply chain concept (Lummus & Vokurka, 1999). Looking through the lens of practice, the underlying idea of the supply chain, as a concept of minimizing the cost and maximizing the profit is an “old concept”. It is as old as the concept of doing any business in the world. Thus, the practices of supply chain and supply chain management are conventional, while the theoretical foundations are much recent. However, any business aims to achieve the maximum possible profit with the lowest cost (Chopra & Meindl, 2001).

Concerning the definitions, the supply chain has been bifurcated into vertical and horizontal supply chain integration which has been discussed in the following paragraphs.

Vertical Supply Chain

The initial concept of the supply chain development originated on the grounds of “vertical integration” (Lummus & Vokurka, 1999). This technique was used largely during the World War II, where the military forces used to secure all the needs of the war internally, and the logistics groups in the army were responsible for delivering the materials and services to all locations on time (Ballou, 2007). After the war, it was not difficult to imitate this practice of vertical integration to the business, as it had succeeded in the military field; therefore it was asserted that it would achieve similar success in business (Wilson, 2014).

Successful examples of vertical integration existed even before its common utilization by the military forces during World War II. The best example of this practice is what was implemented by Henry Ford in the automotive industry, where most of the supply chain activities were done in-house, and the outsourcing activities were kept to the minimum level (Wilson, 2014).

The practice of integrating the supply chain vertically was logically understood at that time; however, the methods of communications were not developed as they are today. Communications between different organisations at the international level were challenging and required a huge amount of time to cooperate and collaborate amongst business partners

(Vishal, 2015). Lack of communication and geographical boundaries created hurdles and lack of accessibility to resources restricted the companies to conduct in-house activities limiting the outsourcing where it was deemed necessary (Timothy & Jonathan, 2012). Thus, the companies at that time had much control, because they can manage the resources and raw materials required for operation internally, as they did not depend on other parties, but just utilizing its internal resources, and sometimes outsourcing nearby whenever possible and easy (Timothy & Jonathan, 2012).

Horizontal Supply Chain

Throughout the time, the organizations realized if they focused on in-house operations, this would transform the focus of the organization from its core competence to some other activities, affecting the ability of the company to compete in the marketplace (Yen et al., 2012). Moreover, the vertical supply chain harms the product quality, as the organization needs to perform activities for which it is not specialized in some cases. There is no way to compare the same to what is offered by other specialized companies in terms of the service level and cost (Jiang & Qureshi, 2006).

For these reasons, the trend of the supply chain integration has been shifted from vertical integration to horizontal integration, so the supply chain can focus more on its core activities and outsource the non-core activities to other parties (Constantin & Oana, 2014). The businesses can lose some control, but it can achieve economies of scale by outsourcing the activities to specialized organizations. Furthermore, it can focus better on its core competences, and controlled can be gained by collaborating closely with suppliers upstream the supply chain (Zafar & Aasim, 2013).

The trend towards horizontal integration has increased the number of business partners within the supply chain, and consequently, the need for effective and responsive communication has also increased (Lotfi et al., 2013). The business relationships between different organizations in the supply chain became very complicated. However, the most advanced tools of information technology were not discovered at that time, which was one of the most important triggers for developing new tools of communications and the evolution of the information technology (Hasan et al., 2012).

The synchronization of the activities between those organizations became a real challenge, and that is why the development of the supply chain as a concept is related to the development of information technology very closely, and how such new technologies can assist the supply chain in achieving the best practice (Hasan et al., 2012). From that point, the supply chains turned their focus to the utilization of information technology tools to facilitate the business, and this trend is still practised today. The supply chain professionals continue to engage with IT experts to develop innovative business solutions. From the viewpoint of this dissertation, which deals with future trends of the supply chain, this type of collaboration must continue in the future as it will help to create the next generation of supply chain management. In a survey conducted by PWC group with more than 500 supply chain professionals, it was confirmed that there is high interest in a new generation of information technology in supply chain and this trend is currently increasing at a rapid pace (PWC, 2013).

The idea of the development of the supply chain is focused on outsourcing trends mainly. Hochman et al. (2007) studied this trend in the USA and found that 92 % of the companies participating in the study are outsourcing some of their products, and 40% believed that they would outsource more in the next two years.

The development of business has to be differentiated into two time period; the one before the appearance of the personal computers and using the same in all types of businesses, and the later period is after the personal computers are commonly used in business. The information technology represented a great revolution to form the supply chain concept itself and evolve it over time (Končar & Leković, 2013).

The manual supply chain – without computers – was not able to handle much information perfectly. There was always a possibility of a large number of human errors while arranging the data. Moreover, it used to take time to generate any data or reports to determine what should be done at any certain time, and until those reports were prepared, the suitable time of the action could have passed. Thus, until the manual supply chain concludes decision point, the situation may have already changed, and another decision should be taken, so there was a gap always related to the synchronization of data and the events requiring actions (Brauner et al., 2013).

On the contrary, and after using the computers to manage the supply chains, this synchronization became momentary and prompt. Hence, the decision-maker can get real-time information always; this has played a significant role in developing the modern supply chain as we know today (Hasan et al., 2012).

Next, the development phases of the supply chain have been focused.

2.1.2. Development Phases of Supply Chain

The supply chain as a concept was created and has evolved through the continuous contribution of efforts (Kopczak, & Johnson, 2003). In this section, a review of supply chain idea evolution has been discussed. Next, the integration of the supply chain has been outlined, followed by the idea of logistic integration resulting in supply chain management. In the final part of this sub-section the development of enterprise resource planning has been reviewed which can be considered as the most advanced and latest development of original materials requirement planning.

Review of Supply Chain Idea

Early insight on the supply chain can be found in the research of Heckert and Miner (1940) concerning the total cost concept with their presumption that controlling the cost of a single function in the organization cannot guarantee to reduce the cost of the entire system. The idea of the supply chain is relatively old, but the term “supply chain” specifically appeared for the first time in research of Oliver and Webber (1982). Nevertheless, before initiating the term of “supply chain, there were various techniques implemented in business such as total cost, best practice, efficient consumer response, and this represented the roots of the modern supply chain (Ballou, 1978).

Before 1950, all the activities of the supply chain were distributed between other functions in the organization, so the traditional structure of the organizations did not include a dedicated team to perform the supply chain activities (Mamun, 2011). For example, the distribution and logistics were included in the marketing and production functions; the responsibilities of each function were much broader than nowadays (Kopczak, & Johnson, 2003). Moreover, each function used to work as a separate silo with a low level of coordination. This resulted in slow motion of materials and information across the organization and between the organization and its business partners as well (Fredendall & Hill 2001). The slow movement led to high

operational costs as a result of low coordination, unclear responsibilities, and missing specialization. For these reasons, there was a need for a system of operating and planning for the business. A lot of efforts were done during the last decades until the supply chain concept was developed as we know it today (Mamun, 2011).

In the mid-1960s, the efforts of developing supply chain were established by merging the “best practice” techniques with the early generations of IBM computers (Mamun, 2014). Later on, the electronic data interchange (EDI) system was developed as a tool of real-time information (Burt et al. 2003).

The roots of the supply chain can also be traced to the textile industry initially and the grocery businesses through the technique of “efficient consumer response” (MacCarthy & Jayarathne, 2012). Additionally, the quick response technique was developed to overcome the problems associated with the long transit and replenishment time in the retailing business. Through the quick response, the retailers and suppliers were able to respond promptly to the meet the customers’ needs, and this was achieved by collaboration and sharing the information of the sales outlets (Lummus & Vokurka, 1999).

For the efficient consumer response, it helped the retailers to anticipate the trends of the future demand, so the supply chain can always be prepared with enough stock to respond to the market requirements (Caro & Martínez, 2010). This idea represented a base for developing a new technique which was known as “continuous replenishment” enabling the retailers to achieve just in time replenishment (Lummus & Vokurka, 1999).

The core concept of developing such techniques overtime was the “integration” which was the key element that the supply chain used to jump from a stage of development to another utilizing the newly invented information technology systems. The integration of processes and partners was the key to supply chain evolvement (Petar, 2014).

Towards Integrated Supply Chain

In the above section, the initial evolvement of the supply chain has been briefly discussed. Next, the evolvement of the supply chain towards an integrated supply chain in a more comprehensive manner has been reviewed. According to Stevens (1989), the integration of the supply chain was performed in four stages.

Stage 1 – fragmentation – it includes stable functions of purchasing material, control, production, sales, and distribution. Each function runs independently completely from the other functions. In this stage, each function seeks to optimize its activities regardless of the impact on the overall performance of the organization.

Stage 2 – functional integration – it includes the integration of various functions through materials management, manufacturing management, and distribution. This stage represents limited integration between two or more functions in the organization.

Stage 3 - internal integration – this stage represents the internal integration inside the organization. This stage represents an integration between all the functions in the organizations or as described by Christopher (2005, p. 18) “end-to-end planning framework”.

Stage 4 - external integration - is related to external integration with the business partners. In this stage, the coordination, which is achieved in the third stage, is linked to the suppliers upstream and the customers downstream across the extended the supply chain (Christopher, 2005, p. 18).

Development of supply chain’ integration is presented in Figure 4

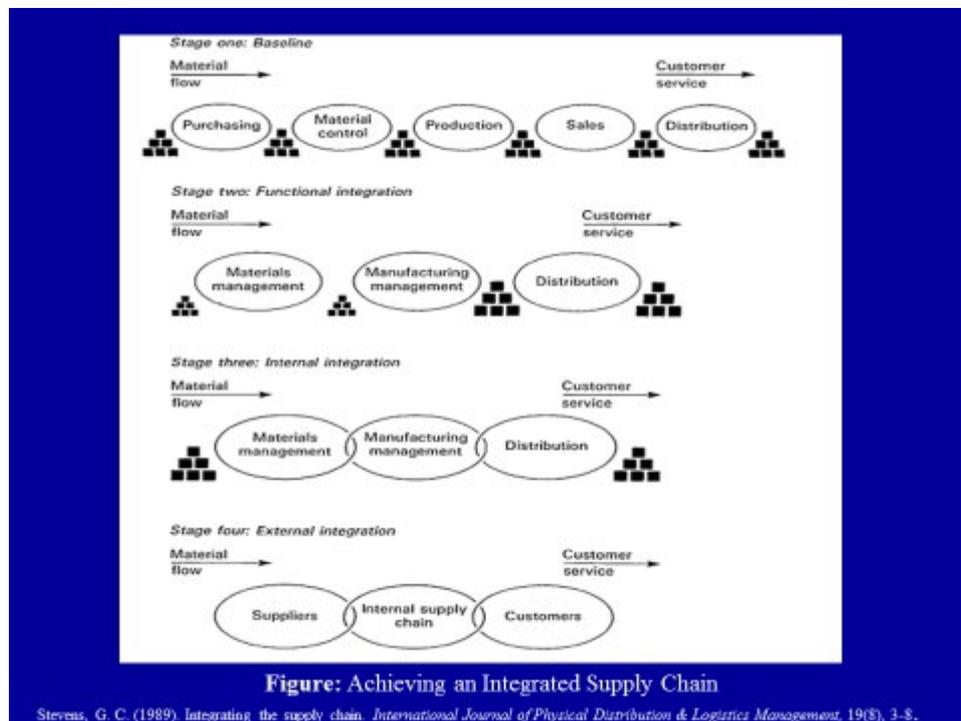


Figure 4: Achieving an integrated supply chain

(adapted from Stevens, 1989)

From Logistic to Supply chain

Besides outlining the development of supply chains, as proposed by Stevens (1989), the literature also highlights the idea about the evolution of logistic integration or evolution of business logistics (Drezner & Hillestad, 1982; Rodrigue, 1998; Christopher, 2011). The fast development of logistic was also influenced by high integration from 1960 till 1980, and this has led to the development of integrated logistics concepts, like materials management and physical distribution. Consolidation process continued in the 1990s in the direction of developing the concept of logistics, which included holistic consideration of inbounds and outbound from an organization. After 2000, a holistic concept of supply chain management appeared, which included the integration of all the functions and extending the collaboration with other supply chains globally making use of the developed information technology methods. The summary of the integration of business logistics is summarized in figure 5 (adapted from Rodrigue, 1998). In figure 5, the evolvement of the logistics from 1960 has been illustrated, where various functions were fragmented, highlighting how the integration of supply chain management was achieved in the 2000s.

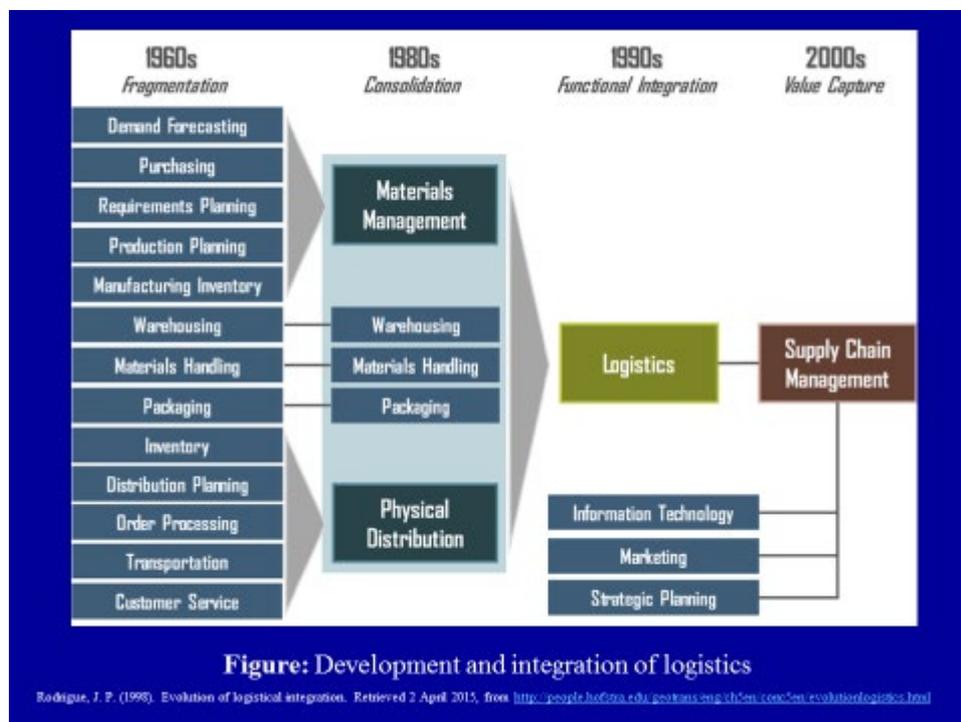


Figure 5: Development and Integration of Logistics

As illustrated in Fig 5, several factors affected and supported the development of the supply chain and its management (Rodrigue et al., 2017). The evolution of information technology

helped the organizations to extend their business relationships overseas accelerating the work cycle as a result of using faster methods of communications and data transfer (Catherine et al., 2014). This implication made the supply chain more complex as the number of participants increased dramatically over time (Jacobs et al., 2014). This trend gave the decision-maker multiple options of outsourcing, and consequently, a new trend of “minimizing the inventory” was recognized because of the competition between many suppliers (Perks & Oosthuizen, 2013). The trend of minimizing the stock resulted from the availability of different sources worldwide, so there was no need for maintaining a high level of inventory as long as the supply chain had so many outsourcing options, in addition to the fast modes of transport and communications (Catherine et al., 2014).

Consequently, each supply chain preferred to keep the inventory at a minimum possible level (Robin et al., 2015). Although this objective seems to be easy, it is difficult to be achieved practically, as there are two constraints for this objective: (1) to determine the requirement of materials and services at any given time, and (2) to identify the priorities of these materials and services continuously. The first point is related to (what is needed?), and the second is (when is it needed?). The time factor plays a fatal role in supply chain management.

Development of Enterprise Resource Planning

Keeping the focus on the importance of information technology for the development of supply chain management, the development of enterprise resource planning can be considered as the most advanced and latest development of original materials and requirement planning philosophy (Slack et al., 2010, p. 408). In line with the enterprise resource planning: (1) material resource planning, (2) material resource planning II, and (3) enterprise resource planning has been discussed.

The Material Resource Planning

To handle two constraints regarding the requirements of materials and priorities – the material resource planning (MRP) is introduced as a concept in the supply chain literature (D’Avino et al., 2014). The MRP helps the supply chain to determine the raw materials needed to manufacture the finished products, in addition to determining the ordering time of the raw materials to be available just on time. It depends on the bill of materials to control this process (Chase & Aquilano, 1995).

To achieve these objectives, the MRP depends on different functions (Kurbel, 2013); “Master production schedule” to determine the due date of the finished products, and the quantities of these products, but the capacity of the production always constrains this. So when the decision-maker thinks about the quantities and the due dates of the finished product, he/she have to consider always what his/her production can do within a specific timeframe. This idea is introduced in the supply chain literature as “Capacity requirement planning”.

These two ideas – Master production schedule and Capacity requirement planning depend on a tool of releasing orders, and this is created to have better control of issuing and receiving dates of the materials. This tool is introduced as “production activity control” (Arica et al., 2012).

Ideas mentioned earlier were developed throughout the years. Initially, when the MRP was developed as a technique in the supply chain, it represented a big step of improvement towards better control of supply chains, especially it worked with computer assistance to provide prompt and accurate results than the manual methods of operating the supply chains in the past (Steve et al., 2016).

On the other hand, Plossl and Wight (1973) argued that the MRP is not enough to control and develop effective supply chain, unless it contains practical tools of controlling the lead time upstream and downstream in each tier and each step of the supply chain. The authors suggested controlling the capacity at each work centre, and this was the base of recognizing the concept of “Capacity requirement planning”.

Characteristics of Material resource planning are presented in figure 6.

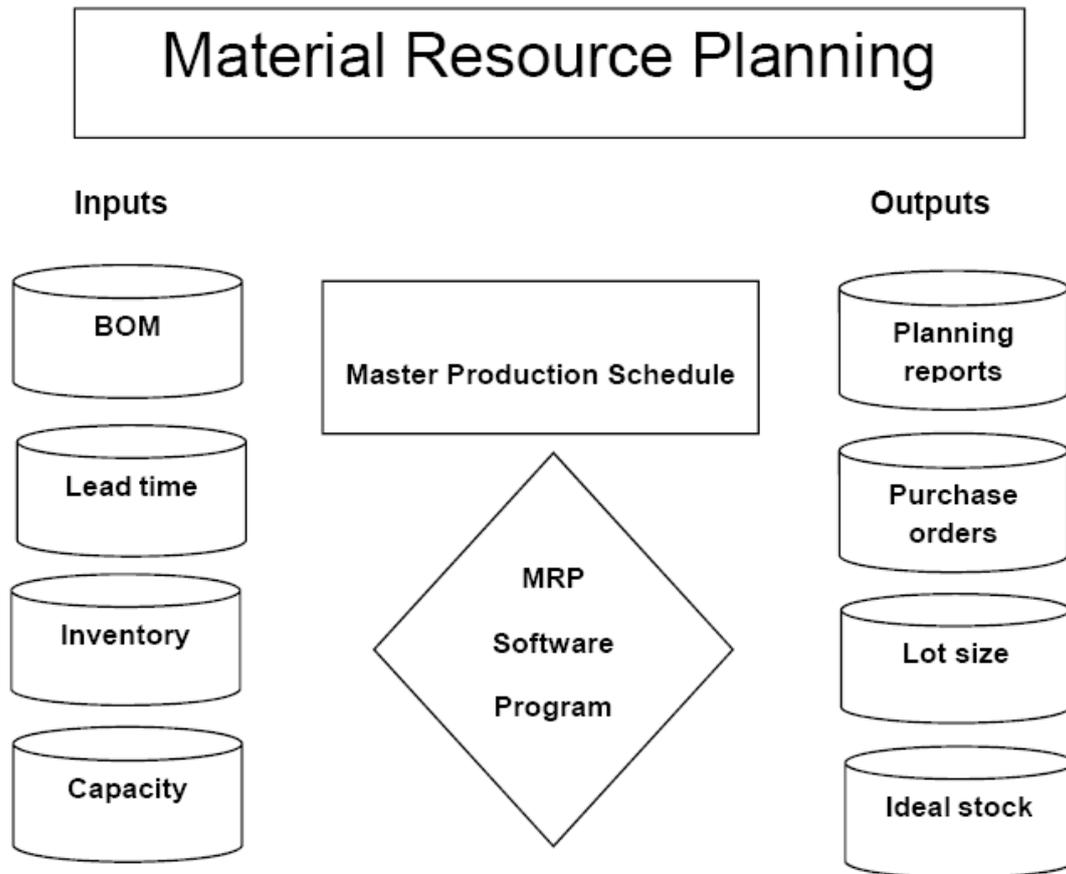


Figure 6: Material Resource Planning (Source: Created by the Author)

Material Resources Planning II

At the early stage of developing MRP, it was useful to the supply chain by enabling better control of materials across the entire chain. Still, with the development of advanced IT technologies, it was observed that controlling the supply chain resources needed more than just some kind of materials control (Nitin et al., 2015). This control can be achieved better by coordination and managing the relationships between the various functions, and taking into consideration the input of each function in the planning process. In turn, MRP II is the next generation of MRP (Choudhary et al., 2016).

While MRP was concerned basically with materials, MRP II is not concerned only with materials, but also with integrating several functions, including manufacturing, finance, engineering, and human resources (Kurbel, 2013). Thus, MRP II is an advanced model of MRP, focusing more on the coordination of the functions to generate better results to improve the manufacturing process together (Miclo et al., 2016).

Enterprise Resource Planning

With the evolution of the supply chain, business relationships became more complicated due to the inclusion of many partners worldwide (Jia et al., 2014). The internal coordination inside any organization is affected by many external relationships with business partners, so the focus of the supply chain has become mainly on the concept of “integration”. This kind of integration was impossible without the advancement of information technology (IT) (Fawcett et al., 2011). IT has helped the supply chain to integrate the various functions across the organizations to promote integration amongst the business partners on a larger scale (Monk & Wagner, 2006).

Enterprise resource planning (ERP) systems enable the supply chains to improve the flow of information and materials across all the organizations participating in the supply chain, as well as the interconnected functions of each organization (Vasilev, 2013).

The MRP and MRP II were the building blocks for developing the ERP system in the late 1980s (Jacobs, Weston, 2007; Akkermans et al., 2003). During the next two decades, there was a revolution of ERP technologies which enabled the organizations to add-on features with each version of ERP every year and to exchange real-time information between the various functions of the organization through e-business solutions and extended ERP models (Crumbly & Fryling, 2013).

The main purpose of ERP is to engage all the functions into the supply chain practice, where each function play its role to contribute to the ideal goal of the supply chain, and this can help to minimize the cost and maximize the profit (Monk & Wagner, 2012).

The development of new ideas and techniques in the supply chain did not stop since the initiation of this concept (Baldwin, 2012). The techniques mentioned above have helped the supply chains to optimize over time from completely manual practice to full automation and integration using the most advanced IT.

As the business is in continuous growth, the supply chain concept is also in continuous evolvment (Christopher & Ryals, 2014). So many researches worldwide have been seeking for the best practice of managing the supply chains, which had been adding value to the body of knowledge and achieved significant development by accumulating the ideas and nominating the best practices (Gereffi & Lee, 2012).

Those cognitions were useful, but definitely, the supply chain is being affected by the status of the global economy, and there are micro and macro-economic factors, which influence the supply chains directly or indirectly. The stakeholders must tailor the supply chain strategy to suit the continuous changes in the global markets. What was suitable yesterday, maybe not be suitable today, and most probably will not be suitable tomorrow. This is because of the dynamic nature of the global markets, which changes rapidly. The key success factor of any supply chain is to adjust its strategy always with the business environment to achieve strategic fit (Israr & Gangele, 2013).

The evolvement process of integration in the supply chains is affected by the Industry 4.0, where the objectives are not just aimed to achieve a high level of effectiveness and productivity, but also to achieve a higher level of automation and connectedness among entities in the supply chain (Ślusarczyk, 2018). This full automation is based on the interaction between people, machines, and between the machines themselves, such as robots. Thus, the integration in the supply chains is now not only required between the personals but also with processes which are fully automated through very advanced digital systems. So it is not strange if the term of supply chain integration is commonly used as “digital supply chain integration” especially with the recent development of blockchain technology and its influence in the integration design process within the supply chains (Korpela et al., 2017).

Push and Pull in Supply Chain

A push and pull represent two different approaches of operating the supply chain which could be defined as “A push strategy refers to the development of processes that emanate from the company and go towards the market: the company invents, develops and proposes a product that is destined to find purchasers. Supply is, therefore sustained by the company. A pull strategy is opposite because it refers to processes that start from the market and go towards the company: demand requests supply and ‘pulls’ it out of the company” (Corniani, 2008, p. 45).

Based on this definition, the supply chain pushes the materials from to the end customers based on the demand forecast, whatever expected orders to receive from the customers are produced in advance, so once any customer order is received, the material is ready for immediate delivery. Certainly, this is good for the end customers as the waiting time is

eliminated. Still, it is not good for the supply chain to carry too much inventory in the form of raw materials, work in progress, and finished products. Here there are several risks; high inventory holding cost, risk of material expiry if the demand is reduced suddenly, and slow cash cycle (Zhang & Zhao, 2008).

On the contrary, within the pull system, the orders of the end customers trigger the operation of the supply chain. Here the customers should be ready to wait a long time because the finished products are not ready in advance as opposed to the push system (Hallam & Contreras, 2016). In a pull system, the inventory is reduced as much as possible, but the waiting time is longer for the end customers to receive their orders (Corniani, 2008).

This will be explained further in the next parts in this research to see how the pull and push systems are connected to while presenting the lean strategy and postponement.

2.2. Supply Chain Strategies

In this section, the role of three considered strategies for management of supply chains – i.e. lean, agility, and leagility has been explained along with different approaches for utilizing each strategy, and how the combination between these strategies can be achieved. Each of the strategies will be present in the details. This section will be concluded with supply chain strategies usage in a contemporary environment.

2.2.1 The Role and Importance of Strategies for Supply Chain

The term strategy is identified as the major intended and emergent initiatives taken by General Managers on behalf of owners, involving utilization of resources to enhance the performance of firms in their external environment (Porter, 1996; Nag et al., 2007). Fundamentally, the strategy of any supply chain assumes that there is a business relationship with two or more organizations with mutual interests (La Londe & Bernard, 1997).

As explained above, regarding the background and history of the supply chain, it is clear that this concept is concerned with controlling and managing the activities of the business to reduce the cost and optimize the service to the customers (Schnetzler et al., 2007). Stevens (1989) believes that the objective of the supply chain is to synchronize the requirements of the market to the operation of the supply chain. But, to achieve this goal, the supply chain should follow a

specific type of operation and practice, and this is the core concept of the supply chain strategy (Sillanpää & Sillanpää, 2014).

The supply chain strategy contains the actions, which are needed to follow the business strategy in practice, such as, how to run the business operation and maintain relationships with business partners? How can the business strategy be translated into practical actions in the day to day operations (Sillanpää, 2014)?

The purpose of the supply chain strategy from the perspective of Chopra and Meindel (2001) is to balance the responsiveness and effectiveness according to the business strategy of the organization. Thus, the supply chain strategy should follow the overall business strategy of the organization. As the business strategy always looks to the competitive advantages and the order winning criteria, the supply chain strategy should be precisely focused on these principles (ORTEC Consulting, 2016). It should work to achieve competitive advantages (Gunasekaran et al., 2008), which are identified earlier by the business strategy (Chopra & Meindel, 2001).

A supply chain is always concerned with controlling the overall associated costs and achieving operational efficiency. The lean strategy was originally developed to assist the supply chain in achieving effectiveness through best practices (Myerson, 2012; Hashmi et al., 2015). However, with time, the competitive advantage within the supply chain is not only signified with reduced cost, but also with the effectiveness of the services. In particular, a focus has been shifted on how fast the supply chain can respond to the market changes, so the agile strategy was developed to help the supply chain to achieve the maximum level of responsiveness (Gligor et al., 2015; Wu et al., 2017). The ultimate aim of the supply chain is to maintain a fine balance between the responsiveness and effectiveness. This has resulted in the development of the new supply chain strategy, named leagile strategy (Naylor et al., 1999; Roh et al., 2014). The underlying reason for selecting the lean, agile and leagile strategy lies in the fact that they are powerful; thus, balancing the trade-off between the responsiveness and effectiveness of the supply chains.

Krishnamurthy and Yauch (2007) identified three approaches towards achieving lean and agility within the supply chain. The first approach involves considering the distinctions between these approaches (Goldsby et al., 2006; Harrison, 1997). The second approach is focused on the supportive nature of the strategies (Naylor et al., 1999; Gunasekaran et al.,

2008; McCullen & Towill, 2001). While, the third approach has presented a lean strategy as the prerequisite for agility (Hormozi, 2001; Jin et al., 2003).

The detailed discussion of these three supply chain strategies i.e. lean, agile, and leagile strategy is provided in the proceeding sections.

2.2.2 Lean strategy

A lean strategy is focused on the identification and elimination of waste in an organization (Shah & Ward, 2007). In particular, lean was originally introduced in the Toyota production system and the implementation of just-in-time deliveries (JIT) (Shah & Ward, 2007). The main objective behind the implementation was to ensure the provision of necessary materials – promptly without compromising on the quality (Sugimori et al., 1977). Ohno (1988) has identified mainly seven types of wastes that include overproduction, waiting, transport, inappropriate processing, unnecessary inventory, unnecessary motion, and defects. To achieve the best practices of the supply chain with the optimal flow, these seven types of waste must be eliminated from the operations.

Initially, the term “lean strategy” was not introduced, but rather it gained popularity under the name of “Toyota Production System” (TPS). In 1988, the term “lean” was introduced for describing the practices undertaken in the planning of Toyota production (Krafcik, 1988). Initially, the lean concept was developed for combining the benefits of just-in-time and mass production in lean thinking; thus, minimizing the total costs of the supply chain. For further understanding of the lean concept, the publication named “The Machine that Changed the World” (Womack et al., 1990) can be referred.

Although Taiichi Ohno (1988) is considered as the father of the concept of lean practice; however, it was implemented in a limited range, especially at the shop floors due to which it is referred as lean manufacturing or production (Womack et al., 1990). Thus, several researchers have contributed to this subject. In particular, Liker and Meier (2006) developed a 4Ps model that includes philosophy, process, people & partners, and problem-solving. On the other hand, Waters (2003) highlighted the main principles of the lean strategy i.e. value, value stream, value flow, and pull that aims for perfection.

Cost reduction has been the main concern in the lean strategy, while, the lead time can be a bit longer in certain cases (Waters, 2009). In particular, lean involves understanding the values of the activities and the waste associated with the processes; hence, result in eliminating the waste from the supply chain (Bhamu & Singh, 2014).

The main aim of the lean strategy is to remove the waste from the supply chain which involves identification of the waste which varies from company to company, and changes with the period (Infor, 2015). A waste of one company can be non-waste of another company. In the aspect of production, each company has the different production capacity, such that if more resources are being added it will lead to waste. While, on the other hand, another company which adds more resources to its production may not cause waste, as the company is widely distributed and expanded that eventually requires more production capacity. Thus, it is entirely dependent on the value of the activities that vary from company-to-company, as well as with the market conditions.

The waste is also changing with time within the same company, so a particular thing which is considered as a waste currently may not be considered as a waste in the future (Infor, 2015). For instance, if a small company which started its business with 100 employees might be able to execute its operations with 80 employees. In this situation, the 20 excess employees are considered as the kind of waste. However, if the business develops and expands later, then the company will eventually utilize these 20 employees and might undertake more hiring. Thus, the underlying idea is that the waste is entirely dependent on the actual requirements of the company at a certain time, and whenever changes take place in these requirements, the waste will also change (Infor, 2015).

Even though waste is usually regarded as the buffer inventory, it is also applicable for the human resource and business processes. It directs towards the fact that human resources and businesses should not include any unnecessary steps or human resource (Gross, 2015). In particular, waste includes everything which the customer is not ready to pay for, either directly or indirectly (Modi and Thakkar, 2014). However, the supply chain also contains certain supportive functions, which does not directly add any value to the customer. These supportive functions are not considered as waste, as they are significant for the operations of the supply chain; thus, adding value to the customer indirectly (Bhamu & Singh, 2014).

Lean is extended to be the philosophy of the supply chain which is applied to every supply chain activity along with the thinking of the supply chain professionals (Hines et al, 2004). All in all, lean mainly aims to reduce cost, while improving the overall supply chain efficiency (Sezen & Erdogan, 2009).

The most valuable contribution of the lean strategy mainly exists in the five principles highlighted by Womack and Jones (1996). These principles are discussed as follows.

- **Specify Value from Customer View:** this principle aims to identify the core customer values and the amount which the customers are ready to pay for the products. According to Joona (2014), the identification should be done after gaining the primary perspective of the customers instead of considering any other party involved in the supply chain. To attain adequate feedback from the customers, they should be engaged properly throughout the process to assess their specified values. McFarlane (2013) explained that organizations can easily tailor the resources to produce products and services that satisfy the end customers, depending on the feedback gathered from the customers.
- **Map the value stream** – since the value is already identified in the first stage; it is now pre-requisite to highlight all those identified values throughout the process flow to monitor their exact location. Thus, this stage would differentiate between the activities that add value to the supply chains and activities that are regarded as waste i.e. non-value adding activities. Shararah (2013) claimed that there exists no possibility to remove the waste without initially identifying both groups. This process could be done by conducting a value stream analysis to identify the value and non-value-added activities across the supply chain (Karningsih et al., 2019). This enables the decision-maker to create another mapping for the future status of the process and explain how it would be beneficial after the removal of non-value-added services. Accordingly, it is a very important step for the implementation of the lean strategy.
- **Establish flow** – when the wastes are identified and eliminated; it is required to ensure that the process is running smoothly and rapidly (Guo et al., 2015). The overall process can be predominantly optimized with the establishment of an adequate flow of materials and information.

- **Let the customers pull the product** – the pull practice also holds significant importance in the lean strategy (Hallam and Contreras, 2016). This would be explained in detail in the further sections of this research. With this principle, the supply chain collaborates downstream with the customers to generate demand forecast based on which the customer pulls the products – i.e. customer set an order.
- **Strive for perfection** – the last step of implementation of the lean strategy is to make it a continuous practice – not just a short term strategy. The lean strategy is comprehensively based on the continuous improvement of this principle to strive for perfection (Borge et al., 2015). Any achievement that is accomplished should be considered as a base for a new level of improvement, and this should be implemented as a continuous practice.

Based on the explanation mentioned above, it has been examined that the lean strategy is primarily concerned with the cost reduction and focuses only on the most desirable actions in the supply chains. This creates value to the customers and supports the supply chain to make the organization competitive in the market using the lenses of effectiveness (Ugochukwu et al., 2012).

2.2.3 Agile strategy

The changing trends of the current market landscape and high level of uncertainty potentially push the researchers to pay more focus on developing another strategy that can support the supply chain to compete within such a dynamic business environment. This focus of the researchers has caused the birth of agility (Childerhouse and Towill, 2000; Lee, 2004).

The concept of lean is criticized in the literature due to the lack of contingency (Hines et al., 2004) and flexibility (Smart et al., 2003). This criticism has triggered the development of the agile strategy. In addition to facing the continuous changes in the markets, the agile concept was initially developed to overcome the limitation of lean, especially related to the flexibility and speed of the work cycle (Christopher, 2000; Christopher & Towill, 2000). Later, the agile concept aimed to become as one of the basic competitive requirements for any business (Collin & Lorenzin, 2006).

Agility is defined as “an externally focused capability that is derived from flexibilities in the supply chain processes” (Swafford et al., 2006, p. 172). Ganguly et al., (2009, p. 411) defined agile strategy as “effective integration of response-ability and knowledge management to rapidly, efficiently, and accurately adapt to any unexpected (or unpredictable) change in both proactive and reactive business/customer needs and opportunities, without compromising the cost or the quality of the product/process”.

The main objective of the agile strategy is to provide the supply chain with the ability to respond to the continuous changes of the markets quickly and adapt the resources of the supply chain to handle the fluctuating demand over time (Yusuf et al., 2004). According to Slack (1983) and Bordoloi et al. (1999), this flexibility in the supply chain is determined by following two dimensions of range numbers and adaptability of the system:

- **Range Numbers** – range number is the number of open, flexible options at a given amount of resources by which the supply chain is able to transform its operation between the available options, without increasing the amount of the resources (Slack, 1983).
- **The adaptability of the system** – the system can change within a given state, so the supply chain should be able to adjust its operation as per the requirements of the market and on the contrary of range. This may require changing the number of resources to achieve more flexibility (Bordoloi et al., 1999).

Sharafi and Zhang (1999) argued that flexibility is not enough for an agile approach. Rather, it has to be complemented by another element “speed”. Several authors have also considered that speed as an essential practice of responsiveness in both agilities (Reichhart & Holweg, 2007; Goldman & Nagel, 1993) and lean strategy (Hines et al., 2004). Thus, the challenge of agile strategy is to accelerate the process and choose the most convenient range between the various open options to optimize the operation without increasing the resources of the overall supply chain (Kumar, & Bhat, 2014). In case, if it is necessary to change the resources, the system should be adaptable to incorporate the additional resources easily, quickly, and smoothly.

Furthermore, Coyle et al. (2013) argued that the agile strategy is concerned with another significant element “time”. Time depends on the flexibility of each organization in the entire

supply network and its ability to interact with the other partners. The core idea of the agile strategy relies on the flexibility and the ability of the organization to keep up with the continuous changes in the marketplace (Stevenson & Spring, 2007). Thus, the organization should be able to adjust its resources smoothly, rapidly, and effectively as per the status of the market. This flexibility requires matching between supply and demand in terms of volume and variety.

There exist different types of flexibility including labors, machines, routing, market demand, changing customer needs, and changing logistical requirements, maximum profit, minimum total cost, prices, delivery time, product, lead time, and quantity flexibility (Seebacher & Winkler, 2015). This is why the flexibility is required in all the tiers and functions of the supply chain. The process cycle of the supply chain always needs to be accelerated to achieve on-time delivery to the customers. Consequently, it is also essential to enhance the responsiveness of the overall supply chain and expediting the entire activities in a timely manner (Ramana et al., 2016).

Time in the supply chain is a very important factor in the order winning criteria. Today, the businesses follow a service nature that adds value to the customers in terms of product quality and delivery time (Pettersson & Segerstedt, 2013). The agile supply chain get benefits from the continuously changing trends of the markets (Vonderembse et al., 2006). For example, various competitors may not be able to adopt their operations quickly to handle the new changes in the markets. Thus, the agile supply chain can get new opportunities from such competition.

Moreover, the agile strategy is essentially required to control the time across the supply chain to compress it as much as possible. This also speeds up the whole process starting from the origin of the raw materials upstream, until the final delivery to the end-user downstream (Jacobs et al., 2014). The importance of an agile strategy for the supply chain has been constantly increased, especially due to the following major reasons:

- The primary reason for which the significance of agile strategy is being increased is the global nature of the supply chains and the open markets. It increases the number of participants in the supply network and also makes the business processes more complicated, as there are many communication channels and relationships (Wendler, 2013).

- Another reason is that the markets have become much more sensitive than they now require a high level of flexibility to respond quickly to the continuous changes, volatile demand, and face fierce competition. For instance, Gerwin (1993) described the flexibility as the ability to adapt to the uncertainties of the environment.
- Also, the life cycle of the products and services have become shorter, so the markets always need to introduce new products before the other competitors can do the same. Nevertheless, this requires a proactive approach and agile actions and associated reactions. The agile strategy is essential to help the supply chain to innovate new products, which can attract the customers (Shahmarichatghieh et al., 2015).
- Lastly, the expectations of the customers are rising continuously, as they always demand excellent quality and service. This is a significant challenge for any supply chain to achieve because it must be cost-effective and ultimately responsive at the same time (Majanoja et al., 2014).

Because of the cognitions mentioned above, several authors also believed that agility determines the survival of the modern supply chains (Vastag et al., 1994; Jassbi et al., 2014; Mavengere, 2013; Fayezi et al., 2016) as it supports the competitiveness of the supply chain significantly by providing a quick response to the requirements of the customers and fulfilling their orders promptly. All this leads to further improvement in the service level of the supply chain (Wu et al., 2017).

2.2.4 Utilization of lean and agile strategies

As already discussed in the previous chapters and also suggested by multiple authors such as Duran and Akci (2015), the agile strategy is associated with time and the lean is concerned with the cost. However, this section of the chapter outlines the utilization of lean and agile strategies in the supply chain that becomes the basis for a later presentation of leagile strategy. In certain cases, the agility can be understood as an element in the lean strategy, if the “cost of time” or “cost of delay” is considered to be as any delay in the operation that causes direct impact in the supply chain (Islam, & Tura, 2013). The opposite idea is also applicable, i.e. lean can be considered as an element of agile strategy because the supply chain cannot respond quickly to the market if it carries too much fat (Kovacs, 2016). Accordingly, lean can lead to agile strategy and vice versa (Khan & Dalu, 2015).

On the other hand, waste is a dynamic concept because it changes with the change in market trends. Therefore, a fixed strategy is not suitable for the supply chain in fast-changing circumstances (Hilletoft, 2012). If the waste is removed today, it might be possible that it appears tomorrow, if the markets are changed. So, it is crucially important to have the required tools to discover and remove the waste quickly out of the supply chain. The agile strategy is essential to determine how fast the supply chain can discover and eliminate waste (Gligor, 2014). The agility is playing here a role of alarm that helps in notifying the decision-maker about any waste. The agile strategy also plays a role in the case of new conditions appear in the market that requires dedicating more resources. It happens because agility is an essential strategy to deal with the uncertain business environment (Swink et al., 2014).

As Fayezi et al. (2016) suggested, the agile strategy should be utilized in different ways. Agility enables the supply chain to convert the waste rapidly into positive resources. This can be achieved by the prompt action to utilize the available resources of the supply chain effectively by adding new resources rapidly to the operations. It can be done by responsive collaboration with the suppliers upstream the supply chain. Conversion of the waste into positive resources is substantially important for lean strategy. Therefore, the supply chain can ensure the best utilization of the current resources before outsourcing additional resources and incurring unnecessary costs (Linne & Ekhall, 2013). Both lean and agile strategies require high quality of products because the quality assurance requires;

- Time for verification and inspecting the products. This is usually a time-consuming process that is against the principles of agile strategy (Qrunfleh & Tarafdar, 2013).
- Accelerating the process rapidly may affect the quality negatively because sometimes, performing the activities quickly creates errors in the production (Bhekithemba & Lemohang, 2015).

The idea of researchers Bhekithemba and Lemohang (2015) and Cruz (2015) is to achieve a desired level of quality through the lowest possible cost and within the minimum time consumed. Time and cost are required as competitive advantages and essentially needed for the order winning criteria (Shahmansouri et al., 2013).

In practice, the selection of any degree of combination between lean and agile strategies depends on the priority as perceived by the customers – i.e. whether the priority of each

customer is cost or time (Dash, 2013). The tradeoff is between cost and time – in other words between lean and agility – because, at any certain level of cost, there would be a certain level of delivery time and vice versa. If it is desired to achieve faster delivery time, the cost could be increased by adding more resources to the supply chain and using faster modes of transport such as air freight.

Yusuf et al. (2004) have revealed that both lean and agile strategies impact the core idea against each other. Lean impacts the flexibility rather than cost, while agility influence cost rather than flexibility. The starting point of lean and agile strategies is to look into the value that can be delivered to the customers. The value could be defined simply by the benefit to the customers, and it could either be product, social, or personal related values (Aulia et al., 2016).

According to Akhilesh (2011), the desired values for the customers can be achieved by:

- Cost reduction and total waste removal that is the core idea of the lean strategy. This can reduce the unit price to the end customers.
- Design a flexible logistics network that is the core idea of agile strategy. This can assure shorter lead time to the customers.

The supply chain can maximize its effectiveness and responsiveness by being lean upstream and agile downstream at the same time. But, since the demand is fluctuating, the supply chain needs to classify the demand to the base and surge. The base demand is well-known in advance, so the plan can include having the materials on time. In this specific case, the lean strategy should be used. The surging demand is not known in advance, but it is requested suddenly and, thus, it is difficult to predict and maintain materials for that type of demand. Therefore, the agile strategy should be used to ensure having the materials as much as possible (Miah et al., 2013).

The main focus of lean and agile strategies is the end customer because the lean produces only what customers exactly require at the right cost. Also, the agile strategy aims to maximize the responsiveness to the customers (Constăngioară et al., 2015). The pull-based system is used in the lean strategy where downstream demand triggers the operations. In this case, the waste can be eliminated as much as possible, while there is no materials produced or action have been taken until the customer's order arrives (Basodan, 2016). Consequently, the supply chain should be fully demand-driven rather than forecast-driven. But the problem always appears for

the period, which the customer is ready to wait until receiving his/her material. That is why agility should also be combined with the pull system to speed up the process and to ensure that the operation runs smoothly and rapidly (Tseng et al., 2013).

The flow of material and information is extremely critical in the pull system (Swierczek, 2013). However, the batch sizes are small and are continuously produced against the orders of the customers, so that the stock is maintained at the minimum limit (Berlec et al., 2014). Unless the process flow moves rapidly, the pull system cannot be implemented because a process of slow flow would not be able to support the operation to meet the delivery schedules or even to do the required activities on time (Holweg & Rich, 2016). Based on that, there is a need to accelerate the process flows of these small batches so that they can be pulled out rapidly from the production to the end-users.

2.2.5 Leagile strategy

The path toward Leagile strategy

In the current business environment, the lead time is a vital element for receiving a competitive advantage. Therefore, alongside the provision of competitive prices, the lead time of the customers is also considered as a significant factor in the supply chain. In particular, a supply chain should combine the benefits of both lean and agile strategies for addressing and managing the continuous changes occurring in the markets; thereby, achieving competitive prices within the shortest possible lead time (Ramana et al., 2013).

Booth (1996) has argued that the agility will replace lean, as lean is not considered to be enough as per the current market conditions. On the other hand, the agile strategy is considered as the developed and improvised version of lean. However, Sharp et al., (1999) and Katayama & Bennett (1999) have argued that lean as the foundation of agility.

The time for introducing the products to the market and delivering them to the customers has gained huge significance. In this account, Ballou (2007) has reported that movement in the consumption of goods eventually results in a shift in the strategy from being entirely focused on efficiency. Thus, it is evident that the combination of lean and agile strategies is significant for the supply chain, as both strategies have a strong impact on the customer's satisfaction levels - in terms of timely delivering the products and services by using agile and achieving competitive prices by using the lean strategy (Montoya & Ortiz, 2014).

The agile strategy is regarded as the essential element for achieving lean strategy, as an agile strategy is mainly concerned with the time, such that there is a cost associated with the time that represents the labor costs (de Treville et al., 2014). Thus, controlling the costs of the time is an important aspect of the lean strategy. It has been identified that one of the seven types of waste - that must be eliminated from the supply chain - include waiting, which in turn represents the unnecessary costs of the lead time (Ohno, 1988).

For instance, if company A decides to implement the lean strategy, then the implementation should involve removal of material, people, and excessive time that is required for the execution of daily activities (Christopher, 2016). Thus, time costing is considered as the core concept of the agile strategy. All in all, the short lead time is regarded as the important factor in the agile strategy, however, it is also significant to reduce uncertainty and optimize demand planning process as part of the lean strategy (Purvis et al., 2014).

Prince and Kay (2003) have argued that lean is the short-term strategy of improving the competitiveness of the supply chain; whereas, agility improves the response of the supply chain. All in all, both strategies tend to assist supply chains in achieving a balance between effectiveness and responsiveness (Kurniawan et al., 2017).

The combination of lean and agile strategies – leagility

In academic literature, the combination of lean and agile strategies is referred to as “leagile” (Naylor et al., 1999; Naim & Gosling, 2011). Christopher (2005) has discussed this concept from different perspectives and stated that “it is essential to have a flexible operation to overcome the uncertainty. Such that adopting lean for some products when the demand is stable, and agility for the unstable demand; and using the postponement technique where a generic stock is maintained at a certain tier of the supply chain, and the final configuration can be done only when the real demand is known.”

Jones (2000) has argued that the adoption of lean and agile strategies is dependent on the holistic strategy of the supply chain. The underlying idea is that the properties of a particular system cannot be explained or determined through its parts alone, but rather, the system as a whole determines how the parts must behave.”

The status of the market also tends to determine the selection of strategy. The tradeoff between the lean and agile strategy is dependent on the degree of certainty and uncertainty – prevailing in the market (Alicke & Forsting, 2017). The selection of a supply chain strategy is

based on the criteria of order winning and order qualifier. However, each supply chain must identify its criteria of competitiveness before the selection of any strategy i.e. lean or agile (Duran & Akci, 2015).

The order winning criteria for the leagile strategy is availability (Razmi et al., 2011). It means obtaining the right product at the right time on the right cost (Peltz et al., 2015). These priorities are mainly reflected in the continuous changes, as the order winning criteria of the last year will be the qualifiers of the next year (Johansson et al., 1993). Therefore, do not seem to be appropriate to stick to any particular strategy.

The leagile strategy mainly enables the organizations to switch between the different strategies with the changes occurring in the markets. The “leagility” is defined as the combination of lean and agile paradigms within a total supply chain strategy by positioning the decoupling point to best suit the need for responding to a volatile demand downstream, yet providing level scheduling upstream from the marketplace” (Jones et al., 2000, p. 4065).

In the literature, mainly three approaches are outlined for achieving the combination between the lean and agility, which results in leagility (Christopher & Towill, 2001):

- **The Pareto Curve**- It involves imposing classification of the products by the volumes i.e. fast- and slow-moving items to top 20% and rest 80%, such that using a different strategy for each group of items.
- **The decoupling points**- It involves selecting the strategy based on the strategic position of the points. The decoupling point is located through which the supply is matched to the demand, also known as “order penetration point” (Yang & Wang, 2014).
- **The concept of base and surge demand**- The idea depends on the differentiation between two kinds of demand. A lean strategy is suitable for the base demand as the demand is stable, while, the agile strategy is suitable for the unpredictable surge in demands (Miah et al., 2013).

These three approaches towards “leagility” can be implemented individually or complementarily, depending on the unique conditions and circumstances of each organization (Christopher, 2005). Some organizations may choose to implement only one of the aforementioned techniques, while others may incorporate a combination of two or all of the approaches in their operations (Christopher, 2005).

Christopher (2000) has identified two conditions for adopting a lean or agile approach. Accordingly, the lean approach is suitable in case of limited variety, certain demand, and no innovation in the products or services. On the other hand, agility is suitable in case of high variety, uncertain demand, and short life cycles. In the context of the agile approach, the uncertainty of the demand results from the continuous changes in the market that require the supply chain to have enough robustness to handle such uncertainty. The robustness in the supply chain is an important issue in the context of the agile strategy. Wieland & Wallenburg (2012, p. 890) have defined Robustness as “a proactive strategy that can be defined as the ability of a supply chain to be responsive towards change without adapting its initial stable configuration”. Robustness enables the supply chain to change from a position to another quickly and to realize the opportunities that may appear in the market as a result of the demand fluctuations (Wieland & Wallenburg, 2012). For example, if there is a sudden surge in demand, the operations should have enough robustness to respond quickly to that demand change. Otherwise, if it cannot be fulfilled perfectly or timely, some or all of the demand will move towards the competitors.

The lean approach is more appropriate for smooth and certain demand, whereas the level scheduling is applied to balance the demand over time (Ketsarapong et al., 2012). The idea of level scheduling also requires high flexibility – same like agile strategy – but it is always time-consuming and thus, affect the delivery time to the customers (Ketsarapong et al., 2012).

Accordingly, the leagile strategy is suggested in many cases, and its key factors are the product characteristics and the life cycle of each product. Hence the supply chain can select lean or agile approach depending on the various supply chain cases (Christopher & Towill, 2000).

In the following subchapter, we will outline how the decision-maker can choose a specific strategy utilizing the Pareto curve, decoupling points, and postponement technique (Goldsby et al., 2006).

Pareto curve

As stated, this is one of the methods that can be used to determine the appropriate strategy. The core idea of the Pareto curve is based on business analysis to classify the products in terms of volume. However, it was found that 80% of the total volume is generated from 20% of the products (Salvi & Mayerle, 2014). This 20% of the top volume constitutes fast-moving items,

the demand of which could be predicted easily, so the lean strategy should be used here. While the remaining 80% are slow-moving items, where the demand is low and consequently difficult to predict. In turn, the agile strategy should be adopted for such products.

The below figure illustrates the principles of the Pareto curve and how it helps to select the proper strategy (adapted from Christopher & Towill, 2001, p. 242).

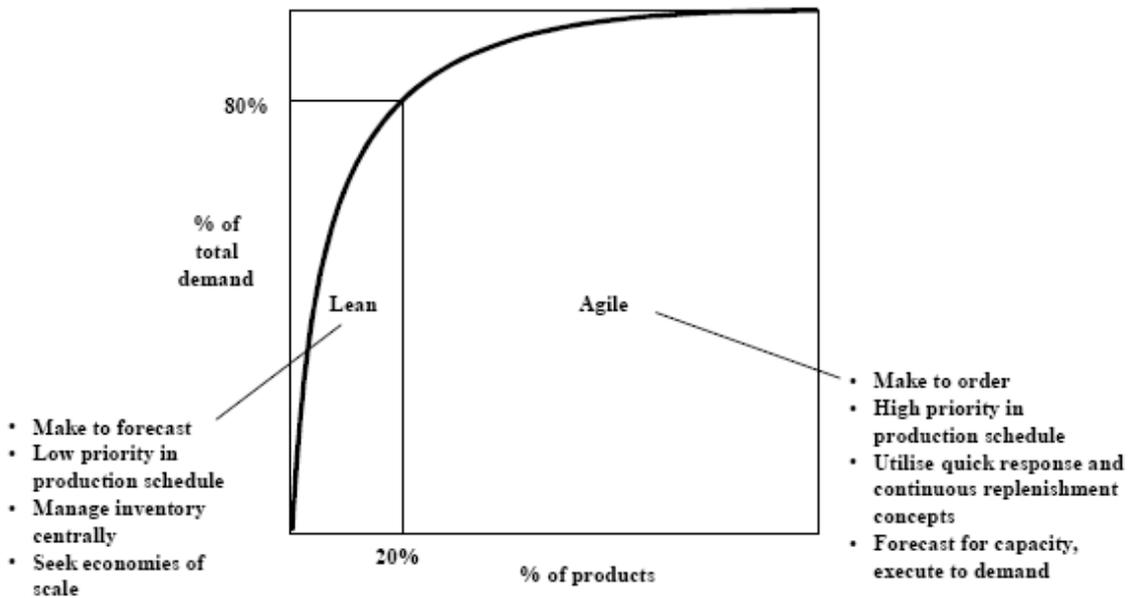


Figure 7 Pareto distribution

Decoupling points and lean and agile strategies

Lean and agile strategies are always presented as subjects for trade-off according to the status of demand as well as the lead time (Purvis et al., 2014). If the lead time is long and the demand is uncertain, the priority should be reducing such lead time, that requires a combination strategy of lean and agile strategy– i.e. leagile strategy (Christopher, 2005).

Figure 8 illustrates the different cases where lean and agile strategies can be useful (adopted from Christopher, 2005, p. 118).

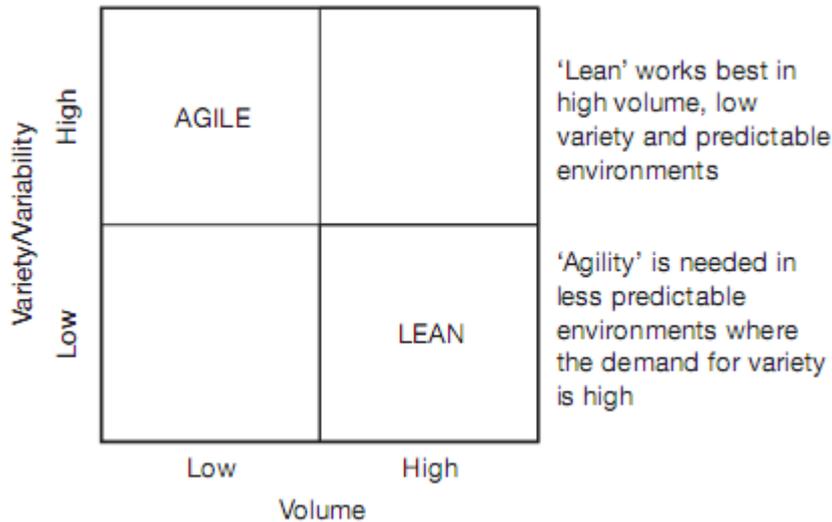


Figure 8: Application of leanness and agility

In the above figure, the lean strategy is recommended in the situation of high volumes, low variability, and predictable environment, while agile strategy is recommended to be used in a less predictable environment where the demand for variety is high.

According to Lawson (2002), the decoupling point is located, where the supply matches the demand. Upstream the decoupling point, the process should be lean through stable demand and low variety, while downstream it should be agile through demand variability and high volumes.

The position of the decoupling point should be determined based on the market knowledge, which reflects the ability of the supply chain to fulfil the demand perfectly, efficiently and quickly (Yang & Wang, 2014). This market knowledge should be updated frequently to reflect the new trends of the market and to examine, whether the current strategies are suitable for the new status of the market or do we need a new approach towards supply chain management (Tefay et al., 2014). This kind of assessment is an essential practice to ensure that lean, agility and leagility can work in various scenarios, and in case if new circumstances take place in the market, for which none of these strategies is effective enough, a new approach should be presented.

In the leagile strategy, two forces are affecting the position of the decoupling point, lean force and agile force (Powell & Arica, 2015). When the cost is the most important factor for achieving a competitive advantage, the lean force pushes the decoupling point downstream. On the other

hand, when the time is the most important determinant of the competitive advantage, the agile force pushes the decoupling point upstream.

At the decoupling point, a strategic stock should be maintained to respond to the volatile demand and at the same time to facilitate the production process. This stock works as a buffer between the volatile demand and the production level scheduling (Swierczek, 2013). If there is sufficient safety stock, there won't be too much stress upon production, rather, it will work smoothly without exhausting the resources by overcapacity.

The material decoupling point is also known as 'order penetration point' as indicated, and the key concern of the leagile strategy is to control the position of the demand penetration point in the process flow, where the actual demand can be fulfilled perfectly and timely (Christopher, 1998). The more the demand penetration point is pushed upstream, the more successful leagile strategy we have.

The concept of certainty/uncertainty has a direct impact on the leagile strategy and balancing lean and agile strategies. Consequently, the supply chain should focus on reducing uncertainty (Safaei, 2014). One of the main objectives of the decoupling point is to reduce the uncertainty by maintaining the inventory at the proper locations within the process flow, as well as to determine its amount accurately. As a result, the supply chain can deal with volatile demand over time successfully.

The internal uncertainties, that may appear inside the organization, can be prevented by inter-organizational collaboration. However, there is a real challenge to overcome the external uncertainties that result from the continuous changes in the market and the volatile demand. Accordingly, there is a need to be sensitive towards the market to monitor the rapid changes and work collaboratively with all the business partners in order to tailor the strategy according to the changes of the markets (Fayezi et al., 2016). Furthermore, it is important to anticipate the forthcoming changes in the market before their occurrence to develop a suitable strategy beforehand for such changes (Zitzmann, 2014). This requires to update the position of the decoupling point continuously, so it can reflect the status of the market (Ghalekhondabi et al., 2016). The decoupling point is not supposed to be fixed, rather, it should be movable to enable the system to apply the right strategy at the right time.

To sum up, Christopher (2005, p. 137) stated that “the responsive business will seek to marry the lean and agile paradigms through de-coupling its upstream and downstream processes, utilizing the principles of postponement, wherever possible.” Therefore, in the next section, we are outlining the postponement technique.

The postponement technique

In academic literature, the concept of postponement is always combined with the concept of the decoupling points (Van Hoek, 2001). This is because the postponement is a tool used while applying the decoupling point practice. The position of the decoupling points can be determined by the degree of coordination between the business partners across the supply chain (Collin & Lorenizn, 2006). The postponement is used commonly in the leagile strategy (Purvis et al., 2014), which is a concept, where some activities of the supply chain can be delayed until a customer order is received (Van Hoek, 2001).

The postponement is used to avoid the risk of potential waste resulting from the uncertainty of the market. This is because according to the postponement technique, the configuration or the final assembly will not be done until the situation of the markets becomes clear and the demand becomes certain again (Kim, 2014).

By using the postponement, the supply chain can delay the assembly till the final delivery of the products while keeping some inventory in generic form waiting for the customer’s order, which can be converted into finished products after the demand downstream in the supply chain appears (Xiaoxun & Jiajun, 2016). Thus, the supply chain can remain lean without too much stock as well as agile by delivering the products on time, since the customer’s order triggers the postponed activities (Van Hoek, 2001).

The major advantage of the postponement concept is that it enhances the flexibility and enables the supply chain to respond to the market in terms of time, effort, cost and performance. It also makes the supply chain lean while removing unnecessary inventory (Crowe, 1992; Upton, 1994; Morlok & Chang, 2004).

The postponement is a pull system, which enables the supply chains to be demand-driven and to move forward only when the customer’s order is received (Salvi & Mayerle, 2014,). It requires strategic sourcing and collaboration upstream to identify the amount and the location of the raw materials, which will be maintained as semi-stock.

The postponement is also useful to reduce the logistics risk related to the delivery time by maintaining the committed stock of raw materials that is readily available for the production (Xiaoxun & Jiajun, 2016). Thus, the postponement has a positive impact on the speed of the process and response time, and consequently on the agile strategy as well.

A very successful example of implementation of this postponement concept is Dell that is one of the pioneer producers of personal computers (Zhou et al., 2014). Dell uses this practice successfully and the company has implemented a business model of “make to order” which enables them to begin the configuration of the units only when the customer order is received (Harzer, 2013).

2.2.6 Supply chain strategies in the current business environment

The discussion about lean and agile supply chains presents a trade-off between responsiveness and effectiveness to help the decision-maker in determining the most appropriate strategy for the business; when to be lean, and when to be agile (Naylor et al., 1999; Minnich & Maier, 2006; Naim & Gosling, 2011).

Based on the above-outlined cognitions, it becomes evident that “lean and agility” appear to be gaining wider adoption across industries. Large corporations embraced lean in the 1990s, and agile became the new byword in the 2000s with the release of “The Agile Manifesto” (Thomas & Reuben, 2015, p. 6). Looking through the literature there is ample evidence about actual utilization of lean or agile concepts – i.e. existence of empirical researches, which reveal comparison with other concepts.

One such study, which considers lean production as one of the management tools that organizations use to support their working and operations, is the study of management tools by Potočan and Nedelko (2017), Nedelko and Potočan (2016) and Dabic et al. (2013). Findings of the study are summarized in table 3.

Management tools ^a	Use of management tools – rank							
	Global 2006	Global* 2008	North America	EU 15	Asia-Pacific	Latin America	Croatia	Slovenia
Strategic Planning	1	2	1	1	2	1	8	8

Customer Relationship Management	2	4	3	4	1	9	4	6 (t)
Customer Segmentation	3	7	6	2 (t)	3	3 (t)	5	11
Benchmarking	4	1	2	2 (t)	9 (t)	2	2	2
Mission and Vision Statements	5	3	4	7	5 (t)	5	1	6 (t)
Core Competencies	6	9	5	5 (t)	4	10	3	3
Outsourcing	7	5	8	5 (t)	7 (t)	3 (t)	6	1
Business Process Reengineering	8	8	10 (t)	10 (t)	5 (t)	14 (t)	10 (t)	10
Scenario and Contingency Planning	9	13	9	8	14	7	10 (t)	12
Knowledge Management	10	14	12	10 (t)	7 (t)	14 (t)	7	4
Strategic Alliances	11	11	7	9	13	13	20	17
Balanced Scorecard	12	6	13 (t)	13	12	11 (t)	13	9
Supply Chain Management	13	12	13 (t)	14 (t)	11	11 (t)	12	15
Growth Strategies Tools	14	16	10 (t)	10 (t)	15 (t)	6	19	18
Total Quality Management	15	17	18 (t)	14 (t)	9 (t)	8	9	5
Shared Service Centers	16	15	18 (t)	19	15 (t)	16	14	23 (t)
Lean Operations	17	-	15	17 (t)	18 (t)	19	25	23 (t)
Collaborative Innovation	18	22	16	20	18 (t)	18	17	19
Loyalty Management	19	24	21	17 (t)	17	20 (t)	15	13
Mergers and Acquisitions	20	10	17	14 (t)	22	17	22 (t)	14
Six Sigma	21	-	22	23	20	20 (t)	22 (t)	20
Offshoring	22	-	18 (t)	21	24	24	24	25
Consumer Ethnography	23	-	23 (t)	22	21	22	18	21
Corporate Blogs	24	-	23 (t)	24	23	25	16	16
Radio Frequency Identification	25	-	25	25	25	23	21	22

^a Note: Data for Global average (GL) 2006 and 2008, North America (NA) 2006, European Union 15 (EU) 2006, Asia Pacific (AP) 2006, and Latin America (LA) 2006 are calculated upon results from management tools utilization research [68, 69]. Data for Slovenia and Croatia are adopted from the research of management tools in Central and East Europe economies. Abbreviation t stands for the tight result. (-) Stand for not applicable.

Table 3: Management tools utilization.

The analysis of the position of lean usage in practice from the above table revealed that lean is not one of the commonly used management tools, as compared to other management tools, and that organizations in the future will need to focus more on fostering the implementation of lean principles.

Aberdeen group (2006) conducted a study by considering 308 manufacturers and found that 90% of the participated organizations reported that they are committed to lean. However, further analysis revealed that less than 10 % of these organizations only could be considered as best in class.

The lean strategy is commonly and frequently used in organizations, as compared to other management tools and strategies. Only a few organizations were able to achieve the best utilization of lean. In contrast, others achieved some of the benefits only as a result of the practices followed by them while implementing lean principles. The limited deployment of lean in the organization is discussed by the Aberdeen group (2006, p. 1), and it was found that over 90% of respondents consider themselves lean. In contrast, less than 20% have extended their lean deployments beyond the manufacturing shop floor (Aberdeen group, 2006, p. 1). For this reason, it is significant in this research to explain the lean strategy and explain how the deployment is likely to provide a maximum benefit.

2.2.7 Future outlook regarding Utilization of Lean, Agile, and Legale Strategies in Supply Chains

The agility is inversely proportional to lean; therefore, whenever the cost is reduced for increasing the effectiveness, there is a significant influence on the time required of performing the activities. Moreover, whenever the lead time is eliminated, it increases the cost of performing the activities (Chen, 2013). (Chen, 2013) proclaimed that the tradeoff is always present (Chen, 2013). Another research conducted by Vijayashree and Uthayakumar (2016) mentioned that the main challenge of the supply chain is to control both, i.e., the lead time and cost to satisfy the end customer. To control the cost and lead time together, the supply chain

can improve the planning in accordance with the requirements of materials within the supply chain (Steve et al., 2016). If the safety stock is maintained well, and there is periodically forecasting reports, it facilitates the supply chain to overcome any shortage of materials, such that the shortage of material is likely to result in urgent airfreights and unnecessary expenses.

The anticipation of the trends of the customers is not an easy task, and consequently, producing accurate forecasting reports has become difficult by the time. The production of the forecasting reports is not difficult because of the trends of the customers only; rather, several macro-economic factors are affecting the global economy currently, which makes the anticipation of the future very difficult. Thus, there is a real challenge for the supply chain to manage these conditions in the future (Sweeney, 2013).

It is not an easy task to determine the appropriate strategy of the supply chain in the future, as the currently known strategies may not be able to suit the future trends of the volatile global markets. Handfield et al. (2013, p. 13) stated that a strategy is referred to as the intended plans of organizations to mitigating, responding, and reacting to the changes or trends. It is significant to measure the success of the strategy for assuring that the intended strategy had addressed the challenges which were supposed to be met.

The unstable political and economic situation globally has increased the concerns about the supply chain practice, and these situations have increasing the level of uncertainty and making the supply chain susceptible to risks (Juttner et al., 2003; Meixell & Gargeya, 2005). For example, the oil price is completely unstable during the last decade, and many wars are running around the world with the higher potential for new wars. Consequently, there are difficulties in running a business in such circumstances and assuring smooth material supply (New, 2003). The reason for choosing these examples lies in the fact that the individuals are dependent upon oil for running most of the activities, whereas wars affect each part of life, including business and supply chains.

The organizations always seek to implement the best strategies for their supply chains, and any new practices that could lead to optimization of business are much appreciated (Pourhejazy et al., 2017). The implementation of the best strategies for the supply chain has become an essential factor in running any business, in being competitive in the market, and surviving in the future (Pfohl et al., 2017). The information technology solutions also facilitate the supply

chain to achieve this goal of building new strategies based on collaboration with business partners (Geunes et al., 2002).

The lean, agile, and leagile strategies are useful for any supply chain; however, it is challenging to select the suitable strategies according to various situations (Miah et al., 2013). The selection of suitable strategies represents a challenge in normal situations; however, it is a more complex challenge in difficult times and abnormal situations. During the difficult situations, the lean, agile, and leagile strategies may not be enough for enabling the supply chain to survive in the future, and we may need a new approach with innovative ideas (Li, 2014). The difficult times and abnormal situations referred to within this research are three future scenarios; energy scarcity, new international monetary system, and war.

The innovative supply chain strategies must not stop over time, and the supply chain researchers and professionals should work collaboratively to develop new ideas and techniques for adding value to the supply chain and contributing to the supply chain in the future. Adamczyk et al. (2012, p. 335) described innovation as an IT-based and time-limited competition, arranged either by an individual calling on a specific target group, or the general population, or by the organization for making the use of skills, expertise, and creativity for submitting the solutions of the particular tasks, previously defined by the organizers, striving for the innovative solutions. Thus, innovation is essentially required for the supply chain strategies to keep up with the continuous changes in the markets. Li (2014, p. 125) reported, that innovation is an essential driver of growth, differentiation, as well as profitability, within the supply chain. In this regard, innovation to the current supply chain strategies is the key success factor in the current business environment, while it is even more important for surviving in the future. The innovation development in this sense is the utilization of current known supply chain strategies, the addition of new strategies to the supply chain management, as well as, innovative usage of these strategies.

All the success stories of the large organizations are based on the innovative supply chain strategies. For instance, Chen and Shi (2015, p. 124), outlined that the success of retailers, such as Amazon and Walmart, and their efficient supply chain strategies are not coincidental.

Based on the above-mentioned definition of innovation, it can be stated that innovation is required to provide new solutions. Moreover, the supply chain strategies also need innovation,

as the support of supply chain strategies is essential for working better in future scenarios. These efforts should be focused on accumulating all the supply chains through a new type of collaboration. This accumulation will work as an enabler for any supply chain in the future, for these reasons (Oliveira & Gimeno, 2014):

- It supports the supply chains to the position which facilitates in decoupling points strategically within the process flow. It also regulates the activities, which are required to be postponed, and the time at which the postponement can be effective for business.
- It improves the visibility of the supply chains, enabling the partners to successfully switch the system between leagile, lean, and agile strategies. As the concept of the supply chain is all about the network of relationships between various partners, any success for this network depends on the improvement of relationships between all the business partners.

To sum up, the supply chain collaboration is the clue to enhance lean, agility, and leagility to work better in the future and to help the supply chain to overcome any sudden changes in the global markets (Lehmacher, 2017). Accordingly, in the next section, we are focusing on the collaboration issues in the supply chain.

3. The collaboration in the supply chain

This chapter deals with collaboration in the supply chain. First, the chapter outlines the theoretical starting points for consideration of collaboration in the supply chain. In that frame, key terms are defined, and types of collaboration are outlined, as well as factors affecting collaboration in the supply chain. Next, the collaboration in the supply chain is examined through the lenses of the utilization of lean, agile, and leagile strategies. Finally, the issues regarding collaboration in the supply chain under different conditions are addressed. Also, the chapter has presented three identified scenarios, in which supply chain management could occur, as well as the impact of each considered scenario on supply chain strategies utilization.

3.1. Theoretical starting points for consideration of collaboration in the supply chain

3.1.1. The Internal and external collaboration in supply chain

Thomson and Perry (2006, p. 23) defined the collaboration as “a process where autonomous actors interact through informal and formal negotiation, that jointly creates rules and structures leading their relationships and ways to take action on the issues that brought them together. This process involves sharing norms, along with mutually beneficial interactions.

There are many parties involved in the supply chain – like persons, organizations, etc., and the collaboration between these parties is essential for managing the supply chain (Krishnapriya & Baral, 2014). Heide and John (1990) exposed the collaboration in the supply chain as the joint action in the business relationship of suppliers and customers (see also Oliveira & Gimeno, 2014; Botta et al., 2013). “The collaboration does not refer to just a single relationship between two parties, rather than that, it refers to sharing the rewards, risks, knowledge, information, ideas, mutual objectives, and solution of the common problems between all the parties in the extended supply chain“ (Paiva et al., 2014, p. 407).

The supply chain collaboration can be deliberated as the integration of entities associated with each other in a business environment, where these entities can be customers, retailers, distributors, manufacturers, and suppliers (Lam et al., 2008). This is required essentially for the supply chain to act on time always and to respond to the continuous changes of the global markets (Prasad et al., 2001).

The collaboration in the supply chain refers to the seven components of interviewing including joint knowledge creation, collaborative communication, resource sharing, and incentive alignment, synchronization in the decision, goal congruence, and information sharing (Cao & Zhang, 2013, p. 55).

As Hudnurkar et al., (2014) revealed, the collaboration is the key success factor to operate any supply chain. They identified several factors affecting the collaboration in the supply chain, mainly; commitment, trust, adaptations, business strategy, processes integrated, communication, government support, resource sharing, knowledge sharing, organizational culture, and information technology.

Fundamentally, there should be a collaboration between the people working in any supply chain and the ability to act as teamwork. This is important to enable the organization to collaborate with all the business partners in the supply chain, so the personal collaboration is a pre-requisite to achieve the supply chain collaboration (Hudnurkar et al., 2014).

The collaboration in the supply chain includes collaborations between all supply chain members from an intra-organizational working environment and external organizational working environments (Emmett & Crocker, 2016). Accordingly, we can identify two types of collaboration (Chen et al., 2017):

- Internal collaboration – this kind of collaboration is inside the organization between different departments. This encompasses the collaboration between the team members in each department as well.
- External collaboration – this kind of collaboration occurs between supply chain activities. More specifically, it can be deliberated as communication with suppliers, customers, competitors, others, etc.

In the figure 9 these two types of collaboration can be recognized, where the internal collaboration is required to manage the activities inside the organization, and required as a pre-requisite for the external collaboration, because no organization can collaborate with its business partners, if it cannot achieve this collaboration first, between its personnel and departments.

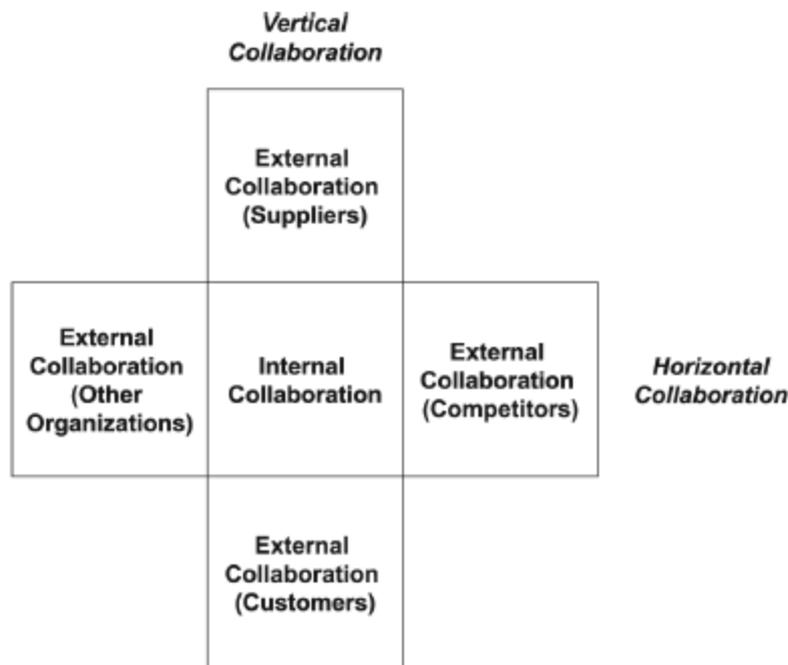


Figure 9: The scope of collaboration in the supply chains.

Adapted from Barratt (2004, p. 32)

In line with the above-outlined cognitions, the internal collaboration would be focused first that is occurring inside the organizations and the team members in each department of the organization.

Internal collaboration in the organization

The collaboration inside any organization is concerned with the interactions between all the functions of the organization and how the information can be exchanged horizontally and vertically (Gustafsson & Magnusson, 2016). This type of collaboration is affected by several elements, of which Rossignoli and Ricciardi (2015) and Cao and Zhang (2013) emphasized the importance of the structure of the organization, organizational culture work regulations, and procedures.

In any organization, the collaboration holds an amplification nature as each collaborating effort between two functions leads to more collaboration in the other functions as well (Germain & Lyer, 2006). For example, Germain and Lyer (2006) led to the fact that collaboration between purchasing functions and sales enhances logistics activities and production planning.

The internal collaboration can be achieved by assimilating the functions of the company and replacing the silos of each function by cross-functional collaborations (Emmett & Crocker, 2016). Cross-functional collaboration also impacts the responsiveness of the entire supply chain positively. Consequently, each function has a separate structure. However, operationally, the activities of each function are synchronized with the other functions in the supply chain in the context of external collaboration (Eng, 2005).

The success of the intra-organizational collaboration depends on the relationships between the functions in the organization in terms of collaboration between the members of different functions in the supply chain, speed, and accuracy of transferring the information, and doing actions on time accordingly (Popp et al., 2014).

The intra-organizational collaboration can help the supply chain to perform these activities on time and with a high level of quality control as well (Gustafsson & Magnusson, 2016). All these points can determine the speed and flow of information and materials across the supply chain (Emmett & Crocker, 2016).

To sum up, the internal collocation aims to overcome the functional silos inside the organization and prevent the different functions of the supply chain from working isolated from each other (Msimangira & Venkatraman, 2014). This is required essentially as a pre-requisite for any external collaboration with other organizations in the supply chain (Romano, 2003). This is logical as there is no possibility to successfully collaborate with external parties, while the internal collaboration is not organized or collaboration inside the organization is poor (Cao & Zhang, 2013).

External collaboration

External collaboration is defined as “active collaboration between two or more firms that operate on the same level of the supply chain” (Cruijssen, 2006, p. 12). This type of collaboration assumes that there are two or more organizations in the supply chain sharing “their responsibilities, resources, and performance information to serve relatively similar end customer” (Solaimani et al., 2015, p. 2).

This type of collaboration is related to the relationship between an organization and its business partners and its business environment. In today’s business environment, these partners are mostly located overseas in different countries, cultures, having different strategies, and have various business processes (Ralston, 2014). The collaboration is a real challenge in this case specifically to streamline the various strategies and procedures of the various companies, which participate in the global supply chain, and align their objectives together (Botta et al., 2013).

External collaboration is not always easy to achieve, but many challenges are faced by any organization when trying to achieve this type of collaboration, mainly related to the control concept. While in the frame of the internal collaboration, the organization has full control of the employees and various functions, in the external collaboration, it always depends on other parties, which is out of the control of the organization. Each organization has its system and process flow, so there is always a challenge to streamline the systems of different organizations together to achieve this external collaboration. The difficulties in the initial phase are directed towards who should be collaborated (Barratt, 2004), and this contains the criteria of the potential business partners subject of collaboration. Mainly, this relationship should be built in strategic elements and cultural elements. Barratt, (2004, p. 36) illustrated the elements of supply chain collaboration, as shown in Figure 10.

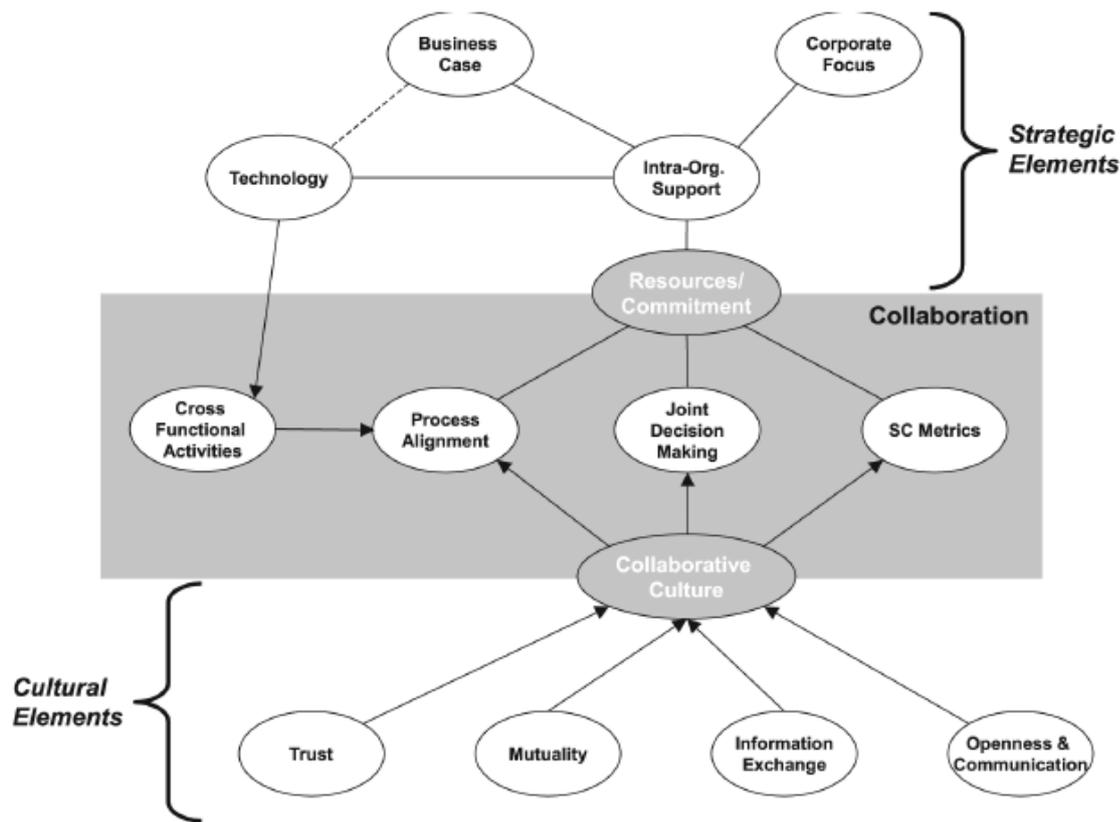


Figure 10: Elements of supply chain collaboration

Adapted from Barratt (2004, p. 36)

“Collaborative planning concepts can be applied to the planning processes that interface with customers - e.g., sales planning, and to those that interface with suppliers - e.g. procurement planning. Further, collaborations can be distinguished by the objects that are exchanged and collaboratively planned, such as supply capability of suppliers or material demand of customers” (Kilger & Reuter, 2005, p. 259).

The collaboration also determines the quality of the information in the supply chain (Marinagi et al., 2015). Higher the collaboration, greater is the chance of exchange of reliable information. This is because the interaction of the partners enables each party to get real-time information which is needed to perform the work in a proper manner (Lotfi et al., 2013). Any shortage of information would affect the visibility of the supply chain entirely, and any information more than what is required may also disclose the confidential information of each company. Moreover, this would waste the time of the information’s receivers because they need to spend time searching for the useful information and refine them from the unnecessary data that they receive (Montoya-Torres & Ortiz-Vargas, 2014).

By collaboration among all members, the customers could be able to realize the value of all the functions in the supply chain, including direct and indirect values. Whatever is visible value to the end customer is considered as capability, and the indirect value is competence, as explained by Watts et al. (1993). By integrating the customers into the overall process of the supply chain, they can value the whole process rather than focusing only on the results of the individual activities (Harzer, 2013).

To sum up, it can be inferred that the core concept of the supply chain itself reflects how to manage different relationships collaboratively to satisfy the end customers (Kempainen & Vepsalainen, 2003; Ahmad & Ullah, 2013; Singhry et al., 2015). Moreover, collaboration becomes a key survival factor in a very competitive environment (Yi et al., 2016) and for managing the entire supply chain in the future (Cox and Lamming, 1997; Ralston, 2014). Thus, the collaboration in the supply chain represents a necessary precondition for the creation and implementation of any supply chain strategy (Deveshwar & Rathee 2010).

In the next chapter, the focus is laid on collaboration among supply chain partners, where the collaboration in the supply chain is examined through the lenses of the utilization of lean, agile, and leagile strategies.

3.1.2. The collaboration and utilization of lean, agile, and leagile strategies

In line with the above cognitions and purpose of this dissertation, the emphasis is placed on important consideration between collaborating entities in the frame of the supply chain and the issue regarding the utilization of different strategies in the supply chain.

The collaboration cannot be done one time, but there must be a preparation phase initially, which should be implemented in the process as a sequence of the selected way of working (Ireland & Crum, 2005). In the literature about supply chain (see for instance Kersten et al., 2013) authors reported several basic phases of collaboration (Saenz et al., 2015; Botta et al., 2013), starting with changing the culture in organizations that want to collaborate to the strategic collaboration among supply chain partners. These phases are outlined in the details below.

- Phase 1 – the first phase is to change the culture of the people from focusing on individual efforts to put in the forefront supply chain efforts, and illustrating the contribution of each activity to the strategy of the supply chain. All the parties must

believe in the positive outcomes of the collaboration and how it can facilitate their work. Otherwise, they would not act well. This shift in the culture can be done by exploring the benefits of collaboration (Prasanna et al., 2016).

- Phase 2 – selecting partners is the second phase, and this phase should be based on trust and reliability to establish a strategic relationship (Handfield & Nichols, 1999). The partners should be able to collaborate and interact perfectly. Dependability and benevolence are very important characteristics of successful collaboration. Furthermore, each party must realize that it can depend on its partners, without disclosing the confidential information of the business (Özpolat et al., 2014).
- Phase 3 – creating common objectives is the third phase. Each organization in the supply chain has a different group of objectives, so the focus should be on the common objectives between all the partners working together to achieve them. The common objectives of the partners are very important factors for building reliable relationships, so there should not be any conflict between the various objectives of the business partners. The ultimate objective of the entire supply chain should always be to satisfy the end customers and achieve a competitive advantage in the market. If different objectives are there, effective collaboration should not be expected (Hrelja et al., 2016). To achieve flexibility, there should be a high level of shared planning, and the partners should have the ability to change the strict contractual obligations as per the status of the market. This is a fundamental step for the leagile strategy to remain flexible over time (Savolainen & Ikonen, 2015).
- Phase 4 – this phase deals with the investment in a long-term relationship, including the required infrastructure of information sharing systems. All the partners need to realize the fact that the value of the partnership holds more importance than the cost which they spend to build the partnership. The partner is suggested to consider the cost as an investment which is beneficial for more value in the long term (Boyce et al., 2016). The business processes of all the partners should be aligned around the supply chain strategy (Pérez, 2013).
- Phase 5 – the most advanced phase is the strategic collaboration and the supply chain integration to merge various business processes, from different members of the supply

chain into one process (Jeston & Nelis, 2014), which flow through the entire supply chain without significant bottlenecks (Krishnapriya & Baral, 2014).

The above-outlined phases can lead to cost reduction for all the partners of the supply chain and acceleration of activities, which means agile as well (Ralston, 2014).

Some authors argued that lean appreciates long term supplier partnerships, while agile focuses on short term only (Kovack et al., 2005). In business practice, both lean, agile, and leagile strategies require long term partnerships because of (Qrunfleh & Tarafdar, 2013):

- The long-term partnership is beneficial for the companies in running their operations smoothly and also to engage the entire process with others efficiently.
- The processes should be standardized, and the daily activities should be normalized for all the employees so that they are familiar with the procedure. This would eventually minimize the workload and also make them able to have quick responses.
- The conflicts can be reduced through the partnership as each party has a clear understanding of others.
- The companies with strong partnerships are eligible to share the resources by mutual understanding. They can also allocate the resources throughout the process flow in an accurate manner.
- The business partnership has a direct impact on the optimization of the continuous flow and speeding up the process, as a result of responsive communication and trust.

Lean, agile, and leagile strategies all require a high level of quality control, and the long term partnership plays a very important role to enhance the quality. However, each party is committed to maintaining quality procedures as per the terms and conditions of the contract.

The impact of the collaboration onto lean, agile, and leagile strategies utilization in supply chain

“The supply chain strategy aspect is considered as an investigation into how the supply chain should operate efficiently to compete, by evaluating costs, benefits and trade-offs in the supply chain operational components” (Petar, 2014, p. 14).

The extent of the collaboration within the business and outside with the supply chain partners is useful in assessing the supply chain strategy’s success (Ahmad & Ullah, 2013). For the

utilization of the strategies related to the supply chain, it is a highly challenging question associated with the trade-off between optimization of the whole supply chain vs optimization of a single firm as a single business unit. For example, a strategy can be useful in improving the performance of the focal company while it decreases the entire supply chain's performance. On the other hand, the supply chain strategy's utilization might make the performance of different companies better, but this might not be the case for other companies. Therefore, it can be noted that the management of the utilization of the strategies can be highly challenging for the managers. This is because there are several dimensions related to the utilization of various supply chain strategies.

Different authors have emphasized on proving the relationship between agility and collaboration. Some researchers consider agility as innovation via collaboration. According to Heisterberg and Verma (2014), "innovation via collaboration is the ability to anticipate challenges and opportunities before they occur, produces a sustainable competitive advantage".

One of the useful ways of monitoring the balance between agile and lean strategies is to monitor the collaboration with partners as well as work to make improvements in the future. With the help of improvement in the supply chain, a balance between agile and lean strategies of the supply chain can be attained (Rossini & Staudacher, 2016).

For collaboration in the supply chain, the leagile strategy is useful in sharing strategic planning in a collaborative manner and in exchanging the information (Christiansen et al., 2007). Stadler and Kilger (2005) mentioned that the larger scope of supply chain collaboration could incorporate more activities in strategic planning.

The leagile strategy needs a huge degree of collaboration downstream with customers and upstream with suppliers for accelerating and harmonizing the activities (Christopher, 2005). Also, a leagile strategy helps perform those activities efficiently. Accordingly, in the leagile strategy, the collaboration is concerned with:

- achieving cost reduction by collaborating with all the entities in the supply chain
- to remove the waste and to pull the requirements of the customers promptly (Purvis et al., 2014)

- Reducing the processing time by smooth and responsive communications (Soltan & Mostafa, 2015).

Cannon and Homburg (2001) reported that the collaboration and flexibility could reduce the operational cost, and are extremely significant factors for lean strategy. Additionally, an agile strategy requires a high level of collaboration because there are many parties involved in the logistics process. Thus, as reported by Sukati et al., (2014), speeding up the activities might not be possible in the absence of collaboration among all parties.

It is important to note that in the vertical integration where the organization performs some logistics activities indoor, the collaboration is still needed to link the logistics function to the other functions of the supply chain (Andreou et al., 2016).

According to Croxton et al. (2001), two issues can be identified with the help of lean, agile, and leagile strategies. These can be identified through the contribution of each function and the sequence of activities. These issues include the speed rate of the entire process and the cost of the overall operation of the supply chain.

In the leagile strategy, the collaboration is concerned with materials and information sharing. Also, this is the core idea of having two decoupling points; one for materials and another for information (Nel & Badenhorst-Weiss, 2015). The researcher has focused on studying the collaboration in the supply chain for lean, agile and leagile strategies utilization. In this regard, two decoupling points have been discussed, which are material and sharing of information.

The collaboration and decoupling points

For the material decoupling point, the supply chain partners should share the materials, and this can be done by levelling the production capacity between the partners (suppliers, manufacturer, and customers). It is also important in determining the location and quantity of the buffer inventory that should be kept with each party at a specific time. This buffer inventory is determined by the status of the downstream demand in the supply chain within a given time. Moreover, the lead time of each material is also considered while determining the buffer inventory (Purvis et al., 2014).

Each organization in the supply chain should keep some stock, so the stock is not stored in one location, but in different locations and thus, two important points can be achieved. First is to

distribute the risk of holding stock between all the organizations in the supply chain, and second is to respond to the demand quickly as the stock is at various locations within the supply chain. It is significant to understand that information sharing can be done through visibility. The visibility is “the capability of a supply chain player to have access to information or the capability to provide the required timely information among supply chain parties. The sharing of information leads to better decision support from supply chain partners (McIntire, 2014, p. 10). Additionally, the collaboration helps to share the necessary information across the supply chain without disclosure of confidential information. This is an essential point that does not allow violating the confidentiality of each organization on an unnecessary basis (Pomponi et al., 2013). Both materials and information decoupling points are considered as shared resources between the collaborated organizations. Also, with the help of these necessary resources, organizations can achieve efficiency (Awasthi & Grzybowska, 2014). Matopoulos et al. (2015, p. 219) mentioned that the resource efficiency in supply chains starts with the awareness of the use of resources and its impact. Thus, in the frame of supply chain collaboration, the resources of all supply chain members act complementary for each other and do not compete with each other.

The collaboration has a strong impact on the determination of the strategic position of the decoupling points. This is because it helps the supply chain of the focal organization to set up the decoupling points strategically between the pull and push boundaries (Wikner & Johansson, 2015). It makes the process flow visible to all the partners and helps them to determine the exact location of the inventory (McIntire, 2014). This can be done by liaising with the downstream boundary of the supply chain to the upstream boundary with the help of vertical and horizontal collaboration (Hakami et al., 2014). Based on experiences from business practice, the author proposes one of the following solutions. As per Liu (2013) in lean practice, the inventory should be distributed collaboratively in each tier of the supply chain so that the quick response can be given to the pull force. In the case of agile practice, the additional production capacity should be reserved to be used in case of surge demand (Huang et al., 2016). In both cases, lean and agile strategies play the key role to determine the appropriate locations, where the inventory can be distributed. Moreover, these strategies also speed up the transfer of the materials between the various stock points (Wikner & Johansson, 2015). From a leagile viewpoint, the supply chain should trade-off between these two options based on the cost of

each option in comparison with its responsiveness. In general, the reservation of the additional production capacity is very useful upstream to increase the flexibility of the operational system (Huang et al., 2015). Also, by doing this, the excess capacity is not wasted. When the inventory is distributed collaboratively, then the lead time is reduced (Kamalapur et al., 2013).

The objective of collaboration in the leagile strategy should be to increase the capability of the supply chain to fulfil the demand of the end customers effectively and responsively (Kamalapur et al., 2013). This can be done by positioning the decoupling points strategically and using the postponement technique.

Bowersox and Closs (1996) classified the postponement as follows:

- Manufacturing postponement – where the stock is maintained in the form of raw material until the customer's order arrives, and after that, the assembly is started.
- The logistics postponement – where the inventory is stored in some strategic locations as centralized inventory (Bask, 2001). Hence, the final delivery can be done quickly once the customer's order arrives. This is very useful for quick response to the customers and to reduce the distribution costs. The trans-shipping practice is very useful for the logistics postponement in which some shipments can be held in transit for some time before shipping to the final destination (Herer et al., 2002).

Although the postponement is applicable at any stage of the process, the core concept is to respond quickly to the customers. Also, the main purpose is to be lean through delaying the final assembly or delivering as much as possible (Xiaoxun & Jiajun, 2016).

In the next section, the focus on collaboration in the supply chain under different conditions has been done.

3.2. The collaboration in supply chain under different conditions

3.2.1. Starting points for collaboration in the supply chain under different conditions

In this section, collaboration in the supply chain under different conditions is focused on where the key starting points for the identification of scenarios are discussed. Later on, each of these

three scenarios is presented in detail. Also, the utilization of three strategies, named as lean, agile, and leagile strategy are discussed under three different scenarios.

The collaboration is needed in the supply chain in all cases. When the market is stable with no major changes, then the collaboration is needed fundamentally. In difficult times, collaboration is a crucial and survival factor for the supply chains (Ueki, 2013).

There are different conditions under which the organizations work, operate, and perform functions of the supply chain. Also, these conditions can be addressed through the phenomena of crisis (Pramanik, 2015; Andrianopoulos, 2015). The crisis can be defined as any situation or series of events that are threatening for people or property, negatively impact an organization, its stakeholders, or even an entire industry, if not handled effectively (Andrianopoulos, 2015, p. 2). Based on this definition, it can be recognized that the crisis could be for people, properties, or both, it could be natural such as an earthquake or tsunami. Also, it could be a health crisis such as COVID 19, and it could be an economic crisis such as the great depression in 1931 or the global economic crisis in 2009. Moreover, the crisis could be political in nature like the fall of a regime in any country or military actions and wars. In all such crises, the organizations and supply chains are affected, and the collaboration is useful in all the situations. The collaboration is essentially required at the time of crisis (Pramanik, 2015).

There must be a contingency plan for every type of crisis. Contingency planning is the process of developing responses proactively for various situations that might impact business activities (Pradhan, 2016, p. 1). In turn, a special type of collaboration with an innovative approach is needed to be able to support the supply chain strategies to cope with crises (Pramanik, 2015).

According to the aims of the dissertation, the researcher has examined different changes in the global market based on three scenarios. These situations cannot be handled by the single organization, and all members of supply chains should make combined efforts for handling the crisis. All parties included in the supply chain should be resilient enough to face future changes. "Resilience means being able to survive, adapt, and improve at the time of stress and change, and to reorganize as well as rebuild when necessary (Smith, 2016, p. 3). Consequently, a different kind of global oriented collaboration in supply chains is required (PWC, 2013).

Management of the global supply chains by utilizing proper strategies is required from the decision-makers to make plans for the future. This is because future events can directly affect

the performance of the supply chain and the overall profitability of the organization (Handfield et al., 2013). In the literature, there were many factors identified which are considered to be the potential risks for the future of the supply chain. These factors include continuous changes in the economy, fluctuations in exchange rates, and political instability (Dornier et al., 1998; Barry, 2004; Manuj, & Mentzer, 2008).

As per the above-mentioned starting points, the possible future scenarios are presented accordingly. Among possible future scenarios, the researcher has focused on three main scenarios through which future conditions can be outlined.

It is extremely important to understand that the supply chains and the whole world are running with the help of non-renewable energy resources and the use of renewable resources is limited. That is why the problems can be faced by business concerns in the future, and it is important to make supply chains prepared for uncertain conditions (EY, 2013). This can lead to understanding and the development of the first scenario related to energy scarcity. Coupled with energy scarcity, there are also complicated political situations present along with the economic crises (Kulacki, 2016 and Mohan et al., 2013). For example, the incident of 2008 impacted the real estate sector in the USA, along with the entire global economy. Also, the issues occurring due to COVID-19 have impacts at the global level. These events can lead to the collapse of the economy (Krueger, 2016), and consequently to major changes in the monetary system (POP, 2016). In addition to both identified scenarios, the third scenario can also be identified based on the threat of wars in the future (Johnson, 2014; Mohr et al., 2015).

In the next sections of the thesis, the identified scenarios are discussed in a more detailed and comprehensive manner.

3.2.2. The Scenario of Energy Scarcity

In the first scenario, the scarcity of energy is presented, which is an important topic for the supply chain processes, as well as for the global economy. The manner in which the energy is essential for the routine life processes and the considerations which limit resources of energy are specifically considered in the context of supply chain management. Energy is significant for the supply chains operations, such that the processes of production, transportation, and other operations are significantly dependent on the availability of energy (Marchi & Zanoni, 2017). The satisfaction levels of end-users or customers are also strongly influenced by energy. For

instance, the levels of satisfaction of the end-users of electronic products and automobiles are dependent on energy. For this reason, Rafique et al. (2015) stated that energy should not be available only to facilitate the production of the products; rather, energy should also facilitate the end-users or customer so utilizing the products (Rafique et al., 2015).

Weinberg (1978), and the World Economic Forum (2013) described energy as the ultimate resource of everything in life and demonstrated that energy is the engine for the working operations of human beings. While considering the context of energy, there is an immense focus on oil, which is essential and at certain times, an exclusive resource of energy for some countries. The report presented by the World Economic Forum (2013) mentioned that in the year 2011, oil held approximately 32 % share of primary energy consumption. Moreover, the recent data demonstrated that the situation had remained the same in the last couple of years (European Union, 2019; World Energy Council, 2019).

There is no doubt that oil is the fundamental element for building the economy of the modern world (World Economic Forum, 2013). According to Hamilton (2005), oil is the resource, which had facilitated the development of all industries in the world within the last century, and is expected to play the same role for at least next 25 years. Tilton (2003) proclaimed that long-run availability of oil and other mineral resources depends on the tradeoff between the reduction of cost of new technologies of exploration and production of resources on one side, and the cost-increasing effects of resources depletion at the other side.

The global economy depends on the oil mainly to grow, and the industrial operations of a considerable majority of industries are either directly or indirectly dependent on oil. The report presented by the World Energy Council (2016) mentioned that all of the human activities worldwide are entirely dependent on oil.

EY (2013) stated that confirmed reserves of oil are not enough to fulfil the world's needs in the future; therefore, within 25 – 50 years, the humankind must be prepared to live without oil. Hirsch et al. (2005) described that "peak oil" as the point, which is achieved when the global production of oil reaches its peak stage and then starts declining permanently. The peak oil point is expected to happen between the years 2007 – 2025. At the time of the present research, (13 years after 2007), the world is closer to the peak oil stage (Hirsch et al., 2005).

The scarcity of oil would raise the prices dramatically in the future, and currently, the humankind has not discovered a replacement of oil, to be used as an alternative over a large scale (World Economic Forum, 2013). In history, the oil price had undergone several cycles of price fluctuations, due to the long lags of discovery and exploration. Moreover, many political, as well as economic factors, affected the price of oil (New, 2003; Tilton, 2003; Cuddington et al., 2008; World Economic Forum, 2013; World Energy Council, 2016).

Although there are alternative sources of energy, including coal, the solar, wind, and nuclear; however, these sources are not applicable for usage in every part of our life. For this reason, until today, there is no suitable solution to replace oil (Osborn, 2009; World Energy Council, 2019).

Any change in the oil price affects the overall economy of the country and the global economic growth directly (Hamilton, 2005; Ey, 2013). According to the evidence, the oil price was the main reason for nine of ten recessions which had occurred between the years 1946 – 2005 (Hamilton, 2005; Johnson, 2014).

According to the World Economic Forum (2013), most of the countries generate electricity power using oil; therefore, any scarcity of oil would lead to huge problems in electric power production. Nowadays, despite the availability of oil, the increment in the consumers of electricity, for example, the users of electric cars, represents continuous stress for the generation of electricity for the current and the new generations. The electricity is a significant element for the home and industries, and specifically, the power failure within the industries is likely to negatively influence the efforts to develop or even sustain businesses (Canadian Electricity Association, 2013).

The current political situation is one of the most significant reasons due to which it is expected to experience a dramatic increment in oil prices. The political situation is becoming very complicated day today, and there is a risk of war in the future due to the political situations (Johnson, 2014). The war is not anticipated to consume the remaining oil which is reserved by the humankind, but might also increase the demand for the sources of supply worldwide and is perceived to make the logistics handling of oil extremely difficult. For instance, about two-thirds of the world's oil supply comes from the Middle East; however, the political situation in this region is not stable. Johnson (2014, p. 72) mentioned that according to the prediction of

the Global Environment Outlook of 1999, there is a likelihood of conflict over water in North Africa and the Middle East between the years 2000 and 2025. The ideological and governance issues are predominated in these regions midway through that predicted period. These cognitions also demonstrate the inter-relatedness between the identified scenarios, as one of the considered scenarios is also a threat of war, which is explained in the later section.

In terms of the energy scarcity, the supply chain (i.e. organizations in the supply chain) has to depend on alternative sources of energy, rather than solely depending on oil. The supply chain has to invest in *Research & Development* (R&D), for developing alternative sources of energy, as depending only on oil, will lead the supply chain to extreme challenge. According to Cucchiella and D'Adamo (2013, p. 774), from the supply chain point of view, the high development of renewable energies give rise to challenging situations.

The increment in oil prices will result in the increment in the prices of all commodities in the world. Consequently, a large scale of consumers will not have the ability to satisfy their needs; therefore, the demand will be collapsed dramatically. This situation might lead to a great recession, and a lot of businesses may not be able to survive in such conditions. After the beginning of the recession which was started in the year 2007, there were speculations about the relationship between high oil (and other energy) prices and economic downturn (Brecha, 2013, p. 678). For overcoming the situation, there is a requirement to develop techniques for alternative sources of energy, and the challenge will remain for the ability of the supply chain to keep up with the increasable rates of commodities.

In line with the aims of this research, the utilization of three considered strategies in the supply chain is discussed under the scenarios of energy scarcity.

The impact of energy scarcity on supply chain strategies utilization

The process of allocating scarce resources across the supply chain is very crucial (Douglas et al., 1998). It is important to note that the lean strategy is concerned with waste elimination in the supply chain. Also, the lean strategy can help the business to remain competitive by reducing the overall cost of the supply chain and offering reasonable prices to the end customers (Noda, 2015).

In 1973, there was an unexpected oil crisis, and no one had made plans for managing it (Morrigan, 2010). The oil price increased significantly as a result of the interrupted export of oil

from Saudi Arabia and other Arab countries to support Egypt against Israel in the war (Morrigan, 2010). Thus, many companies faced a very difficult time and shut down their operation entirely; however, Toyota earned huge profits by imitating the lean practice (Womack & Jones, 1996). Since that time, the case of Toyota became a very good example for other companies. This is because Toyota showed good performance even at the time of crisis when several other companies could not survive at all (Womack & Jones, 1996). Despite that, the scenario of energy scarcity taken under consideration by the researcher is relevant to the dramatic increase in the oil price. Also, this could handicap any cost reduction tool to manage the crisis.

Moreover, it may be associated with significant logistics difficulties. In such conditions, the supply chains cannot control the prices of their finished products. This is because the cost reduction due to the elimination of wastes is not remarkable to the dramatic increment of the oil price that can cause an increase in the prices of all the commodities and raw materials (Fleming, 2016). It can be concluded that the lean strategy is not enough to overcome the situation of energy scarcity. Also, it can be assumed that the management of this scenario cannot be done only through a lean strategy (Fleming, 2016).

The agility can be helpful to accelerate the decision-making process in the supply chain and in eliminating the time of activities. Also, this can play a very important role to satisfy the customers and keep up with the continuous changes in the markets. But, if the agility is examined as a strategy against the selected scenario of energy scarcity, then certain difficulties can be discovered (Prater et al., 2001). This could make the agile strategy not suitable for the scenario of energy scarcity. This is because it can simply increase the overall cost of the supply chain, which is already extremely high due to the increasing prices of the oil and raw materials (Prater et al., 2001).

The leagile strategy is considered to be the most effective strategy and can help the supply chain to the trade-off between lean and agility strategies as per the status of the markets. Also, the leagile strategy is useful for the postponement technique. However, the material is kept as raw as possible and the final assembly is postponed until customers' orders are received. This can support the decision-maker to attain a high level of flexibility by using the raw materials for multiple purposes. Consequently, it helps in reducing the overall inventory level because a single raw material can be used for different activities (Kim, 2014).

Although the leagile strategy is recommended for managing supply chains under this scenario, it is believed that it cannot be enough. This is because of the dramatic changes in the global markets like the increase in oil prices. The leagile strategy can help to reduce the negative impact of such changes, but it cannot provide the ultimate solution.

Thus, a new framework for managing the supply chain is required that could be more effective and suitable for managing supply chains in the future.

3.2.3. The scenario of the new international monetary system

This scenario is considered specifically because of the financial problems prevailing globally since 2008. These include the huge levels of debits of all the countries worldwide. Despite being a leader to the global economy, the US federal government debt is increasing every year (Tseng, 2015). Because of these reasons, the need for a new international monetary system is present and is considered as a scenario in the current study.

In this section, the possible development of the international monetary system is discussed. It is extremely significant to understand how the current monetary system is developed and where it is now. Thus, it can be identified that this current system could collapse anytime and a need to introduce a new monetary system is prevalent. Secondly, it is outlined how the new international monetary system would influence the supply chain and utilization of lean, agile, and leagile strategies in the context of supply chain management.

Development of the international monetary system

Before discussing the possibility of developing a new international monetary system for the future, it is useful to understand the current monetary system. It is important to understand the reasons why the current monetary system cannot sustain in the future.

The development of the international monetary system dated back to ancient times, where the monetary system was based mainly on grains such as barley or wheat (Wray, 1990). Later on, the people used gold and silver as currencies (Innes, 1913), and that system was sustained for a long period as the unique monetary system of the world (Wray, 1990). Finally, a major change happened in the last centuries, when the banking system was developed, and consequently, the usage of paper money started (Keynes, 1982; Wray, 1998).

The paper money was used initially by the merchants and bankers in the form of “bills of exchange” as a “promise to pay” (Wray, 1990). There were many benefits associated with this

“system”. For example, the merchants were not enforced to carry the heavyweight of gold and silver, the payments were done smoothly, and there was no risk of losing the money as before (Davies, 2010).

Accordingly, private entities were established to handle the payments and reserve the gold without risks, and that was the foundation of the banking system (Wray, 2012). People used to keep their gold with the bankers, and the bankers used to make receipts as proof of receiving a certain amount of gold. After the completion of the trading deal, the buyer claimed his/her gold from the banker to hand over the same to the seller. Then, the seller used to return the gold to the banker to reserve under his/her name (Davies, 2010).

Over time, all the buyers and sellers realized that it is not a practical way to move the gold for each trading deal, but instead the receipts issued by the banks could be exchanged. Thus, the trading deals were done just by papers of guarantee by the bankers (Rothbard, 2002).

Later on, the bankers noticed that nobody was claiming the gold except in a few cases, and everybody started to trust the receipts of the bankers as an acceptable method of payment (Triffin, 1964). This situation empowered the bankers to lend gold and to issue more and more receipts. That point of history represented the birth of the “paper money”, which is functional today (Triffin, 1964). The bankers gained a massive amount of money from the process of issuance of guarantee receipts and lending the money with interest, even without owing that money. The money was owned by the people who trusted the bankers and kept their gold with them (Rothbard, 2002).

With the development of banks, the reservation of gold in the banks was equal to the paper money in the market, and everybody was able to exchange the paper money with gold at the time of need (Wray, 2012). This situation sustained for years until World War I took place. The huge expenses of the war did not allow the governments to reserve gold for each paper money in the market, but they started to print more and more papers. Also, there was no reserved gold against printed paper money. That was the initial step towards another economical phenomenon called “inflation”. Makinen (2003, p. 1) reported inflation as a “sustained or continuous rise in the general price level or as a sustained or continuous fall in the value of money that reduces the power of the paper currencies”.

Additionally, Triffin (1964, p. 21) reported that the financing of the First World War and the postwar reconstruction caused inflation. This was the same as the case with earlier and later wars. Also, the sharp and inflationary increase in the monetary liabilities of national banking systems occurred while gold production expanded at a significantly lower rate than before.

Before 1944, people were able to exchange their paper money to gold, but with a lower rate than before (Triffin, 1964). In 1944 the situation changed due to the Bretton woods conference. Also, the monetary system of Bretton woods was based on the obligation of each country to tie its currency with the US dollar with the possibility of converting the currencies to gold with a rate of 35 \$ per ounce. Thus, the US dollar ruled the world (Davies, 2010). After World War II, the monetary system was not stable, but all the countries did not prefer to return to the “gold standard” again (Hansen, 1945).

In 1971, the United States terminated the link between the US dollar and gold. Consequently, the entire global economy was based on a paper monetary system, with continuous rates of inflation (Davies, 2010).

The international monetary system (IMS) is defined as “the set of official arrangements that regulate key dimensions of the balance of payments. It consists of four elements: (1) exchange arrangements and exchange rates; (2) international payments and transfers relative to current international transactions; (3) international capital movements; and (4) international reserves. The essential purpose of the IMS is to facilitate the exchange of goods, services and capital among countries” (Mohan et al., 2013, p. 4).

Based on the background mentioned above, the global economy faced many difficult situations. For example, in 1973, the shortage of oil supply occurred due to the war between Egypt and Israel. This is because the Arab countries stopped the oil supply. At that time, the shortage of oil supply was a big issue on the international level, and this led to an increase in the price of oil. This affected the global economy and the entire monetary system significantly. It occurred due to the petrodollar system where all the oil purchase worldwide has to be settled by the US dollar only. Thus, a strong connection between the oil and the US dollar created trouble for the international monetary system (Suleiman, 2013).

In 2008, the global economy suffered a lot due to the financial crisis. At present, the status of the global economy is not clear, and the future is vague. The only certain fact is that the current

system of the global economy cannot remain stable for a long period, and there will be changes in the future (PWC, 2015). Nowadays, there are again sign of a new economic downturn due to the trade war between the US and China (Liu & Woo, 2018; Lukin, A., 2019).

According to the cognitions mentioned above, Pop (2016) has identified 3 scenarios for the future of the international monetary system:

- The repair and improvement scenario aiming to improve the current system.
- The Multi-polar/Bipolar Scenario assuming that the US dollar remains the main currency but some other currencies play an important role in the future, including the Chinese Yuan and Euro.
- The Renewed Multilateralism Scenario assuming to build multilateral international monetary order.

Thus, there is a need for a new monetary system, and the recent status of the global economy is supporting this trend (Tseng, 2015; Pop, 2016). As stated by Mohan et al. (2013, p. 1) “The North Atlantic financial crisis of 2008-2009 has spurred renewed interest in reforming the international monetary system which has been malfunctioning in many aspects”.

For instance, one of the current trends is related to bitcoins and other digital currencies (David, 2014; Dobija, 2014). This is questioning the current monetary system and its existence in the future. The new monetary system is not a strange idea nowadays, especially after the digital currencies appeared. Thus, the future could not be for the coins and papers money with the control of central banks in all countries. (Dobija, 2014) mentioned that computers excavate digital currencies only without the involvement of bankers. Thus, the government cannot print paper money whenever needed. Consequently, the current monetary system would not be stable in the future due to the development of digital currencies (Ali & Southgate, 2014). The current monetary system may change significantly in the future. This change could be in terms of using digital currencies to replace the paper money, which implies no control of central banks. Also, there can be a major chance to turn back to the exchange rates and the usage of gold again (Tanaka, 1996).

To develop a successful monetary system, “a well-functioning international monetary system is needed. This system should need two things: (a) individual countries and especially large ones must be stable”, and (b) certain arrangements are needed to address the consistency and

stability of the system as a whole” (Krueger, 2016, p. 123). Thus, the countries participating in this monetary system must be stable, and the system itself must be consistent and stable.

The international business would be affected due to the development of a new monetary system. Consequently, the supply chain strategy utilization would happen under new circumstances. In line with the aims of this research, the utilization of three considered strategies in the supply chain is discussed under the scenario of a new international monetary system.

The impact and utilization of a new international monetary system on supply chain strategies

Cook (2006) believed that even 0.5% deviation of the exchange rate could affect the entire supply chain significantly, and disastrous outcomes could be attained if this percentage reaches to 4%. Cook (2006), however, only discussed deviation of the exchange rate, so a situation is imaginable if a new setup to the international monetary system takes place.

For the discussion of strategies utilization under conditions of the new international monetary system, the following predictions have been outlined such as using digital currencies to replace the paper money, no control of central banks, major changes in the exchange rates and the usage of gold again, etc.

The supply chain can utilize lean strategy because of the following reasons (Christopher, 2005):

- The supply chain implementing lean strategy have little waste, so it is more economical, and this could help the supply chain to overcome the shifting process from a monetary system to another with the minimum possible limit of negative consequences.
- The lean strategy requires a high level of flexibility which could be the core base of managing the supply chains in the future. Especially, if the global economy is collapsed somehow, the supply chains with a higher level of flexibility would be able to adjust its business quickly to the new monetary system.
- The lean strategy is concerned with cost reduction across the supply chain, and this is a very important point to run any business in general and becomes crucial in the difficult times such as the current scenario of the new monetary system which could lead to economic collapse.

It is believed that despite the lean strategy is useful in the period of economic recession as indicated (Georgescu, 2011), it is not enough to handle a disastrous situation such as the collapse of the global economy that could be a result of the new monetary system. Especially, the extent of collapse and its duration is also uncertain.

One of the most important weak points of lean strategy in this scenario of the new monetary system is its perspective of maintaining assets and excess materials (Christopher, 2005). The lean strategy is against obtaining excess materials and assets more than the capacity of the supply chain, and consequently, the supply chain can have a high level of liquidity and cash flow. In comparison to the considered collapse of the monetary system, it can be a disastrous case for the lean supply chain, because simply, in that case, the assets and materials would have value forever, but the paper money and cash maybe without value in such case, so the assets are better than money in the current scenario (Schlichter, 2011).

Turning to the agile strategy, it can be useful to help the supply chain to respond quickly to the changes in the markets (Wendler, 2013). The decision making process is also rapid, and this can be an effective technique in the difficult times, which can help the organizations to act and react promptly overcoming the negative results of any crisis urgently (Purvis et al., 2014).

There are always opportunities within any crisis, and the key factor is how to discover and utilize these opportunities once they appear (Trilateral Commission, 2009). The agile strategy could help to discover these opportunities quickly, but it may be limited to give a complete solution for all the problems of the supply chain in such a situation. Mainly it may increase the cost of the supply chain to improve the service level (Christopher, 2005), while in fact, the supply chain may not be able to survive with additional cost in such difficult situation.

The leagile strategy is useful to the supply chain in the normal situations, but unfortunately, it does not give solution to handle major changes in the markets, specifically in the current scenario of the new monetary system. Since the leagile strategy gives answers to the uncertainty of demand (Naylor et al., 1999), it does not answer any major change such as a new monetary system leading to the collapse of the economy. The nature of uncertainty in the present scenario is larger than the scope of uncertainty which the leagile strategy created to control it.

These circumstances call again for a new framework for managing the supply chain, which could be more effective and suitable for managing supply chains in the future.

3.2.4. Scenario of wars

In this scenario, the possibility of wars is discussed along with taking into consideration the possibility of occurrence, causes, and the way through which it can impact on the global business environment, particularly, the supply chain strategies' utilization.

The highly complicated political situation across the world may result in the occurrence of a new war (Kulacki, 2016), as the hassle and competition between the nations did not stop after the World War II (Cohen, 2006). Currently, the resources in the world have become limited while the population is over 7 billion across the globe which has forced the nations to compete in the limited available resources leading to hassle (Huntington, 1997). In particular, each nation has been playing monopoly in owning and utilizing the maximum portion of the global resources (Mohr et al., 2015).

Another possible reason for the next war is considered to be a collision among different religions (Stahl, 2013). The crashing point will ultimately come due to the inability of each nation to understand and accept the religions of other nations to live together in a peaceful manner (Mohr et al., 2015). This has eventually led to an extremely dangerous situation, as feeding the people with such conflicting attitude will automatically cause a crash one day (Cohen, 2006). Referring to history, most of the wars have been based on religious conflicts and reasons and the inability of the people to respect the religious perspectives of others (Cohen, 2006).

Even though mankind has made significant improvements to their lifestyle in the last century, however, some people still do not believe in civilization. Particularly, in the case of understanding diversity within the religions and culture, resulting in an increasing misunderstanding between the national cultures and religions (Mishra & Kumar, 2014).

The third reason is related to the economic competition on a large scale between the most influential countries like China, USA, Russia, India, and Brazil (Huntington, 1997), and the increasing political role of China and Russia due to their financial strengths (Kulacki, 2016). This global polarization has created tensions from time to time, which can eventually cause a crash at any moment (Cohen, 2006). The Power Transition Theory claims that when the power of China and Russia will reach to the power level of the USA as the global leader, the chances of

the war will eventually increase (Tammen et al., 2000). Kugler (2006), Kulacki (2016) and Mohr et al., (2015) have already expected this to happen in the next few decades.

The most important factor is the nature of the war which has ultimately increased the associated risks of the war, such that currently, due to high technologies wars can be extremely dangerous for the entire mankind (Kulacki, 2016). If the new war is expected to happen, then it will be most probably a nuclear war whose impacts will be huge and disastrous. Such that “Today, the world’s nuclear weapons could destroy fifty worlds like ours. Before the current generation, we did not have the means to destroy the entire world” (Stahl, 2013, p. 8).

To fulfil the aims of the research, the utilization of the three considered strategies of the supply chain are discussed under the scenario of the war conditions which has emphasized on the higher level of uncertainty, complicated logistics, and volatile demand. In particular, the supply chain strategy must deal with these conditions in a perfect manner.

The impact of war conditions on supply chain strategies utilization

The political situation tends to affect the business directly or indirectly (Kozubikova et al., 2019; Barash & Webel, 2017). Cook (2006) has highlighted among 50 countries that are not conducive for the business to operate due to the political status, as the decision of war is dependent on the politicians, thus, showing the connection between the political status and wars. The risk of war is one of the most important aspects of the supply chain management (Enyinda et al., 2008), especially due to the unstable political conditions and threats of terrorism (Sheffi, 2001; Barash & Webel, 2017; Chang & Lee, 2018). The scale of war could vary from a local war within a country or between the two countries, and a global war such as World War I and World War II, however, the associated impacts of the war represent a huge risk for the supply chain management (Sheffi, 2001).

Busch (2010) has suggested the following techniques for building resiliency within the supply chain, thus, managing the risk of local wars and terrorism.

- Shorten the supply chain by maintaining a smaller number of tiers.
- Develop an alternative mode of shipping (air, sea, rail, or road) and maintain an alternative source of local supply to complement the global supply.
- Perform an analysis to keep the stock safe to cover the shortage of supply.
- Work closely and collaboratively with the logistics provider to consider all the risks while shipping.

- Buy the risk insurance for all the shipments.
- Work collaboratively with all the suppliers to become the preferred customers, such that in the situation where they cannot supply their customers, preference can ultimately work.
- Consider all the risks as part of the contract included through protection clauses from a legal point of view.

There is a direct connection between trade and war (Levy, 2003). Thus, Levy (2003, p. 127) has stated that “While there are extensive debates over the proper research designs for investigating this question, and while some empirical studies find that trade is associated with international conflict, most studies conclude that trade is associated with peace, both at the dyadic and systemic levels”. So, the key concept lies in the fact that how can the future wars affect the supply chain directly, in terms of its management and utilization of lean, agile and leagile strategies (Chopra & Sodhi, 2004).

In the aspect of the utilization of the lean strategy in the frame of war conditions, there are several historical events which outline the role and importance of the lean strategies in the war conditions for managing the supply chains. The case of Toyota, in particular, is the best example of the role of lean strategy (Womack & Jones, 1996), as it is one of the real challenges to operate in difficult situations like wars where no one is aware of the extent of war. However, history has proved that there are greater opportunities for businesses in the wars. For example, “America's response to World War II was the most extraordinary mobilization of an idle economy in the history of the world. During the war, 17 million new civilian jobs were created, industrial productivity increased by 96 percent, and corporate profits after taxes doubled” (Goodwin, 2001, p. 1).

“American industry was revitalized by the war, and many sectors were either sharply oriented to defense production (for example, aerospace and electronics) or completely dependent on it by 1945” (Tassava, 2008, p. 1). Similarly, in Europe, the war caused huge destruction, as the economy was in the bad situation, and therefore the Marshall’s plan was introduced for rescuing Europe and reconstructing the entities that were being destroyed in the war. During this time, the USA aid of 13 billion dollars played a huge role in the plan, such that “Using the GDP deflator as a measure of a price change and comparing 2006 to 1950 (the mid-year of the Marshall Plan), the amount spent by the US is equivalent to \$92 billion in 2006

prices” (Dadkhah, 2009, p. 42). This automatically provided a huge push to the economy such that causing companies to restart their operations in the market.

Despite the disastrous situation for some organizations, several organizations capitalize on the war and made billions during that time. For those organization, the statement “the more difficulties of supplying material and services, the more profit could be achieved” (Merritt, 2012) has been completely valid. The underlying idea is that if the supply is easy there will many competitors, however, when the supply is difficult, only a few organizations can capitalize as they know how to manage these conditions and survive in the market.

It is highly recommended that the costs are controlled particularly in difficult situations like wars, such that removing the waste is not considered as the luxury strategy but rather a survival factor. In this regard, a lean strategy is essential to run the operations of the supply chain economically. In this manner, businesses can assure their sustainability during the wars.

“In response to the terrorist attack of September 11, management began to question the wisdom of lean operations using JIT processes. Some companies are ordering parts in larger quantities and increasing safety stocks to keep their assembly lines moving “just-in-case” if their inbound transportation is disrupted. Besides, they plan to keep more finished goods on hand so customers can be supplied even when the manufacturing process is disrupted” (Sheffi, 2001, p. 3). The lean strategy is mainly a supportive element in the war situations; however, it is not sufficient as it can create massive destructions, thus, corrupting any successful business. The supporting action for the lean strategy, in this case, is to work on mitigating the effect of another terrorist attack by designating a certain portion of the inventory as “strategic emergency stock”. This stock should not be used by the manufacturers in the day to day operations, but rather only in the case of extreme disruption. In particular, the costs of carrying this extra inventory represents the price of the premium bought in the insurance (Sheffi, 2001, p. 3).

All in all, a lean strategy is not enough to work alone in the war scenario due to the discussed limitations. Such that the circumstances and results of war are much more than that of the ability of the lean strategy when it is implemented alone in the supply chain.

The agile strategy is crucial in these scenarios to allow the supply chain to attain the highest level of flexibility to deal with the dramatic changes occurring in the global markets due to the war conditions. In these scenarios, taking prompt decisions of shifting the status of the

supply chain from one to another alongside taking quick actions is the primary element (Fayezi et al., 2016).

During the situations of wars, logistic channels tend to become more difficult (Privratsky, 2014). Originally, the term “logistics” has its initial roots from the military sector due to the wide-ranging difficulties faced by the organizations for supplying the materials in these situations, so “time” is considered as the key success factor (Privratsky, 2014). During the wars, there will be several opportunities but only those organizations will gain success who can manage their logistics effectively through taking prompt actions.

If the agile strategy is used as discussed, it will not be enough to address the circumstances of war (Clancy & Gresham, 2001). The destructions caused by the wars is far much greater and faster than the response of the agile attitude in the supply chains, where the supply chain may not be able to react and respond to the difficult conditions which are changing day to day and on the monetary basis (Sheffi, 2001).

In these situations, the leagile strategy can be effective for the supply chain in terms of maintaining a tradeoff between the lean and agile strategy to address the continuous changes occurring in the markets, thus, overcoming the difficulties resulted by the war. Besides, the postponing of the final decision of the assembly till a certain demand appears downstream the chain becomes difficult. The supply chain can avoid the risk of stocking the finished products in these difficult times. Despite the benefits of leagile strategy, it is established that it is highly difficult to operate the supply chain, as the negative impacts of the wars will not even allow for making a change in the strategy or maintain the raw materials as a normal case (Sheffi, 2001).

These circumstances realize the need for a new framework for managing the supply chain which could be more effective and suitable for managing the supply chains in the future.

4. Framework for utilization of lean, agile and leagile strategies in supply chains under different scenarios

To achieve the aims of the research i.e. develop the framework for the utilization of lean, agility and leagility strategies in the supply chains under different scenarios, the stage 2 of the research will involve the development of the framework of supply chain management by using the grounded theory approach. In this regard, certain points for the research and the associated methodologies will be outlined. The central focus of this chapter is on the development of the framework based on the answers acquired from the in-depth interviews with the supply chain professionals.

4.1. Research methodology

This section discusses the research methodologies in detail. Concerning the development of the global business environment, it is required from the supply chain to use suitable business strategies for managing the supply chain perfectly. In this regard, a framework is required for improving supply chain management.

Research design

Since, the core purpose of this research is to develop a framework for utilizing the lean, agility and leagility strategies in the supply chain under different scenarios which require creativity for generating new ideas, therefore, the grounded theory approach is primarily used. Particularly, to develop the framework to be used under different scenarios, the grounded theory has been used as the most appropriate research methodology. This is mainly a rigorous, qualitative, theory-building approach that is based on the field study of the multifaceted phenomenon or process through a series of steps of structured data collection and analysis.

In this research, the interaction between the specific events (supply chain strategies) presented in the scenarios and people is discussed. As per McCallin (2003), the grounded theory is an ideal methodology for addressing this kind of interaction due to which it is mainly selected for the researches. Another reason for selecting the grounded theory is its creative nature (Glaser, 1978), such that it can assist in creating the framework for utilizing the supply chain strategies of lean, agility and leagility in the supply chain under different scenarios, thereby, adding value to the existing literature on the supply chain.

Grounded theory is an appropriate methodology for studying the emerging supply chain phenomena using an inductive, holistic approach that has resulted in success particularly in the supply management research (Randall & Mello, 2012). To focus only on the researches in the broader area of supply chain management, the grounded theory approach is focused on the systematic gathering and analysis of the data to derive the theory (Strauss and Corbin, 1998), therefore, it has been widely used in the supply chain researches (Gebhardt et al., 2006; Giunipero et al., 2006; Malshe and Sohi, 2009; Mellos & Flint, 2009; Johnson & Sohi, 2016).

As discussed in chapter 1.4, the grounded theory is mainly concerned with the data collection and analysis, where the fundamental data collection in the aspect of utilizing the grounded theory approach in this research has passed to 2 stages:

- First is theoretical: To study the literature related to the supply chain strategies and identifying the possible areas for further investigation while making notes. This investigation is related to the ability of these strategies to work during different scenarios.
- Second is practical: The formulated notes from the first stage is then used as questions and asked from the supply chain professionals through the interviews.

The merging of these two stages ensures that the theoretical and practical approach in the research is mainly the outcomes of the data extracted from the literature and people working practically in the supply chains globally.

As per Glaser (1978), the grounded theory will be mainly used in the dissertation for:

- Comparing the various concepts extracted from the literature review which are particularly related to the core concept of the supply chain strategies i.e., lean, agility and legality. Such that particularly in terms of how they are working currently, and how they can work in the presented three scenarios where the focus is fundamentally laid on the major changes to the political and economic factors which affect the supply chain strategies significantly.
- Recording the theoretical similarities and differences of the existing supply chain strategies i.e. lean, agility and leagility.
- Developing a theory suitable for the future trends of the global markets.
- The development of the framework will be based on the higher theory emerged from the above-discussed stages to fill the gap present in the practices of the supply chain

strategies, within three presented scenarios. The core idea of the proposed framework must be extracted from the literature to figure out the best support to be provided to the supply chain strategies to address future scenarios effectively.

Sampling

Following the guidelines of grounded theory, semi-structured interviews with the supply chain managers are conducted. The focus on supply chain managers reflects the research practices in the area, dictated with the notion that participants, who can provide meaningful, relevant data about the phenomenon investigated were selected (Fetterman, 1988). Participants were selected based on their experiences with the phenomena, job titles, job profiles, articulation skills and willingness to participate, and their business relations.

The supply chain professionals hold positions in a wide variety of industries that include oil & gas, energy, petrochemicals, chemicals, food, pharmaceutical, equipment, logistics, shipping, freight forwarding and transporters, manufacturer, and service providers. The firms in the sample are major players with extensive global supply chains with the worldwide revenues ranging from \$50 million to over \$50 billion existing at different levels of the supply chain, e.g. assembler, manufacturer, supplier, distributor, and a third-party logistics service provider.

The interview participants have different job titles that include vice president of supply chain strategy, director of supply chain strategy, director of global supply chain strategy, director of operations and fulfilment, director of supply chain integration, director of worldwide customer and distribution services, and manager of supply chain solutions.

Most of the interviewees had senior-level managerial experiences with other firms and industries before their current jobs, while, some are long time employees within their current companies who have provided historical perspectives of their companies and associated decision-making responsibilities. The common themes and concepts from the responses assisted in getting the core of the phenomenon.

Interview process

According to the research practice and suggestions by Cohen et al. (2007), and Strauss and Corbin (1998), the researchers using grounded theory approach should start by asking broad questions guided by the extant literature review. As research started by asking broad questions related to the concept of supply chain strategies – namely lean, agility, and leagility, these

broad questions were formulated from the careful reviewing of literature related to the research subject. Then, specific questions were addressed in the interviews related to the utilization of these strategies in the practice of supply chain management.

The qualitative research guidelines suggest that interviewing enough participants must be done until saturation is attained, which is usually after eight or more informants (McCracken, 1988; Strauss and Corbin, 1998; Johnson & Sohi, 2016) or up to 20 participants (Manuj & Mentzer, 2008; Sangari et al., 2015). In the research, these guidelines were merely considered, since managers from various continents, various organizations, and various levels of management etc. were included. The researchers considered to expand the number of respondents to develop comprehensive insight into the actual practice of supply chain management in various cultures, organizations, and organizations levels, due to the possible differences in culture, type of organization, manager's positions etc. (Strauss & Corbin, 1998; Cohen et al., 2007; Manuj & Mentzer, 2008).

The theoretical saturation (i.e. no new information or insights obtained from additional interviews) was attained in the first phase of the survey after 150 interviews, some interviews were done through physical meetings, and others over phone calls. The interviews were conducted until a clear understanding of the perspective of the supply chain professionals was developed, specifically related to the core concepts of lean, agility, and leagility from a practical point of view and the utilization of these strategies in the supply chain currently and in future.

The interviews were conducted over the phone or through one-on-one meetings. The duration of each interview was about 20-30 minutes. After the collection of answers in each interview, a summary of the key points was presented to the participants so he/she can review, add, amend, or remove any information. This practice was to ensure that all the participants understood the subject of research, and all the answers represent their opinion perfectly.

The answers were gathered and calculated to see the final results accordingly. The collected data is presented in figures, where each figure shows the percentage of the participants selecting a specific answer in multiple-choice questions format.

Interview protocol

The interviews should always start with an introduction between the interviewer and the participants, to know each other and warm up before starting the interview. But in this

research, the author already knows the participants, as they are business partners in global supply chains, working together for many years and having strong business relationships. Accordingly, the first step is bypassed and/or briefly done in the research. Next step was the overview of the research subject, and brief information about the aim of the interview and the topic of the discussion was presented.

The participants were assured that all their identities would be confidential, and the results will be presented objectively, where the names of the participants, the name of their organizations, and identities will remain confidential. Full details of the jobs of the participants, industries, size, and geographical locations are presented in demographic characteristics sections later on.

The questions were formulated in a simple structure to be understood easily by the participants. The author depended on his knowledge of supply chain strategies to create understandable questions. To ensure the systematic collection of answers, only one question is asked to the participants at a time. Once they confirmed their understanding of the same and chose the answer, researcher moved to the next question. Closed questions with several possible answers were used; thus, the interviews are structured based on selecting the best answer from the given choices, presented to the participants.

The research relied on following guidelines and/or principles when conducting interviews, like (Lincoln & Guba, 1985):

Trustworthiness – It is important to adhere to the criteria of trustworthiness in the interviews (Lincoln & Guba, 1985), which was achieved by a relationship between the author and the participants. However, the participants and the author know each other personally and have business relationships together. Therefore, a trustworthy relationship exists that helped in answering the questions related to the current practical supply chains.

Credibility – This is to ensure that the findings and results of the interviews are true and accurate. To achieve this, a copy of the results was given to each participant.

Transferability – This is important to express how the results apply to other contexts. To accomplish this, it was ensured that the participants have diversity.

Confirmability – this is to prevent any form of biasness in the results. To achieve this, a copy of all the questions were reviewed and approved by peer colleagues and professors, who mentored this research. The same also was done for the results after conducting the interviews.

Dependability - the participants were requested to express their experience in supply chain strategies, according to their career history and level of experiments they faced during the work.

The interview protocol, following the suggestions of McCracken (1988), is presented as follows:

- Opening and a short warm-up
- Introduction about the subject of the interview
- Explaining the purpose of this research
- Confidentiality assurance
- Demographic data
- Title, position and industry of the participant
- Questions and answers (see appendix 1)
- Review of the answers and adjustments
- End of the interview
- Thanking the participants for their time

Consistent with qualitative research guidelines (Strauss and Corbin, 1998), the researchers used grounded theory collect, code, and analyze the interview data continuously throughout the interview process. The interview transcriptions are sometimes analyzed using software like ATLAS.Ti (Smit, 2002; Rambaree, 2013), which enabled an objective evaluation of the transcripts. In this research, no software was used, and analysis was performed manually by focusing on relationships and connections while collecting the data, and searching for similarities, differences, categories, reading all the data, and diving into smaller more meaningful units to create the categories and codes. As stated by Smit (2002, p. 69), “The program such as Atlas.Ti to conduct the analysis does not necessarily have to be in line with grounded theory methodology; however, the theory does explicate detailed procedures for coding and memo writing, facilitating a way of working with the data.”

All the ideas researched in this dissertation are reviewed carefully, and the codification system is presented to find out the main characteristics of the developed framework. Thus, the framework has emerged from the deep research of the various ideas of the dissertation.

4.2. Demographic characteristics of participants in the interviews

The characteristics of the 150 participants in the interview are outlined below. The following figure presents the industries of the participants, where it is evident that data was collected from participants of different industries to have accurate results. Consequently, there are varying perspectives in the interviews as participants were from different industries. The below numbers in the figures refer to the number of answers.



Figure 11: Industries of the participants

This figure outlines various functions of the participants in the supply chain, with which feedback from various functions was collected. Although, it is seen that the majority of the participants came from supply chain background and this was highly important to have specialized people, who know very well about supply chain strategies and have performed them in business practice.

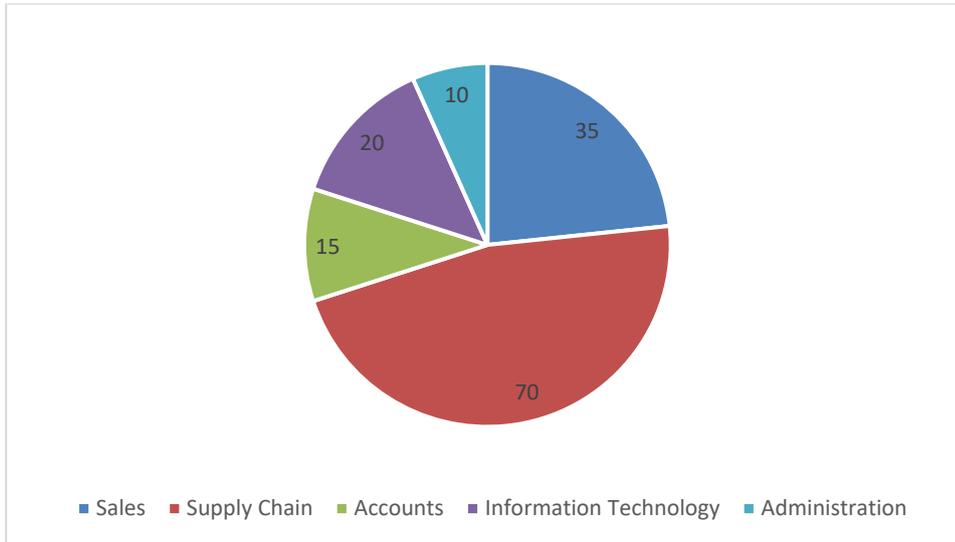


Figure 12: Functional areas of the participants

This figure presents the positions of the participants in organizations. It is evident that participants were gathered from all levels of management, from the top management to the lower levels. The majority of the participants came from the middle management level, which, in practice, are mainly concerned with the operations of supply chains and day to day decision-making.

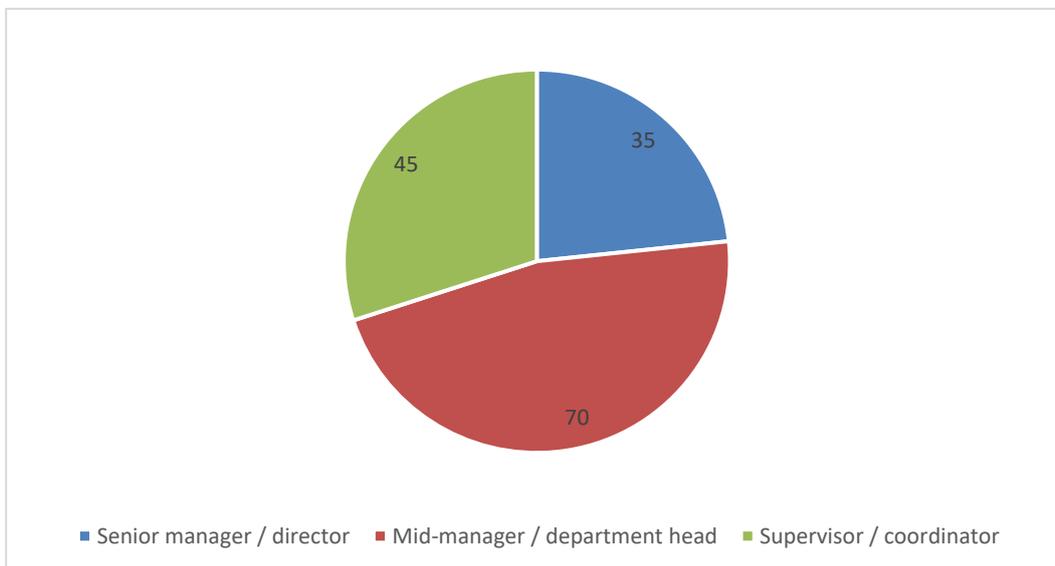


Figure 13: Positions of the participants in organizations

This figure presents the various geographical areas of the participants' organizations. It was ensured to have participants from all over the world to reflect various economical environments, regulations, and practices of the supply chain. This practice is very important to

ensure accurate results and the feedback, which was gained from interviewing, does not come from a specific area so that the results can have global nature.

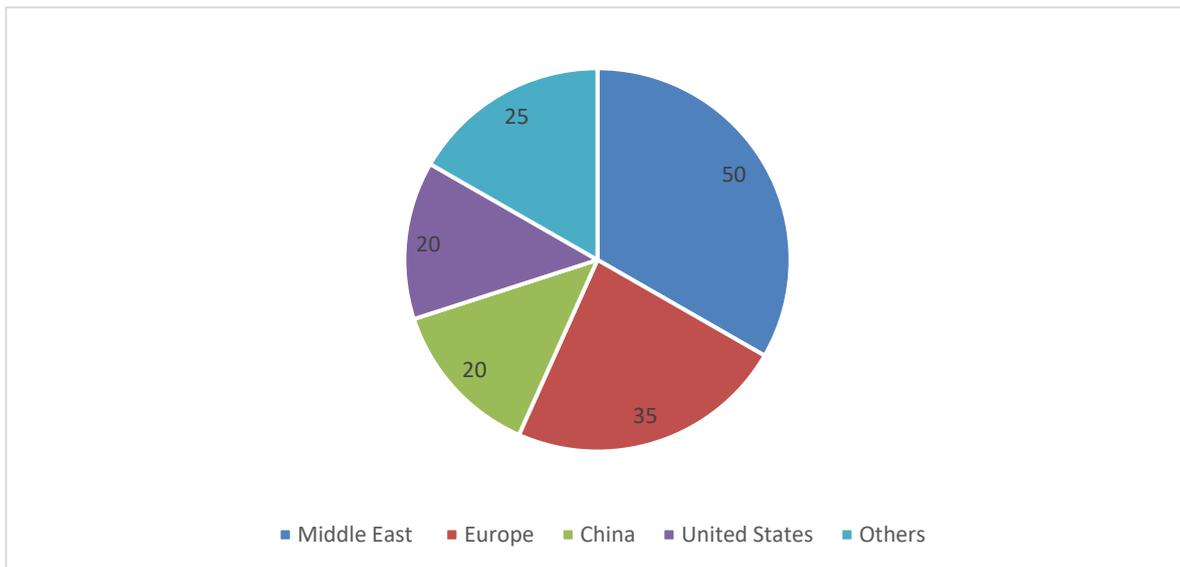


Figure 14: Geographical areas of the participant’s organizations

This figure presents the various sizes of the companies, from which participants came. It was ensured to have the majority of the participants working in big companies with over 1000 employees. Thus, adequate cognitions about the strategies of a large organization were gained that are leading the economy.

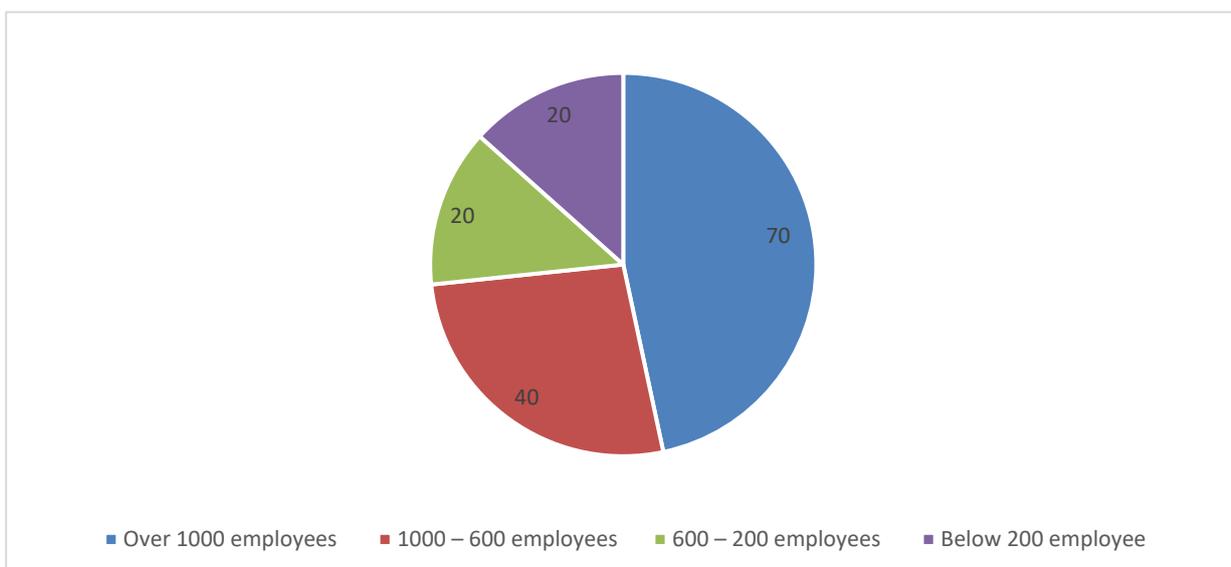


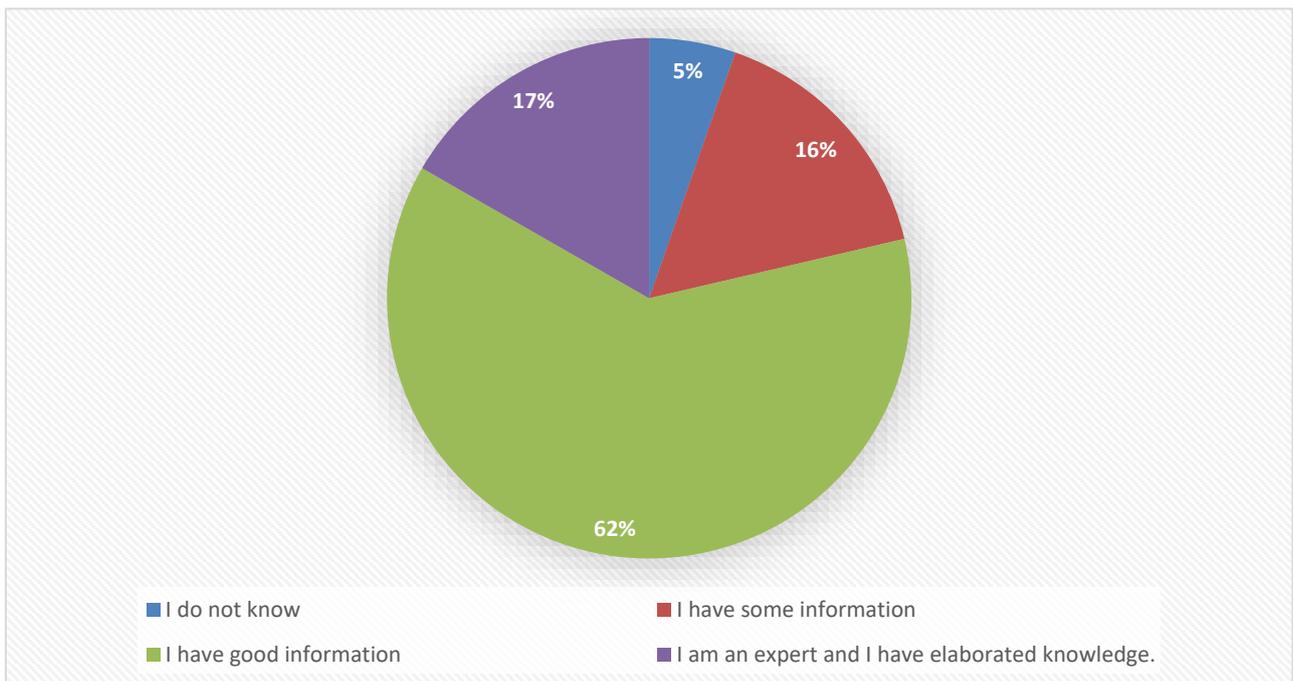
Figure 15: Company size of the participants

4.3. Findings from interviewing participants

This sub-section presents and analyzes how the supply chain professionals see the utilization of supply chain strategies in practice. In addition to this, the sub-section also outlines the opinions and knowledge of the professionals about the strategies and their implementation in their respective organizations. Besides, professionals are also asked about the challenges that they see in the current global markets as well as the ways that can be used to reduce the impact of such challenges and improve future supply chains. To gain in-depth insights, the proceeding sections demonstrate the responses of the participants that were given during the interview.

1. Knowledge about the key supply chain strategies; lean, agility, and leagility

This is a very important question to identify how this research is effective as it gives an idea about the knowledge of the participants about the selected topic. The majority of the participants (i.e., 62%) confirmed that they have a good knowledge of considered strategies



and they use lean, agility, and leagility strategies in practice. Moreover, 17% of the experts – working in this area – had excellent knowledge about these strategies. On the other hand, 16% of the participants know little about these strategies and only 5% outlined that their knowledge about these strategies is rather poor. These findings are presented in figure 16.

Figure 16: Knowledge about the key supply chain strategies; lean, agility, and leagility

From these results, it can be recognized that the majority of the participants have good knowledge about considered strategies and this is a very fundamental point to start the other questions of this survey. Moreover, this feature is also expected to add immense value and credibility to the survey results, as the responses are coming from supply chain professionals having proven knowledge about the strategies and their implementation in the supply chain.

2. My organization is implementing any of the key supply chain strategies currently or in the past

This question aims to identify the practical implementation of the considered strategies. The results showed that 45% of organizations, in which the participants work, have implemented lean strategy either now or in the past. On the other hand, 18% of the organizations implemented agile strategy, and 15% implemented leagility. This indicates that the leagility is still, until now, not commonly used strategy as it is a new concept as compared to lean and agility. Besides, 21% of the participants confirmed that all of these strategies have been implemented in their organizations, and only 2% said that their organization did not deal with any of these strategies at all. These results are shown in figure 17 below.

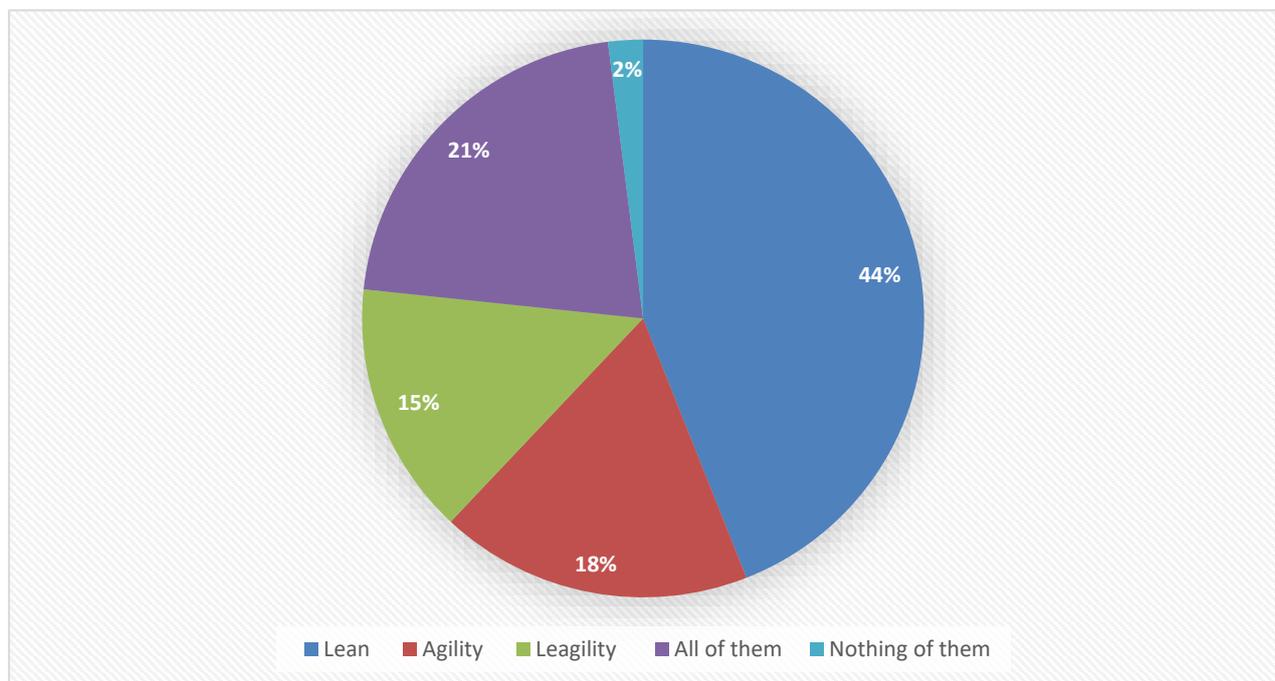


Figure 17: Implementation of key supply chain strategies currently or in the past

To sum up, the majority of the participants have utilized one or more of these strategies in business practice. This can be considered as a highly supportive and valid indication about the

utilization of the three supply chain strategies as the feedback came from professionals, utilizing strategies in their work.

3. Experiences with using any of the supply chain strategies lean, agility, or leagility

This question is designed to identify the experiences of the participants regarding utilization of supply chain strategies. The majority of the participants, i.e., 38% have an experience of 4 – 10 years, followed by 29% of the participants, having more than 15 years of experience in using of these strategies. The results are shown in figure 18 below.

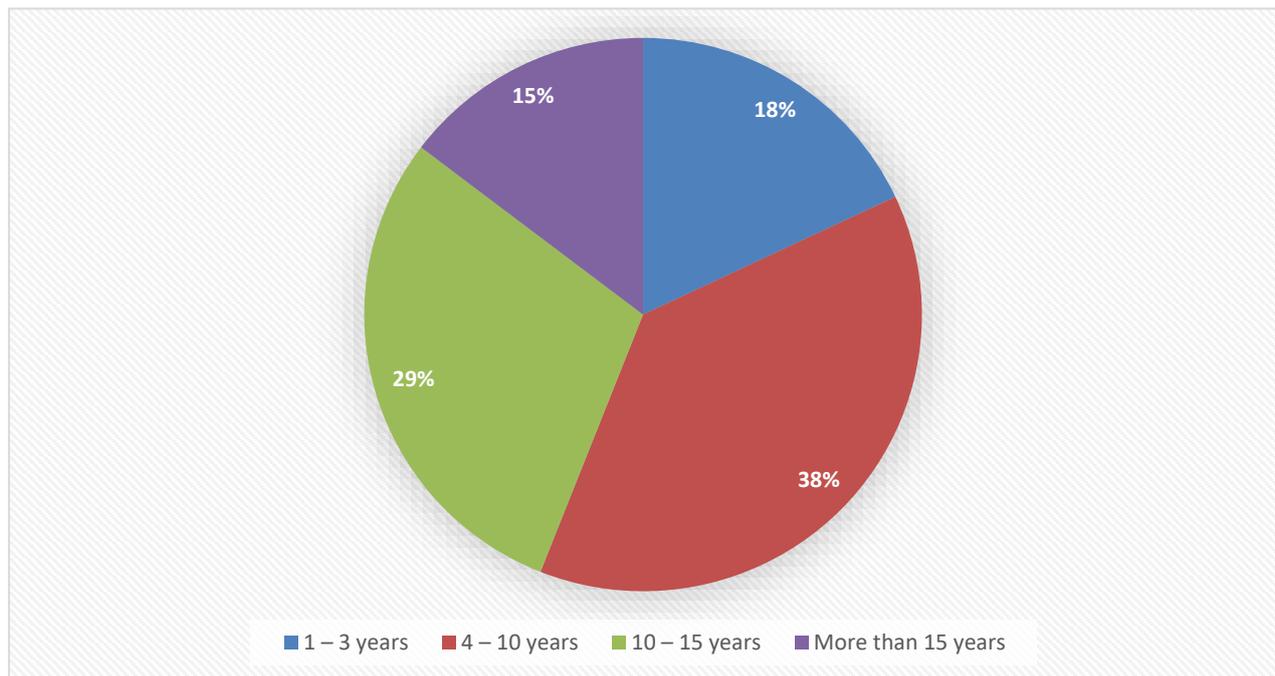


Figure 18: Number of years using any of the supply chain strategies lean, agility, or leagility

The acquired information is highly valuable, as it is directly shared by the professionals having a vast experience of practically using these strategies. However, some of the participants have shorter experience as compared to other participants. This combination is very useful, in terms of hearing from different individuals, having a different level of experiences.

4. Highest priority of the supply chain

This question is designed to identify the priorities of the supply chain from the perspective of supply chain professionals. According to the opinions of 30% of the supply chain professionals, the top priority is to reduce the overall cost of the supply chain. On the other hand, 25% of the participants perceive that the main priority of the supply chain is to improve the cash flow of

the supply chain and 24% of the participants declared increasing responsiveness as the highest priority of the supply chain. These results are shown in figure 19 below.

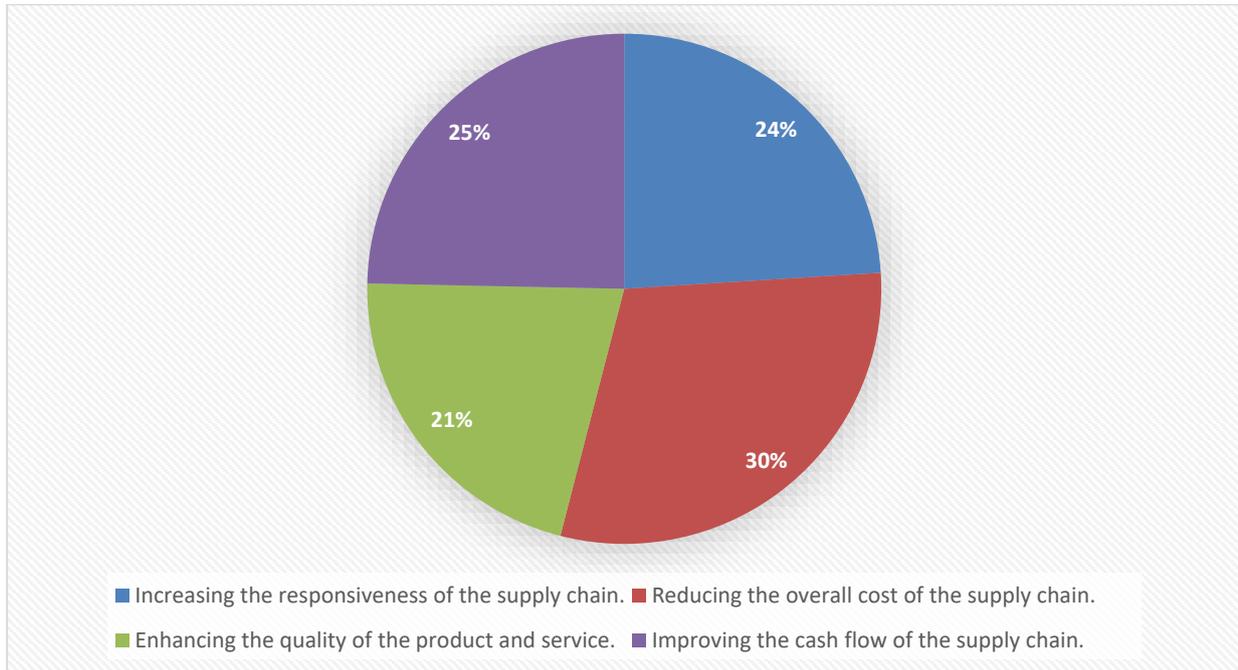


Figure 19: Highest priority of the supply chain

These results indicate that the businesses are still most concerned about the cost, even more than the service level of organizations.

5. Benefits of key supply chain strategies utilization

This question is designed to identify the benefits of utilizing key supply chain strategies. Results show that the majority of the participants, i.e., 36% said that the benefit of using key supply chain strategies is to enhance the competitiveness of the price and service in the marketplace. However, 23% of the participants perceive minimization of the inventory as the benefit of using utilizing key supply chain strategies. Other participants declared reduction of cycle time (22%) and increased flexibility (19%) as the benefits of using key supply chain strategies. Results are depicted in figure 20.



Figure 20: Benefits of key strategies of supply chains utilization

The results give the implication that in the current times, prices and services are the main concern of the supply chain professionals.

6. Relationships between lean and agility, and leagility strategies

The main purpose of this question was to identify the understanding of the interviewees regarding the relationships between the considered supply chain strategies. As most of the interviewees were experts, only 7% of them thinks that these strategies are opposites, while the 29% of the participants believe that deploying more than one strategy in the organization is not possible. However, the majority of the participants, i.e., 64% of the interviewees confirmed that these strategies can complete each other and can be utilized simultaneously in the same supply chain. However, it is important to note that the utilization of the combination of both of the strategies varies from organization to organization, markets trends, etc. Results are shown in figure 21.

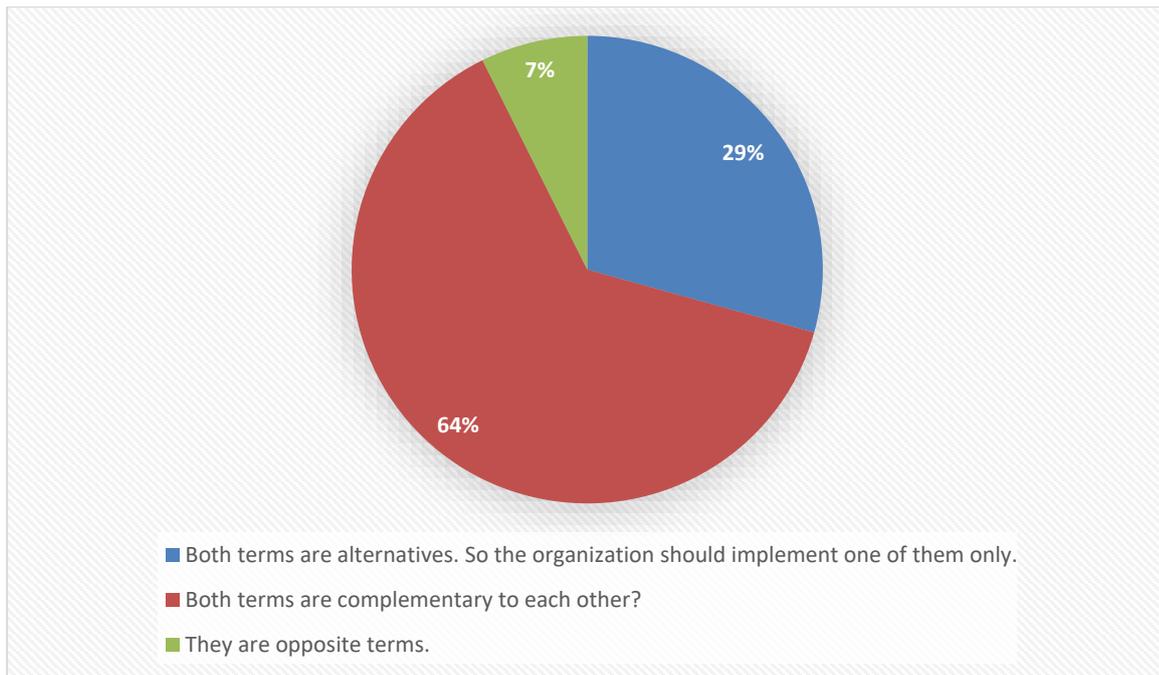


Figure 21: Relationships between lean and agility, and leagility

These results indicate that the participants adequately understand the core concept of these strategies and how they can use them practically. This is good support to this research, in terms of drawing credible conclusions.

7. Utilization of single strategy in the supply chains

This question is designed to outline and understand the current utilization of supply chain strategies in organizations. As per the perception of the 40% of the interviewees, their organization implements lean strategy; however, 25% of the participants stated that their organization implements an agile strategy. On the other hand, only 14% of the professionals said that their organization use a hybrid strategy, i.e., leagile.

It is evident that lean is commonly used in practice as it is the oldest strategy, while agility comes in the second rating. These results are depicted in figure 22 below.



Figure 22: Utilization of a single strategy in the supply chains

8. Enablers of lean, agility, and leagility strategies utilization

This question is designed to identify the enablers of supply chain strategies. The responses show, that the majority of the interviewees, i.e., 39% believe that the information technology is the most important enabler of utilizing supply chain strategies. However, 25% of the respondents said that human resource management facilitates the utilization of lean, agility, and leagility strategies.

Results are shown in figure 23.

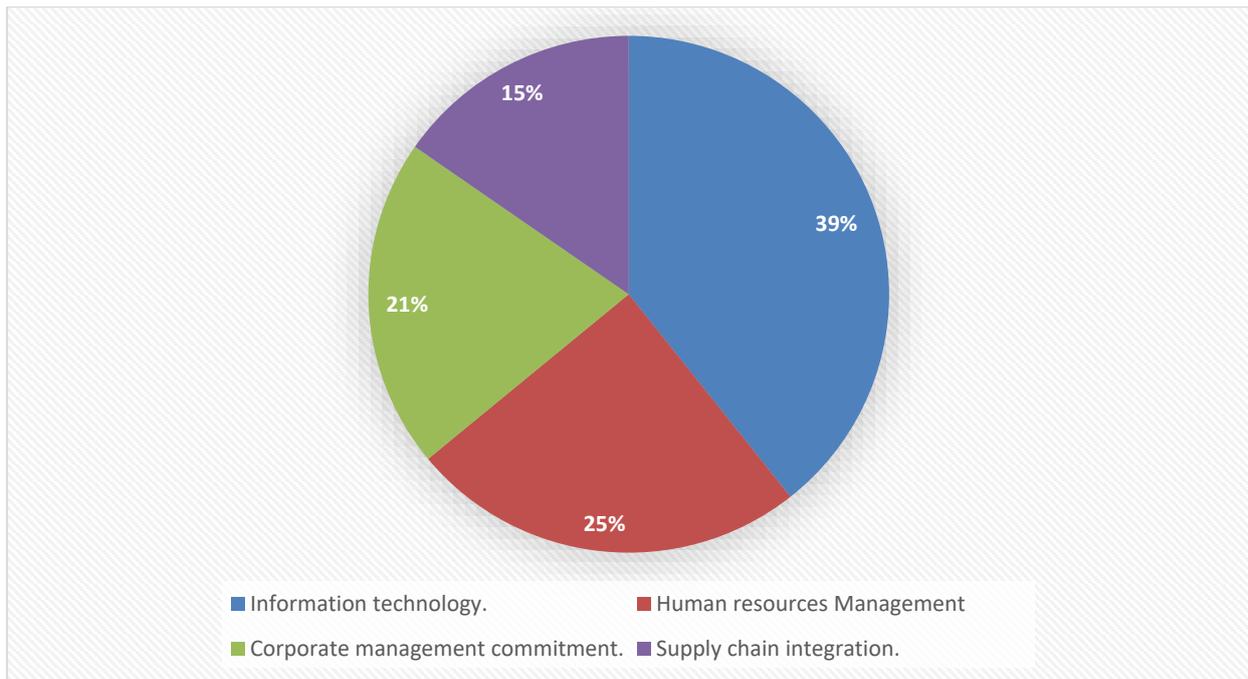


Figure 23: Enablers of lean, agility, and leagility strategies utilization

These results indicate that any proposed framework - aiming to improve the utilization of supply chain strategies - should depend on the information technology as well as on the appropriate human resources management. Consideration of these aspects would help organizations in ensuring smooth and effective integration of the supply chain.

9. Recommended strategy in circumstances of uncertainty

In the above questions, it has been discovered that the lean strategy is the most commonly used in organizations – specifically in the context of supply chain management. Turning to the uncertain situation, it is evident that 73% of the participants recommended leagile strategy to cope with the uncertain business environment.

The acquired results are shown in figure 24.

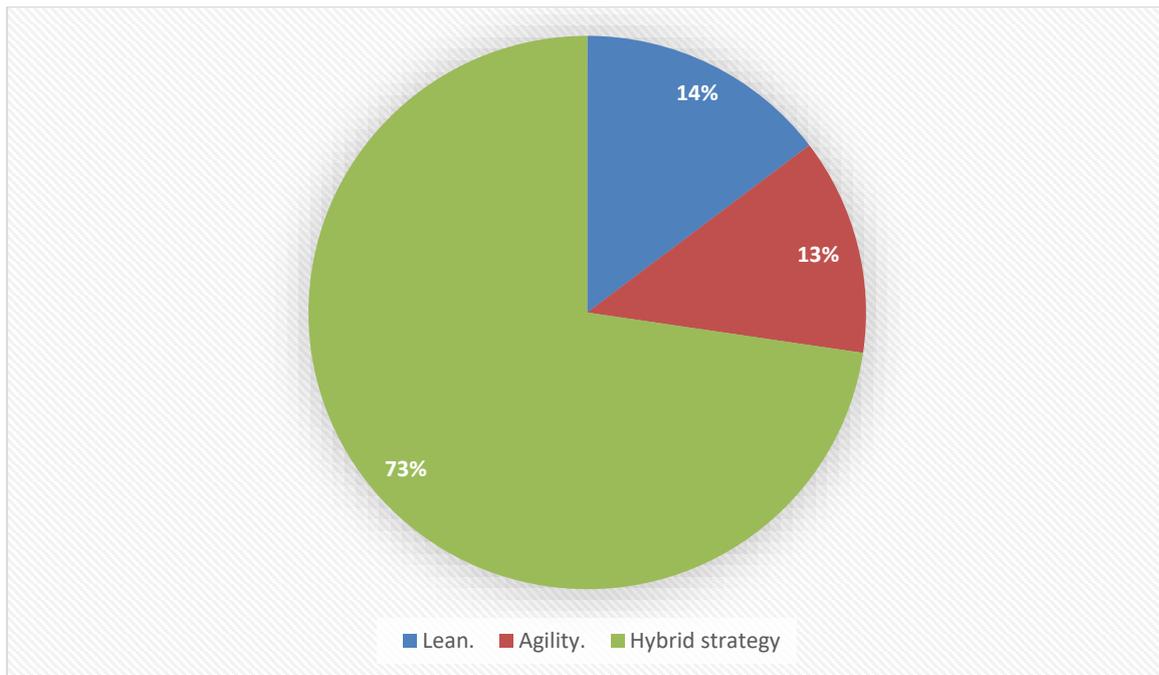


Figure 24: Recommended strategy in circumstances of uncertainty

These results give another indication that any proposed framework should focus on combining the benefits of lean and agility, i.e., developing and using leagility strategy to cope with the uncertain situation that might occur in future.

10. Achieving leagile strategy

Referring to the previous question in which professionals were asked to share their opinion about using leagile strategy, they were further asked to recommend the best practice of achieving the leagile strategy. In this account, the majority of the participants – i.e., 53% - believed that enhancing communications and collaboration is the most important factor to achieve this leagile strategy. The results are depicted in figure 25.

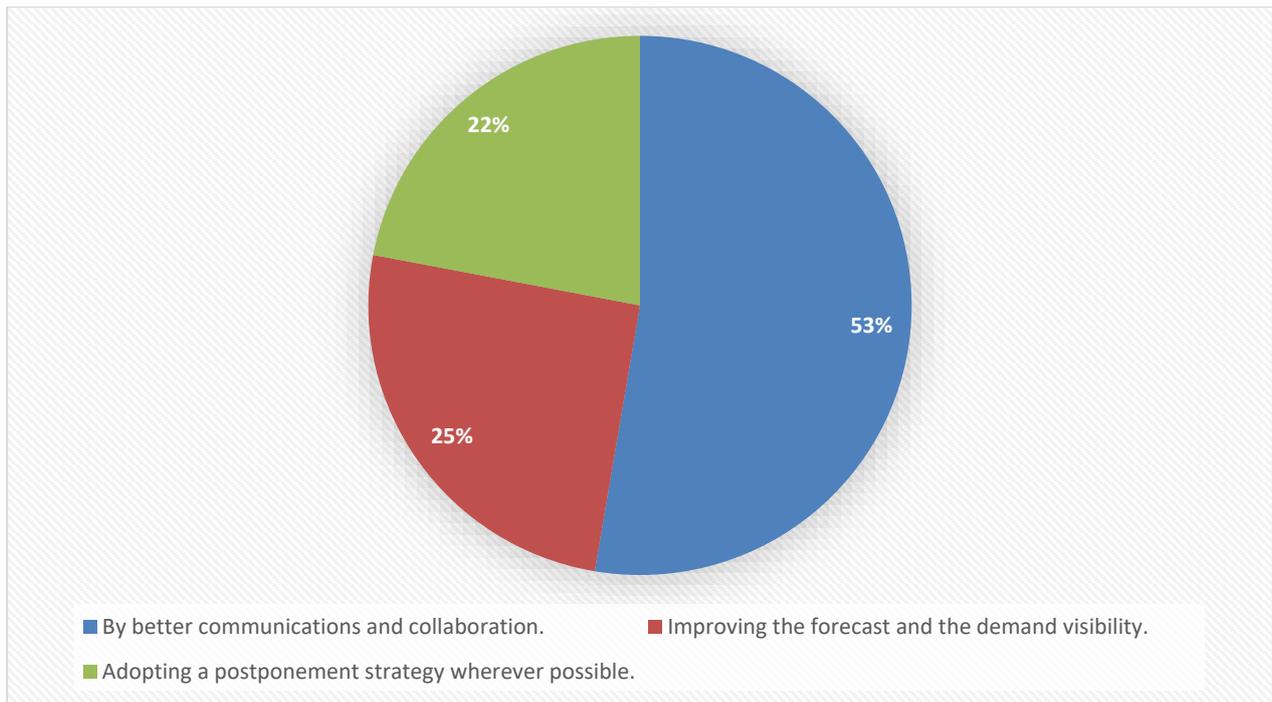


Figure 25: Achieving leagile strategy

The results direct that the proposed framework should consider collaboration, as an essential factor to build new framework, which will be useful for future supply chain management practices.

11. Adopting different strategies for different products in the supply chain

This question is designed to assess the understanding of the interviewees about the implementation of supply chain strategies for different products in the supply chain as well as the implementation of the leagile strategy in the organization. The responses of the interviewees reveal that 54% of the participants believe that each product can be handled through different strategy. On the other hand, 31% of the participants perceive that it depends on the characteristics of the product. Results are outlined in figure 26.

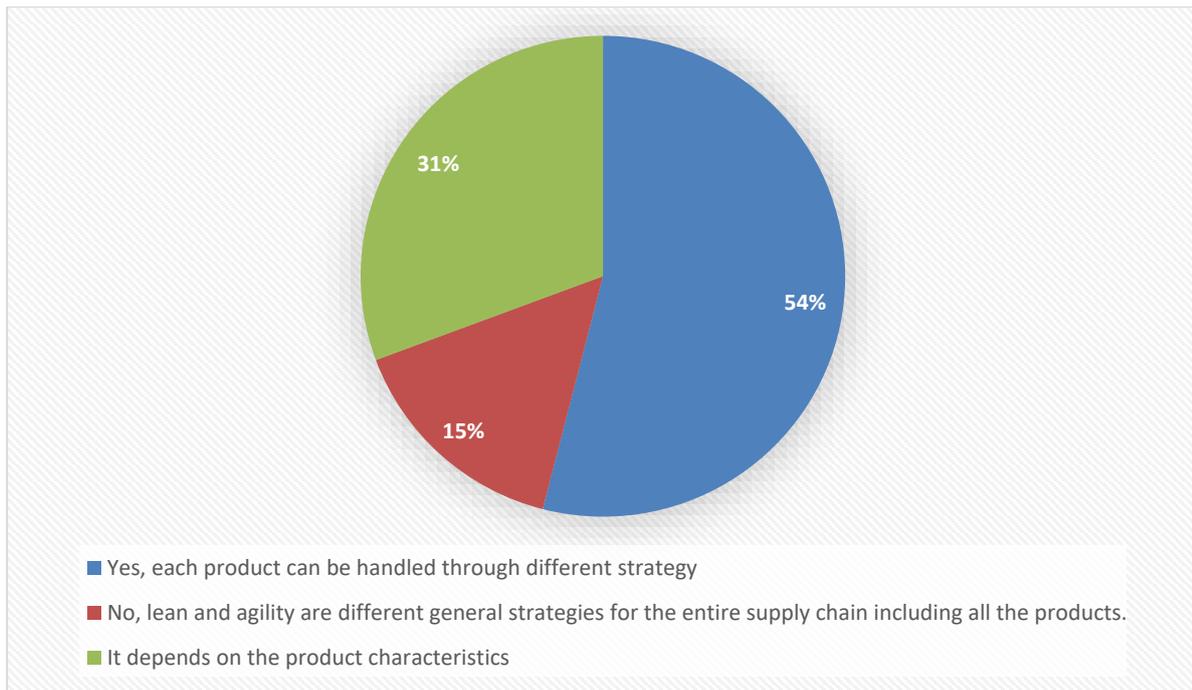


Figure 26: Adopting different strategies for different products in the supply chain

These results give implication about the necessity of the flexibility to shift supply chain operations from one strategy to another while considering the profile and characteristics of the products.

12. Key future challenges of supply chain

This is a very important question for the research, especially for future scenario planning. Since the core concept of the research is to develop future scenarios, it is of crucial importance to hear from the supply chain professionals, what they perceive as key challenges in the future. In this account, the majority of the interviewees - (i.e., 42%) - consider that the status of the global economy and the possibility of collapses is the main concern in the future supply chain. Moreover, 26% of interviewees considered global political problems and war threats as the main challenge and stated that these conditions might lead the supply chain operations and businesses to negative outcomes. The acquired results are shown in figure 27.

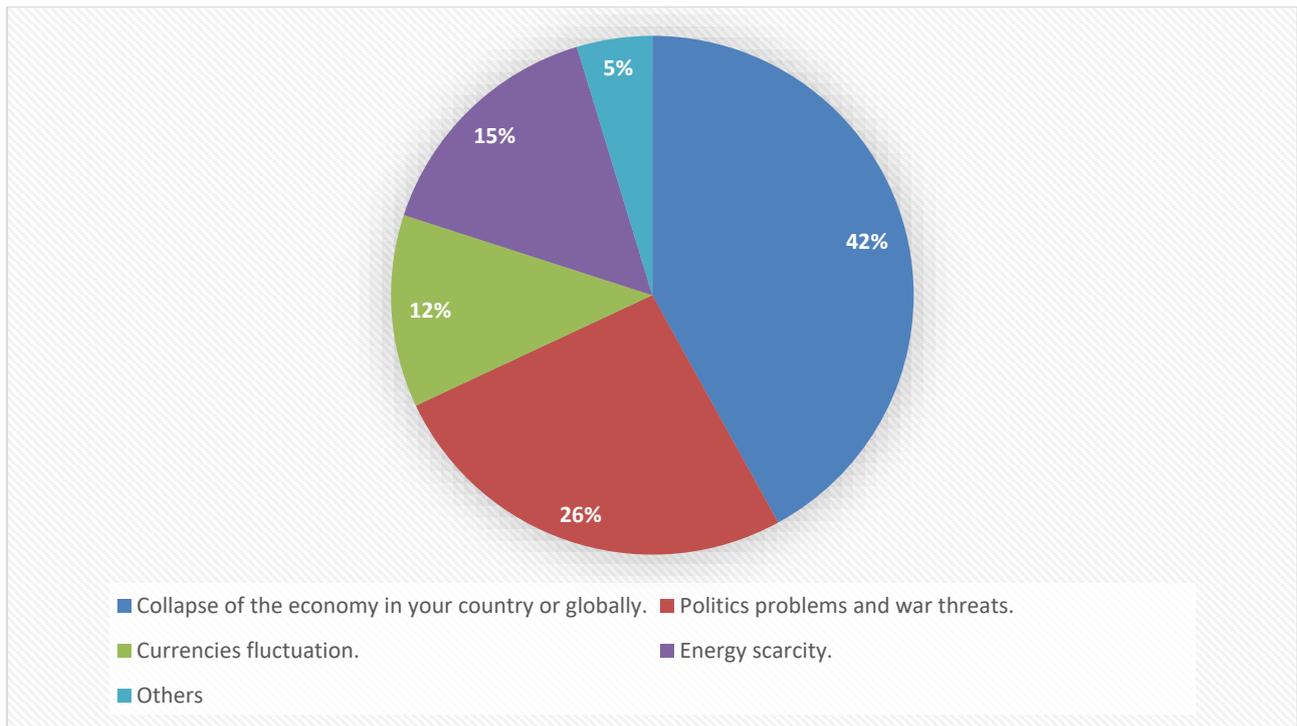


Figure 27: Key future challenges of supply chain management

To sum up, mainly the economic and political factors are the key challenges in the context of future supply chain management.

13. Tools to reduce the impact of the future challenges of the global markets on supply chain

This question is designed to analyze the opinion and perceptions of the interviewees regarding the best methods to reduce the impact of future challenges on the supply chain. The results show that only 14% of the participants perceive that getting aids from the government is the best tool for reducing the impact of the future challenges of global markets on the supply chain. However, the majority of the respondents – i.e., 38% - believe that reducing the impact of the future challenges depends only on the organizations themselves, in terms of ensuring continuous innovation of new practices and technologies. Moreover, 19% of the respondents perceive that having resilient human resource management might help in reducing the impact of future challenges on the supply chain. The results are also shown in figure 28 below.

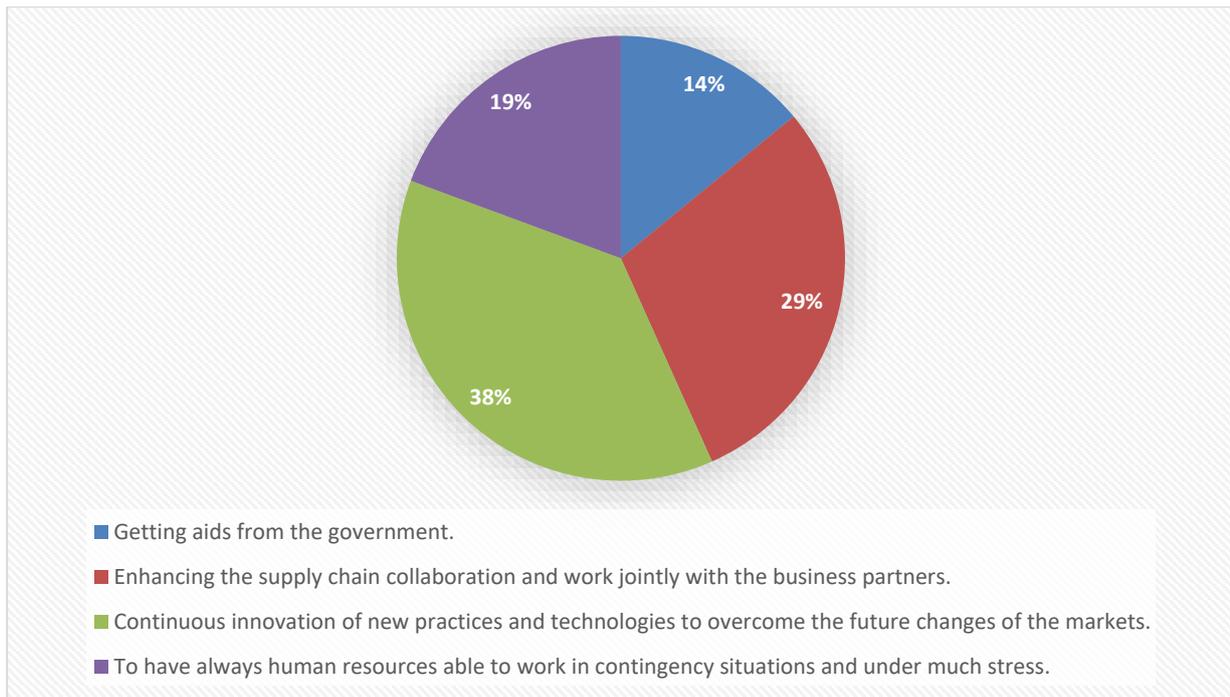


Figure 28: Tools to reduce the impact of the future challenges of the global markets on supply chain

Based on these results, it can be affirmed that the proposed framework should be focused on improving the supply chain collaboration in the first place.

14. Importance of the information technology in the future supply chains

This question is designed to acquire the perception of the interviewees regarding the role of the information technology in the future supply chains and to what extent it can help in overcoming the challenges of the global markets. Although the information technology has brought substantial transformations in daily life, only 11% of the participants believe it can work alone to overcome the future market challenges. On the other hand, approximately 90% of the interviewees emphasized that information technology must be used in “different context and/ combinations”. Results are outlined in figure 29.



Figure 29: Importance of the information technology in the supply chain of the future

These results highlight that the information technology will be extremely important in the future, but it must be supported with governmental tools of business practice as well. For instance, the governments must work to create a suitable business environment, since IT cannot work alone to attract investments. The professional human resource management is also a very important element to facilitate supply chain collaboration, globally. Thus, the new framework should consider all these elements, i.e., to depend on the information technology, to have some kind support from the authorities, to use professional human resources management, and to facilitate the supply chain collaboration globally.

15. Difficulties facing your organization for material sourcing

This question is designed to discover the real problems that are being faced by the supply chain professionals – specifically in the material sourcing process. The majority of the interviewees, i.e., 45% of the participants, considered the process of finding new suppliers as the most challenging task. The interviewees explained they have a real problem in verifying the reliability of the new suppliers. Despite they may find new suppliers easily, when it comes to practical business, the initial promises are not realized. Besides that, a significant portion of the interviewees – i.e., 27% of the participants – said that the governmental rules, related to the importing and exporting, makes their operation difficult. In addition to this, 23% of the

participants perceive that collaborating with the existing suppliers is one of the difficulties that they face during supply chain operations. Results are represented in figure 30.

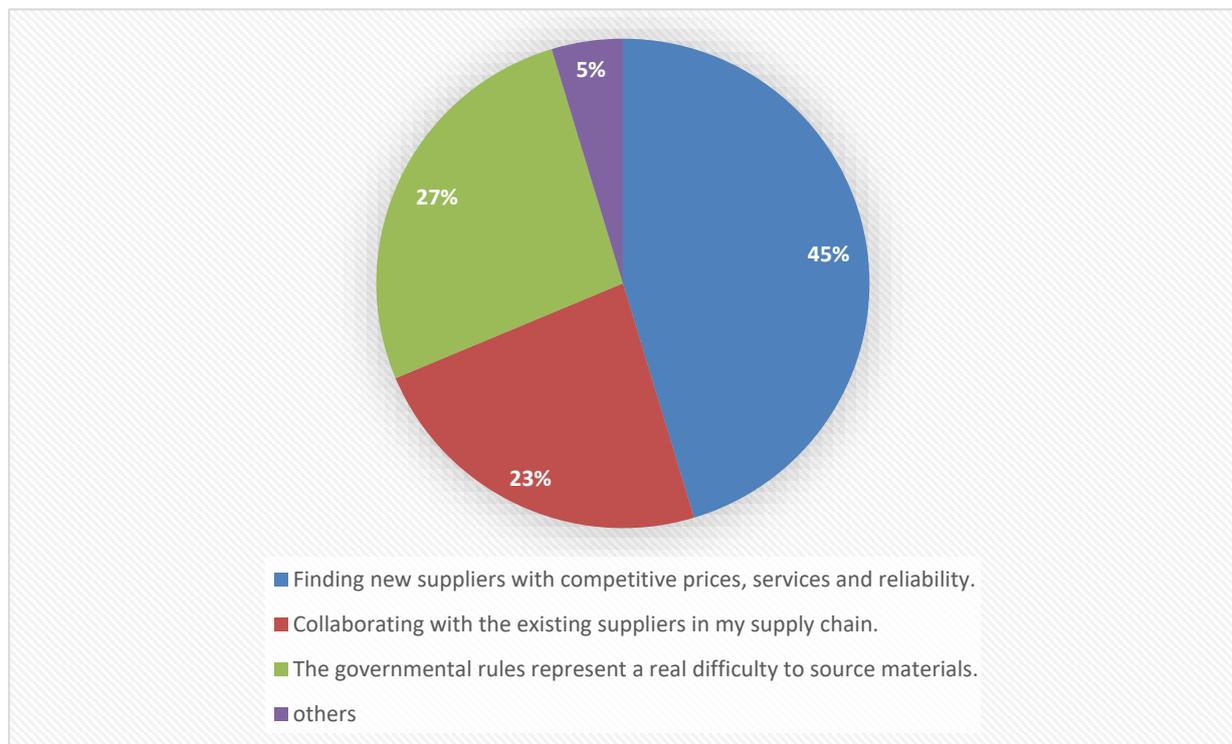


Figure 30: Difficulties facing your organization for material sourcing

Above results show that certain aspects have to be considered during the development of the new framework. These aspects are associated with enhancing the reliability of the suppliers, simplifying the governmental rules, and facilitating the collaboration with the existing suppliers.

16. Key functions of the future supply chains

This question is designed to understand the perception of the interviewees regarding the key functions of the future supply chains. In response to the question, the interviewees outlined sourcing, followed by the sales, and manufacturing as the key functions of the future supply chains. It is important to note that the majority of the interviewees consider the harmonization of all outlined functions, as the key function of the future supply chain. The results are shown in figure 31.

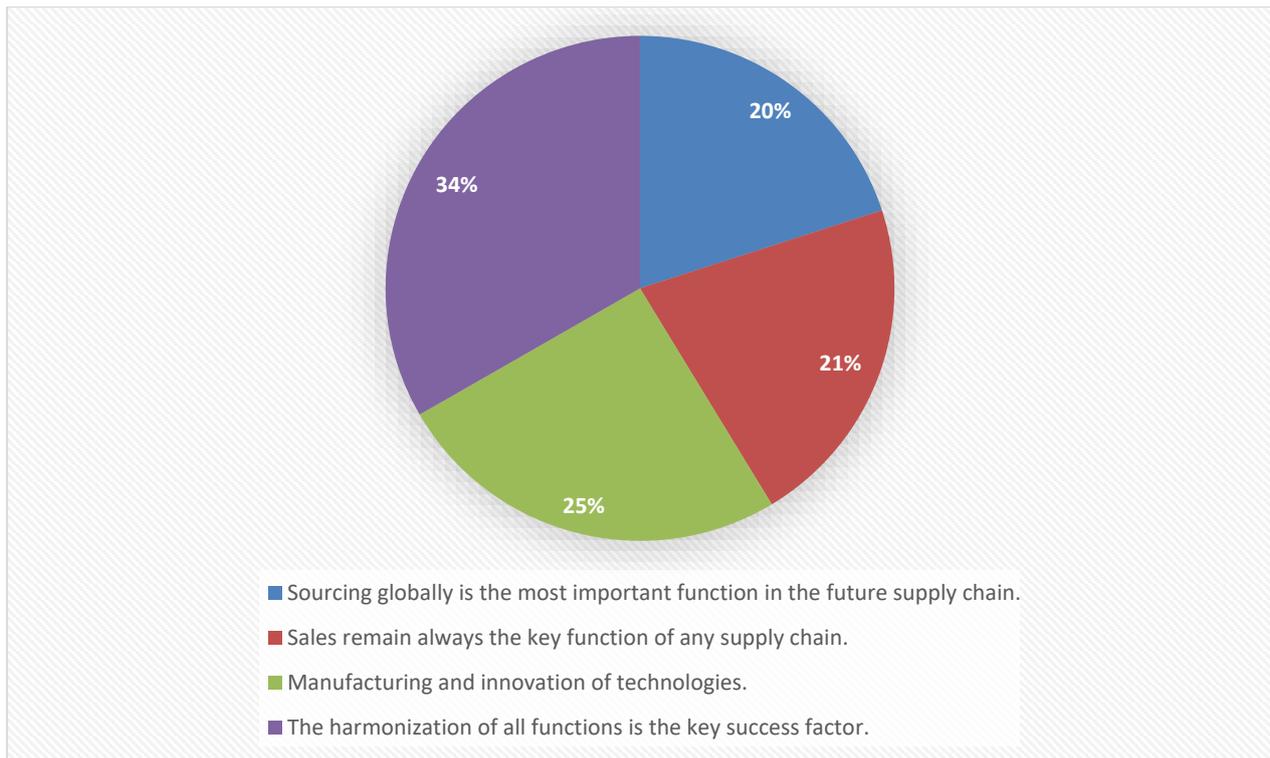


Figure 31: Key functions of the future supply chains

The implication of this question - for the proposed framework development - is the need to focus on increasing the harmonization of supply chain functions.

17. Your satisfaction with the global sourcing practice in your organization

This question is designed to understand the satisfaction of the interviewees towards the global sourcing process in their organizations, in the context of the supply chain. The majority of the interviewees, i.e., 45% were not satisfied and they perceived that there are several areas of possible improvements, but they could not implement these improvements because of internal organizational reasons. These reasons include management commitment, lack of professional human resources management, resistance towards new proposals in the organization, etc. Some of the interviewees outlined that they could not achieve improvement of the global sourcing because of external reasons, such as difficult rules of import and export, the status of the global markets, or the difficulties of sourcing overseas. Results are outlined in figure 32.

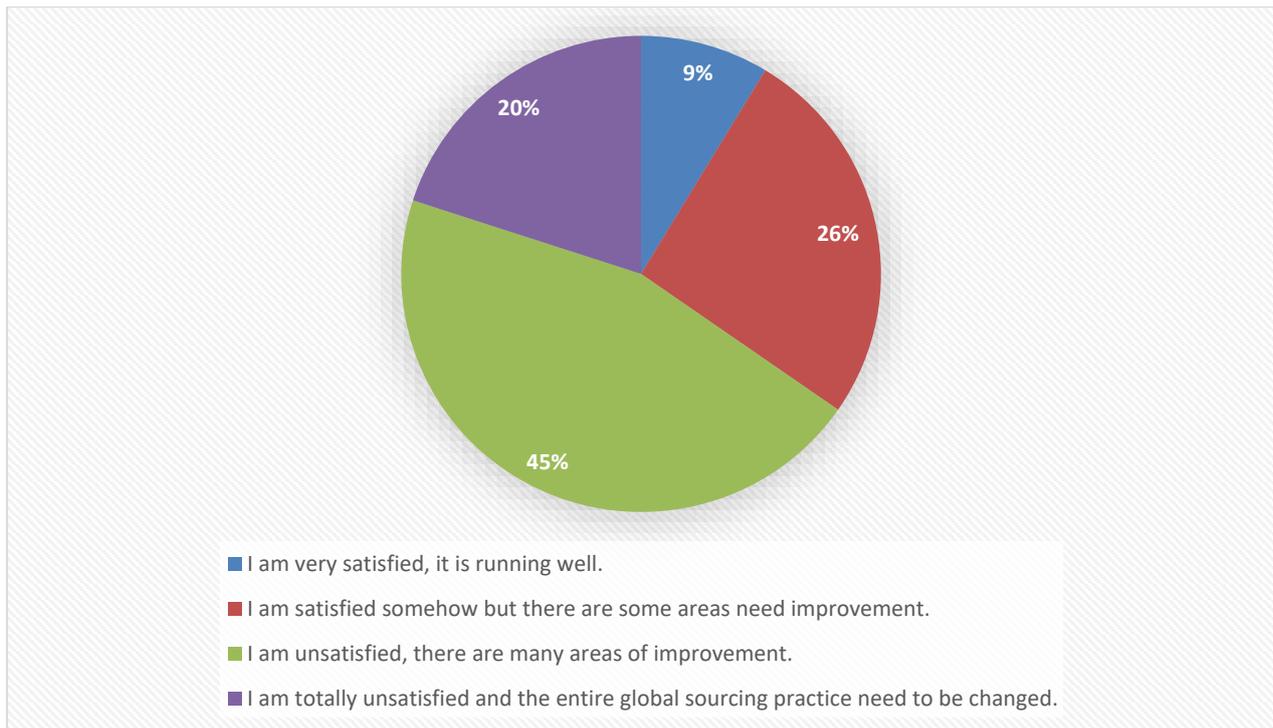


Figure 32: Your satisfaction with the global sourcing practice in your organization

The above results call for developing new supply chain management framework, based mainly on improving global sourcing process.

18. Improvement of the global sourcing process

The question aims to identify the best ways of improving the global sourcing process. The majority of the interviewees, i.e., 32% believe that innovating IT tools could help to improve/facilitate the global sourcing process. Besides, an almost similar percentage of the interviewees, i.e., 31%, believes that global sourcing process can be improved by working actively on finding new partners. While 18% of the interviewees believe that either standardization of the business processes and 19% perceived that having specific criteria to assure the reliability of the new suppliers could improve the global sourcing. Results are outlined in figure 33.

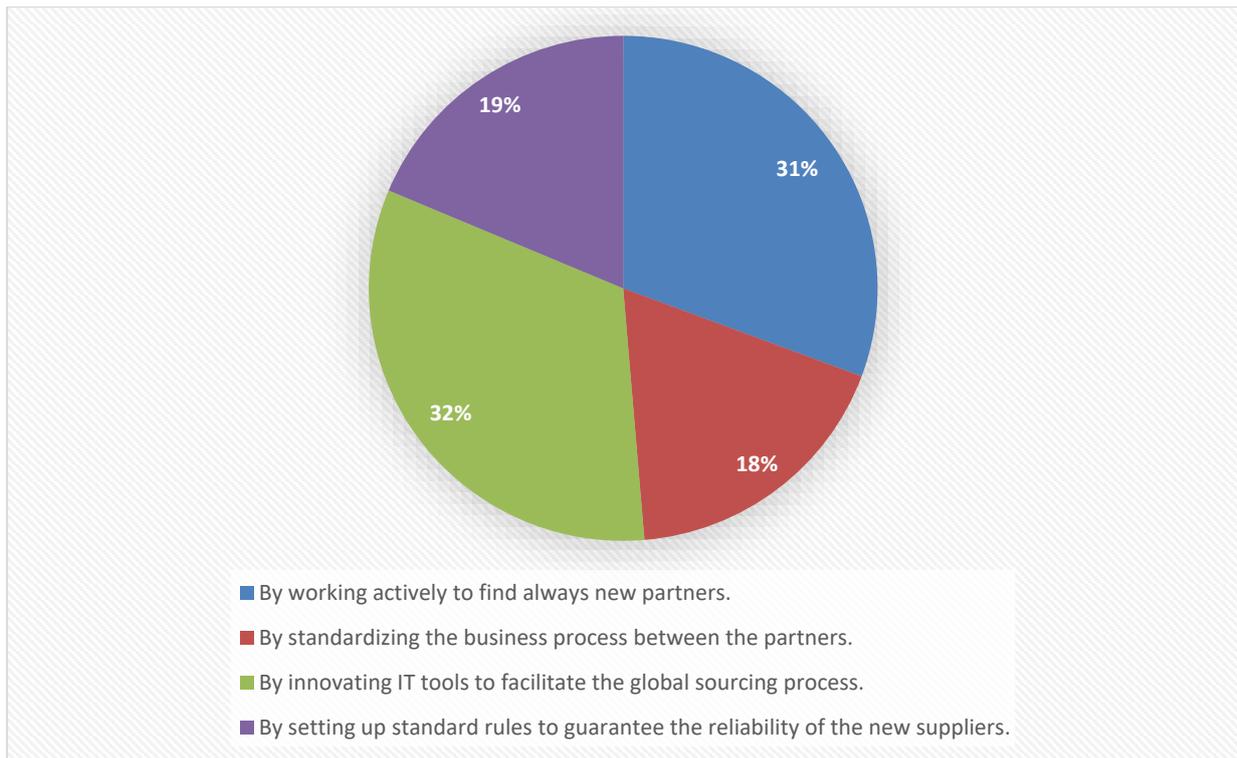


Figure 33: Improvement of the global sourcing process

The implication of these responses is to ensure that the proposed framework will be based on information technology, helping the supply chain to find new business partners with reliability, and supporting the business process accordingly.

19. The impact of improving the global sourcing process to support lean, agility, and leagility strategy utilization

It is evident from the previous questions that the global sourcing process is a very important function for the supply chain professionals, especially in the future market conditions that are prone to continual changes. Thus, it is very important to ask the interviewees about the relationship between global sourcing improvement and the utilization of the supply chain strategies. Exactly half of the interviewees believe, that if we succeed to improve the global sourcing process, this could give ultimate support for the utilization of supply chain strategies. However, 21% of the participants believe that it will not help to improve the supply chain strategies utilization only, but it will also help to change the entire business environment. Results are shown in figure 34.

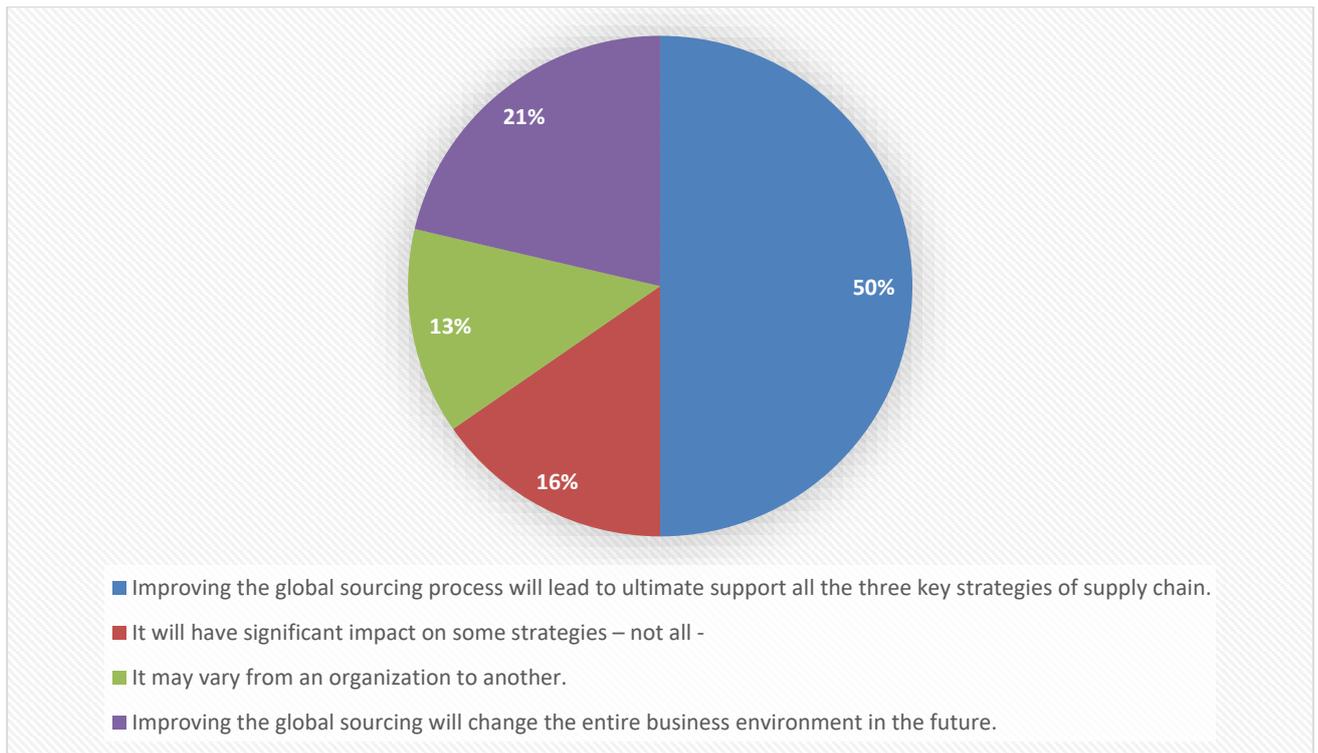


Figure 34: The impact of improving the global sourcing process to support lean, agility, and leagility strategy utilization

This result gives implication to build the proposed framework, which should be based on global sourcing and focusing to improve this function.

20. The ability of lean agility, and leagility strategy to cope with the future challenges

In this question, three developed scenarios were presented as the future challenges that would be faced by the supply chain. In this account, supply chain professionals were asked if they recommend any changes to the current utilization of the supply chain strategies. The majority of the interviewees, i.e., 75% believe that these strategies - with their current practice - can work to some extent. However, there should be additional tools for improvement and 23% of the interviewees believed that major changes are needed to ensure the long-term survival of the supply chain in the future. Results are shown in figure 35.

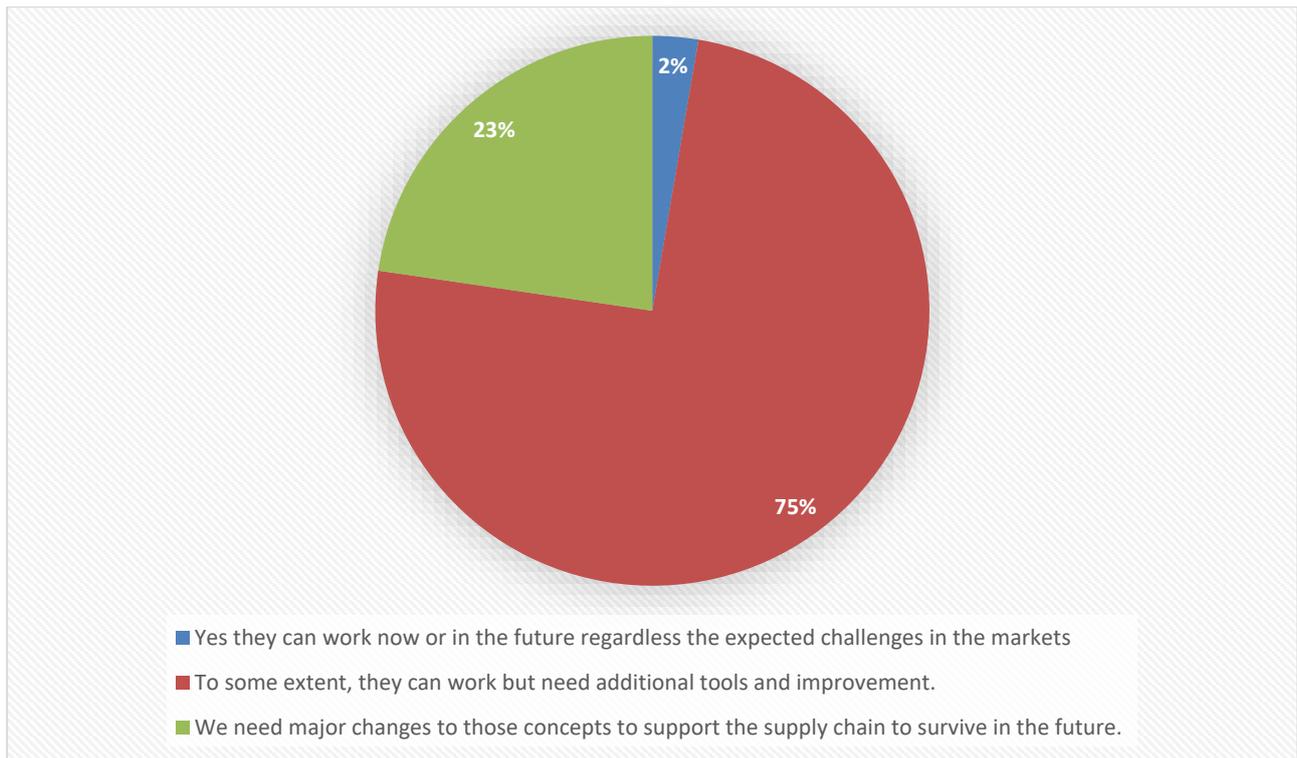


Figure 35: The ability of lean agility, and leagility to cope with the future challenges

Finally, based on above-outlined findings, as well as the last question, it can be affirmed that the core guideline that has to be considered while building a new framework is to reconsider the utilization of the supply chain strategies while focusing on global sourcing.

4.4. Research coding

By using the adopted research approach, i.e., utilization of the grounded theory approach, the main categories of the research are going to be identified to assign open codes for them. Later on, based on the relative connections of the open codes, the axial codes will be created and consequently selected codes will be identified, which will lead the research towards the theoretical saturation point. This point will be the trigger to develop the new framework. Accordingly, the categories of lean strategy will be presented (see table 4), followed by agility strategy (see table 5), leagility strategy (see table 6), and future trends (see table 7).

Open Codes	Subject
1	Removing the waste out of the supply chain
2	Following the most economical supply chain practice
3	Best utilization of the available resources of the supply chain
4	Achieving the maximum possible profitability
5	Avoiding unnecessary movement of materials across the supply chain
6	Simplifying the business processes to avoid unnecessary costs resulted by the complication
7	Just-in-time production
8	Pull strategy
9	Kanban technique
10	Continuous improvement
11	Reducing the lot sizes and eliminating the overproduction
12	Production levelling

13	Requiring a high level of information technology utilization for exchanging real-time data
14	Offering competitive prices to the customers as a result of the lean supply chain practice
15	Maintaining high-quality levels of products and services
16	Respecting people and considering their safety as an important subject
17	Focusing only on the activities which create value to the customers
18	Requires well trained and professional workers to perfectly operate the system
19	Associated with longer lead times than the agile strategy
20	Lower flexibility while having a decision due to the cost restrictions
21	Requires a high level of collaboration with all the business partners
22	Can be useful for the supply chain management in difficult times
23	It may not be enough to work alone in the scenarios that are presented in this research

Table 4: Category 1 - Lean strategy codes

Codes	Subject
--------------	----------------

1	Expediting the activities across the supply chain as much as possible
2	Prioritizing the reduction of lead time even with higher cost
3	Achieving a high level of customers satisfaction through agile deliveries
4	Requires a high level of information technology usage for exchanging real-time data
5	It increases the overall supply chain cost and prices of the finished products, which may not be competitive
6	Requires a high level of collaboration with all the business partners
7	Reducing the lead time to the end customers and considering this as a top competitive advantage
8	Keep up with the dynamic business environment
9	Market-oriented philosophy
10	Requires well trained and professional workers to perfectly operate the system
11	Can be useful for the supply chain management in difficult times
12	It may not be enough to work alone in the scenarios that are presented in this research

13	It requires a high level of speed and flexibility within the supply chain
14	Ideal for the supply chains, dealing with products having a short life cycle

Table 5: Category 2 - agile strategy codes

Codes	Subject
1	Combination of lean and agility to avail the benefits of both
2	Trading-off between lean and agility according to the situation
3	Maintaining a generic stock for customization as per the request of the customers
4	Requires a high level of information technology usage for exchanging a real-time data
5	Utilizing the stock in different purposes by storing it as raw as possible
6	Requires a high level of collaboration with all the business partners
7	Depending on the pull strategy to trigger the customization process
8	Always using the postponement technique
9	The innovative approach of integration of lean and agile principles

10	Requires well trained and professional workers to perfectly operate the system
11	Can be useful for the supply chain management in difficult times
12	It may not be enough to work alone in the scenarios which are presented in this research
13	It requires a high level of speed and flexibility within the supply chain

Table 6: Category 3 - Leagile supply chain codes

Codes	Subject
1	The global markets are in continuous change and this trend is expected to grow substantially in the future
2	The global economic and political situation could lead international businesses towards difficult scenarios
3	The supply chain, which cannot keep up with the sudden and major changes of the global markets, will not be able to survive in the future
4	There is an essential need to reduce the impact of the future challenges of the global markets on supply chain management and supply chain operations
5	Difficulties are faced by the organizations for implementing the supply chain strategies specifically in terms of collaboration and outsourcing

6	Lean, agility, and leagility are key strategies of the supply chain in current circumstances, but they need supportive tools to work better in the future
7	The information technology is a very important tool to support the supply chain management and its operations and to overcome the future changes and challenges of the global markets

Table 7: Category 4 - future trends of the market's codes

The axial codes

According to Böhm (2004. p. 272), “for theory formation, what is of particular importance, is the development of relationships between the axial categories and the concepts that are related to them in terms of their formal and content aspects”. Since grounded theory has been used as a main research method in this study, the axial coding step is very essential to form the core characteristics of the new proposed framework that deals with the utilization of selected three supply chain strategies under different scenarios.

The current section presents the axial codes. In line with research practice, it is here important to highlight the hypotheses on the axial codes to present them on the conditions and contexts of the research subject and presenting the actions and consequences, accordingly.

Before presenting the axial codes, it is useful to firstly present how these axial codes are extracted from the open codes, which were outlined above. The main idea of this process is to focus on the selected subject of the research. In the above four tables, all the categories and codes of the research were presented. Next, all the ideas are narrowed down to a specific phenomenon by linking the categories to the relevant codes. The objective here is to leverage the knowledge presented in the research to the higher thinking point, as per the grounded theory approach – specifically by establishing axial codes to reach to selective code at the end. Accordingly, in table 8 each phenomenon presented among the axial codes and its relevant link are presented with the open codes - by category and code numbers. In this account, the categories refer to the above categories of open codes (i.e. 1 – lean, 2 – agile, 3 – leagile, 4 – future trends) and single code numbered by sequence within the categories.

Phenomenon	Category of open code	Open code
Managing future supply chains trends – utilization of lean, agile, and leagile strategies	4	4 - 5 - 6
Lean, agile, and leagile strategies can be useful for the supply chain management in different circumstances	1	22
	2	11
	3	11
	4	6
Lean, agile, and leagile strategies cannot work alone in the presented scenarios developed by the author	1	23
	2	12
	3	12
	4	6
Lean, agile, and leagile strategies require a high level of information technology support	1	13
	2	4
	3	4

	4	7
Lean, agile, and leagile strategies require well trained and professional workers to perfectly operate the supply chain	1	18
	2	10
	3	10
Lean, agile, and leagile strategies require a high level of collaboration with all the business partners – in the context of supply chain	1	21
	2	6
	3	6
	4	5

Table 8: Relevant coding links

Later on, in the context of the axial coding process demonstrated by Strauss and Corbin (1990) the selected subject of research is identified along with its casual conditions, context, action strategies, and consequences. The present research has followed this procedure and each phenomenon is presented in a separate table with all the relevant elements. In that frame, following axial codes are presented: (1) managing future supply chain trends – utilization of lean, agile, and leagile strategies – see table 9; (2) lean, agile, and leagile strategies can be useful for the supply chain management in different circumstances – see table 10; (3) lean, agile, and leagile strategies cannot work alone in the presented scenarios developed by the author – see table 11; (4) lean, agile, and leagile strategies require a high level of information technology support – see table 12; (5) lean, agile, and leagile strategies require well trained and professional workers to perfectly operate the supply chains– see table 13; (6) lean, agile, and leagile strategies require a high level of collaboration with all the business partners – see table 14.

Element	Description
Phenomenon	The subject of interest in this research include managing future supply chain trends and utilization of lean, agile, and leagile strategies
Casual conditions	Development of business environment will require the supply chains to utilize adequate business strategies for managing supply chains (Hypothesis 3)
Context	The continuous changes of the global business environment – both current and future – have made it essential for the decision-makers to search for new supportive tools. This would enable the supply chain strategies to cope with future trends, occurring in the global markets
Action strategies	For the management of supply chains, a new framework is needed, which will support the improvement of current and future supply chain management operations (Hypothesis 2)
Consequences	The developed framework - for managing future supply chains - will improve the management of the supply chain, according to the predicted scenarios (Hypothesis 1)

Table 9: Axial Code 1 - Managing future supply chains trends – utilization of lean, agile, and leagile strategies

Element	Description
Phenomenon	Lean, agile, and leagile strategies can be useful for the management of the supply chain in difficult times
Casual conditions	Lean, agile, and leagile strategies help the supply chain to be effective and responsive
Context	Lean, agile, and leagile strategies aim to satisfy the customers
Action strategies	It is recommended to implement lean, agile, and leagile strategies in the supply chains to ensure effective management
Consequences	Improving the supply chain management practice

Table 10: Axial Code 2 - Lean, agile, and leagile strategies can be useful for the supply chain management in different circumstances

Element	Description
Phenomenon	Lean, agile, and leagile strategies cannot work alone in the presented scenarios, developed by the author
Casual conditions	The dramatic changes of the global markets require more effective and innovative tools for managing supply chains
Context	The developed scenarios need a new framework for managing future supply chains, within identified scenarios

Action strategies	Developing a new framework for managing future supply chains under different circumstances, specifically through the utilization of three considered strategies
Consequences	To handle the supply chain and managing supply chains in these scenarios

Table 11: Axial Code 3 - lean, agile, and leagile strategies cannot work alone in the presented scenarios developed by the author

Element	Description
Phenomenon	Lean, agile, and leagile strategies require a high level of information technology support
Casual conditions	The information technology is required for exchanging real-time data in the supply chains
Context	The information technology is an essential tool for implementing any of the lean, agile, and leagile strategies
Action strategies	Implementing advanced information technology in supply chain management and operations
Consequences	Improving the supply chain and its management

Table 12: Axial Code 4 - lean, agile, and leagile strategies require a high level of information technology support

Element	Description
Phenomenon	Lean, agile, and leagile strategies require well trained and professional workers to perfectly operate the supply chains
Casual conditions	The strategies cannot be implemented without well trained and professional people
Context	Implementing the proper supply chain strategy is a crucial factor for the success of the business and its supply chain
Action strategies	The human resources must be trained before implementing considered strategies – specifically to manage supply chain
Consequences	Proper implementation of the principles of these strategies in the context of supply chain management

Table 13: Axial Code 5 – lean, agile, and leagile strategies require well trained and professional workers to operate the supply chains perfectly

Element	Description
Phenomenon	Lean, agile, and leagile strategies require a high level of collaboration with all the business partners, operating in the supply chain
Casual conditions	The three considered strategies cannot be implemented without the collaboration of all the business partners, operating in the supply chain

Context	The collaboration enables the supply chain partners to achieve value across the supply chain
Action strategies	Establishing effective collaboration with all the business partners in the supply chain
Consequences	Improving the supply chain performance

Table 14: Axial Code 6 - lean, agile, and leagile strategies require high level of collaboration with all the business partners

Selective coding

As described earlier in this research, the future trends of the global markets, which are reflected in the developed scenarios, will influence the utilization of the supply chain strategies in supply chain management. This requires supportive tools to add value to these strategies; hence, enabling them to work better in the future. The major changes expected in the global markets are higher than the ability of a single company or even the supply chain to handle them.

Throughout the history of the supply chain, all the developed techniques are revolving around collaboration with the business partners, operating in the supply chain, starting from a single company doing everything in-house to the engagement of multiple business partners in one supply chain; hence, connecting all supply chains together. All these ideas were running around a single concept named “collaboration”. Consequently, it is useful to start from this point. “In the future, companies will need to use collaboration to keep their innovation flow filled” (Joseph et al., 2006).

This concept of “collaboration” is nominated as a single research point and selective code, and the same can be directly tracked in the above-mentioned categories. The reason for selecting collaboration as selective code for this research is that the major changes of the global markets must be handled through collaboration to overcome the negative impact of such changes or at least to reduce its consequences as much as possible (Barratt, 2004; Hudnurkar, et al., 2014; Joseph et al., 2006; Pramanik, 2015). Moreover, implementing any supply chain strategy, without mainly focusing on enhancing the collaboration, is useless.

The developed scenarios in this research represent an extremely high level of uncertainty and only the collaboration can help to overcome pre-supposed circumstances (Hoyt & Huq, 2000). The limited supply chain collaboration will not enable the business to survive in difficult situations, but there must be some kind of global collaboration on a large scale. This is the core concept of the proposed framework of this research. The proposed framework will add additional value – in terms of utilizing the supply chain strategies, i.e., lean, agile, and leagility under diversified future circumstances. It will imply to change the nature of these strategies and the way for implementing them in any supply chain.

The aim of the continually collecting, analyzing, and reviewing the same data in the grounded theory methodology is to reach a “theoretical saturation” point. At this point, it is believed that no new categories can be found during coding. However, any new category will not add value to the research, and this point is defined as “theoretical saturation”. This is because, the study reaches to a single point of researching, which is the selective code of “global collaboration”. The author believes that developing a new framework of global collaboration represents the clue of this research.

4.5. Framework for managing future supply chains based on global collaboration

There are several comments, received from the supply chain professionals on how to support the utilization of supply chains strategies in the future to cope with the various challenges. After organizing the interview responses, it was obvious that the supply chain professionals are looking mainly to improve the global sourcing process, as they believe if the sourcing practices are improved, supply chain strategies would adequately handle the future challenges. Based on this point, the proposed framework is created in this research. The framework is developed to fill a recognized gap by globally organizing all the resources, in a systematic manner and under a legal umbrella.

The above-outlined findings contributed to the development of the framework for managing the utilization of the future supply chains strategies, i.e., lean, agile and leagile strategies under different circumstances. As explained in the previous sections, it has been deduced that the proposed framework has to be created through the coding of interviews. The framework is needed to improve the global collaboration process, which will play an essential role in

improving the utilization of supply chain strategies in future, as indicated clearly by the supply chain professionals who had participated in an interview. So, hereunder the core idea of the proposed framework is presented.

Introduction and background of new framework development

In the literature review of this research, various supply chain strategies have been presented, i.e., lean, agile, and leagility. Moreover, it is explained how these strategies can be used in supply. Moreover, it is also discussed that these strategies need some support to face the expected future changes and global market conditions. These include a high level of uncertainty, limited resources, and ultimate risks to the supply chains. The collaboration is the key factor that plays a supporting role, in terms of sharing the risks (Kogut, 1988) and utilizing the limited resources (Park & Song, 2004).

As explained in the literature review and future scenario development section, it is obvious that the discussed strategies are essential for any supply chain and its management (Sillanpää, & Sillanpää, 2014). However, it has also been established that these strategies will be affected in future circumstances (Bala, 2014). Consequently, there is a need for an innovative framework to support these strategies to work better in the future (Blecker, 2014). This perspective is clearly outlined and supported by the opinions of supply chain professionals, collected from the interviews in the frame of grounded theory approach.

Considering the responses collected from the interviews, it is obvious that the supply chain professionals are looking for a higher level of collaboration and this collaboration needs to be done globally between all the supply chains. This will support the utilization of supply chain strategies, especially in the future, where a plethora of challenges might impact the supply chain. Therefore, the situation calls for the development of such strategies or frameworks that could adequately handle this situation. Succinctly, it has been deduced that the establishment of the proposed framework is necessary to fill this gap.

The proposed framework is concerned with improving the global collaboration of the international business that is expected to support the supply chain strategies to work better in the future, especially under three identified scenarios.

As explained above, the development of the supply chain concept took several decades until we reached to the current body of knowledge. Thousands of researchers, throughout the years,

contributed to supply chain management literature, specifically by evolving its concept gradually by adding new techniques, innovating ideas, and new tools. All the contribution and efforts were aimed at drawing the best supply chain practices and various aspects of supply chain management. After all of these years of the evolvement of the current body of knowledge, it is evident that the supply chain concept is all about collaboration – both internally and externally – with all the business partners, operating within the supply chain (Singh et al., 2018). Furthermore, the degree of success in business is essentially dependent on the effectiveness of collaboration between supply chain partners (Hudnurkar, et al., 2014; Joseph et al., 2006; Pramanik, 2015).

The means of collaboration have been comprehensively discussed during the last decades – especially after the evolution of the information technology (Fawcett et al., 2011; Ralston, 2014) – and how the supply chain utilized such evolution to develop better methods of collaboration through instant communications (Barratt, 2004; Adams et al., 2014; Chen et al., 2017).

In the present research, it is very useful to rely on the concept of collaboration to develop such a framework that could support the utilization of supply chain strategies, despite the uncertain future trends of the markets.

The developed scenarios in this research represent an extremely high level of uncertainty and require a high level of collaboration. In this account, the current body of knowledge has excessively emphasized on supply chain collaboration, however, it cannot stand alone in front of the dramatic changes of the global markets and developed scenarios (Joseph et al., 2006; Fawcett et al., 2011; Ralston, 2014; Pramanik, 2015). Precisely, there is a need for a new framework of collaboration to survive in the future. This type of collaboration should be done on large scale, so the international business can achieve benefits out of that.

The aim of the proposed collaboration between the supply chains and its members is to facilitate the international business by optimal management of the available resources worldwide; hence, achieving maximum utilization of the limited resources. Moreover, to engage all the supply chains in a single global network, the concept of the supply chain can be upgraded from being a chain of partners to be a global network. This transition can bring

significant improvements in the business practices as well as to their supply chain strategy (Trappey et al., 2016).

The need for a new global organization

In the contemporary era, the known supply chain collaboration tools are utilized in different forms, some of them are discussed as follows:

- Organized relationships between the firm and some of its partners (Ralston, 2014),
- Relationships between supply chain and another supply chain – not individual organizations.
- Some business associations for each industry, where the companies can participate to get better collaboration tools. For example, Elemica which is one of such associations for chemical industry enables the associated companies to integrate their different ERP systems (Rashad & Gumzej, 2014).
- The chambers of commerce in each country represent some kind of collaboration, where the companies can meet and collaborate together.
- We can also consider the trade unions, as a type of collaboration in business.

Our proposed framework is composed of core elements that intend to change the traditional practice of supply chain collaboration – specifically by establishing a new global resources management organization. Using that framework, the research is intended to link the supply chain strategies to the market circumstances, while leveraging the collaboration to the international level; hence, ensuring single-channel global collaboration.

We propose a new type of collaboration, which we think that it is most effective. This proposal aims to establish a single organization under a name of “The international resources management organization” – “IRMO”.

The framework, proposed in the research – i.e., IRMO – aims to improve the global collaboration between the supply chains. In this account, the suggestions - given by the industry professionals in the interview – have been considered and it is anticipated that it would result in improving the utilization of supply chain strategies in future. Consequently, global collaboration is identified as a selective code in the grounded theory practice that is followed in the research. This gives IRMO the required conceptualization to fit in the framework, proposed in the present research.

As per Masson, et al. (2007), in the highly uncertain business environment, it is crucial for the supply chain to keep a wide range of supplier base to ensure the continuous availability of the materials. The IRMO can play this role by allowing the supply chains to select their business partners, with the utmost level of reliability. Consequently, it can timely respond to the changes taking place in the market (Prater, et al., 2001).

If any supply chain is seeking to improve the response to the unexpected market events and varying customer demands, it must look to develop collaborative relationships with the suppliers (Bruce & Daly, 2011). As explained above, the collaboration is considered as the selective code of the research. The important challenge for collaboration is associated with the selection of the appropriate business partners (Barratt, 2004; Sabath & Fontanella, 2002). IRMO is proposed to facilitate this task to the supply chains.

Many authors believe that building collaborated and trustable business relationships are the optimal way of overcoming the uncertainties (Monczka et al., 1998; Peters & Hogensen, 1999; Chandra & Kumar, 2001). Therefore, IRMO is needed to play this role and helping the supply chains to utilize the strategies to overcome the future challenges that might occur due to the extreme level of uncertainty.

As discussed earlier, to improve the supply chain management and ensure better utilization of supply chain strategies, especially in the difficult times, there is a need for a special type of collaboration. It is essential to enhance the flexibility of the supply chain and this could be done according to Tachizawa & Thomsen (2007) by “improved supplier responsiveness” and “flexible sourcing”. It is important to note that both of these advantages can be achieved by creating IRMO.

The best practice of supply chain management is dependent on the ability of the stakeholders to find reliable business partners and establish mutual benefits relationships. The ability to search for good partners depends on the available data what we have and this determines the perfect selection process we can make.

The purpose and aims of IRMO

The main purpose of establishing IRMO is to work as a data bank of all the global business that enable the companies to reach each other quickly through a reliable channel. Moreover, this will play an important role in supporting the utilization of lean, agile, and leagile strategies to

work better in the future within the special type of collaboration, which IRMO could achieve. As noted earlier, improving the global collaboration between the supply chains is the selective code in this research, which represents the clue to improve the supply chain strategies. These aspects have been specially considered while developing IRMO to ensure that it will improve this global collaboration of the supply chains, accordingly.

The role of IRMO is to change the traditional collaboration while reforming the buyer-supplier relationships and engaging all the partners in a single global network. In this way, all the members can interact effectively and responsively. In other words, IRMO will contribute to enhancing the utilization of lean strategy by being effective and at the same time, it will help to improve the responsiveness of the supply chains, through global collaboration with all the business partners. This plays an important role in improving the agile strategy across the supply chains. The leagile strategy could work better with this proposal, however, the global collaboration which could be achieved by IRMO, will enable the supply chains to achieve the required balance between lean and agility; hence, formulating and implementing leagile strategy successfully.

In times of rapid market changes, it is quite tough to survive without having an alliance with other partners. This could turn the risks to opportunities and improve the competitive advantages of the supply chain (Devor et al., 1997). IRMO aims to help the supply chains to form this alliance with reliable partners. Right now, there is no entity to play this role, but the companies always try to search for overseas partners in different ways, like:

- Searching on the internet for companies selling or buying their products.
- Referring to other business partners to work with a specific company, based on previous experience.
- Business trips to other locations to visit companies seeking partnerships.
- Participating in associations gathering companies from the same industry.

Currently, some entities are trying to work as a data bank and connecting the companies, like Ali-Baba, Amazon, or E-bay. However, none of them gathers all the information needed worldwide, they are either working on a local and regional scale or working globally but with some information only. It is important to note that this type can be found in the e-procurement websites.

These multiple options of outsourcing and getting information about partners and products are not effective for the supply chains, because the available information is always limited as compared to the entire business information. None of the associations or e-procurement website has all the data of the companies, specifically related to their products and prices. However, the companies usually search for what they need in different channels and certainly this process is very time consuming and requires many efforts.

On the other hand, IRMO is beneficial, in terms of allowing the supply chains to easily depend on several sources. It is because it is very risky to depend on single or limited sources. Some supply chains depend on limited sourcing options, as a result of facing difficulties associated with the process of building reliable business partners. However, if this process is made easier, then the supply chain can depend on many reliable sourcing options, which can play a very important role in protecting the supply chain from any sudden condition that might occur in the future.

For example, although Toyota is the first company to adopt a lean strategy in 1997 it was depending on limited sourcing channel to supply the brake parts. Therefore, when the fire suddenly erupted in that plant, Toyota had to halt the production that led it to incur the loss of \$300 million (Nishiguchi & Beaudet, 1998). This event was the trigger for Toyota to consider multiple sourcing channels.

To sum up, the IRMO aims to improve the utilization of supply chain strategies, specifically by saving time and efforts. It is because IRMO provides information in a single data bank. It is important to note that it provides such information, which is reliable and trustable as they are extracted from legal companies only worldwide. This trust is very crucial for the partnerships and cannot be attained easily; however, through IRMO, this can be easily achieved (McCutcheon & Stewart, 2000).

Unique Character of IRMO

All the other outlined organizations and associations are different from the proposed IRMO. The World trade organization or the International chamber of commerce, for example, are not playing the same role as described above, as they have other functions and goals (Baldwin, 2016). IRMO is also different from the e-procurement websites that are existing on the internet, belonging from various areas. These include:

- IRMO is a legal body that is operating under the umbrella of the UN, while the e-procurement websites are operated privately.
- IRMO is a non-profit organization that is funded by the UN. However, the e-procurement websites are for-profit mostly and depend on subscriptions, the percentage of each deal, and advertising opportunities on the site.
- IRMO is not a place of making deals, but just data bank of information, which is contrary to the websites that deals with the buying and selling of products. Examples include E-buy, Amazon, or Alibaba.
- IRMO works globally to generate master data for the entire business because the database of IRMO is built on including all the information - provided by the governments about all the companies operating legally in each country. In the e-procurement websites, the subscription is the choice for each company, so these sites are always limited in terms of their participants.
- There is no guarantee about the liability of the companies that are participating in the e-procurement website; hence, any fake company can easily register and scam the people. IRMO is a UN organization, so only the legal business in each country are listed. Thus, there is no risk of dealing with fake or deceiving companies, as all the participants are real companies that are legally bound to avoid deceiving activities.

IRMO should utilize the evolution of the information technology to create its database and to organize a massive amount of data - received from each part of the world. This will enable the users to have innovative features in the system, while searching, refining, and extracting the data they need within minutes.

Functions of IRMO

In terms of identified functions of IRMO, the ways of improving supply chain strategies by facilitating collaboration, legal function and function of global data bank are discussed as follows:

Improving the supply chain strategies utilization by facilitating the collaboration

IRMO play a very important role in improving the utilization of lean, agile, and leagile strategy and this can be done by facilitating the global collaboration between all the supply chains. It should be designed to facilitate the global collaboration by recording all the data of the

companies that are globally operating in the industry; hence, enabling the companies to know each other in terms of products, services, and prices.

Legal function

The information technology has changed sourcing practices and has enabled companies to source their required material from the entire world. However, it has also resulted in increasing the risk of commercial frauds, like illegal contracts/conditions and quality of products and services. Besides that, frauds related to fake financial transactions are also associated with technology-driven sourcing practices.

All of these issues can be easily countered through IRMO, as it gathers data for the legal organizations only; hence, limiting the illegal businesses to participate in the sourcing activities. In this account, it is important to note that legal business is the ones who comply with the local law of the country. This is to ensure the liability of trading between the parties and also to restrict the illegal business from competing with the legal one.

IRMO is related to the United Nation and is working as a UN specialized agency. One of the interesting aspects is that most of the countries worldwide are members of the UN. IRMO's function is to allow companies to get reliable data about each other without spending a lot of time. However, all the information about the potential business partners will be presented clearly, so the companies can communicate and interact perfectly.

Global data bank

IRMO will work as a comprehensive data bank for all the companies worldwide. It will be the official source of information, on which the supply chains can depend on to do business. IRMO is not a private company, but the not-for-profit organization and working under the umbrella of the UN. The UN now has many specialized agencies such as world health organization or international labor organization. IRMO should act as a UN specialized agency, i.e., also working specifically to improve the global sourcing process, which will add value to all the nations.

Preconditions for establishing IRMO

According to the UN charter, which is the foundation treaty of the UN, the UN Economic and Social Council acting under Articles 57 and 63 is responsible for incorporating a new agency to the UN. As stated in Article 63 (UN, 2020):

- The Economic and Social Council may enter into agreements with any of the agencies that are referred to in Article 57. It defines the terms on which the concerned agency shall be brought into relationship with the UN. Such agreements shall be subject to approval by the General Assembly.
- It may co-ordinate the activities of the specialized agencies through consultation with the General Assembly and to the Members of the UN.

A list of all the specialized agencies of the UN, which are proposed to be included in IRMO, is available on the UN website link: <https://www.un.org/en/sections/about-un/funds-programmes-specialized-agencies-and-others/index.html>

The structure of IRMO

The author proposes establishing this organization under the umbrella of the UN. The head office could be in New York - the USA with regional offices in each continent, as proposed below:

- Europe: Antwerp – Belgium
- North America: Huston – USA
- South America: Rio de Janeiro – Brazil
- Africa: Cape Town – South Africa
- Asia: Shanghai – China
- Australia: Sydney

These cities are nominated because each one represents hub in its region for the international business, especially from the viewpoint of supply chain activities.

In each country – all across the globe – there will be an office that would gather the required information. This country office should liaise with the local chambers of commerce to get the updated information. The reason for proposing the chamber of commerce is that the chambers are the reliable source of information in each country since they are established to gather all the companies - operating legally in any country - in one body under the observation of the governments.

Key processes in IRMO

As IRMO has a global nature, the process design should start first from the member countries individually, to ensure the reliability of the information, before moving to the international level. It would allow the supply chains to access the master data of all the legal companies worldwide.

The purpose of these key processes is to facilitate data collecting while offering maximum benefits to all the members of IRMO in terms of adequately utilizing this data. This process will facilitate global collaboration and interaction between all the supply chains, operating all across the world. Once this global collaboration is optimized, the supply chain strategies will be improved directly.

The key processes in IRMO are outlined below:

- The country offices should collaboratively gather all the nationwide information via local chambers of commerce. It is due to the fact that each chamber of commerce has the information about the companies, working in the country. Thus, it is ensured that the participants are all officially registered in the countries they operate in.
- The information should include all the details of the legal companies, specifically associated with their products, quality, and prices. This will be included in a specific template to ensure that all the information is collected and organized in the same format. Each company, present in the chamber of commerce, has a specific registration number. The objective behind allotting a unique number to each organization is to avoid any conflict. In the commercial registration of each company, there is already information about the products categories – associated with the business. Each company should provide a portfolio of detailed products and prices for marketing purposes.
- It will be the responsibility of each country office to verify the information and refine it perfectly to have an up-to-date record. It is important to note that the coordination with the local chamber of commerce – present in each city – can play an important role in perfectly updating the information. It is expected from the chambers of commerce to show a high level of cooperation with IRMO as a UN agency.
- The country office should classify the companies and products in a directory so that they can be easily selected and tracked. This is one of the main responsibilities of IRMO to

present the massive amount of information on a portal so that it can be used easily by the members.

- This information should be periodically updated to the regional office of IRMO. This is a very important step towards having up-to-dated information, both regionally and globally.
- The information in the regional offices should be reported to the head office globally. In this regard, there can be a single directory containing all the information that is required for outsourcing globally. In this way, the companies can easily search and select the best outsourcing solutions in each industry, without spending a lot of time or putting excessive efforts. Succinctly, by using proposed IRMO, any company can build reliable business relationships more easily and quickly. The system of IRMO enables the companies to survey all the outsourcing solutions – available all across the globe – and nominate the best within minutes.

The core concept of the proposed framework – i.e., IRMO – is shown in figure 36, where the input is the supply chain strategies, namely lean, agility, and then leagility. If this input is combined with supporting tool (i.e. IRMO), this will lead to flexible sourcing and improved supplier's responsiveness. This will eventually lead the companies towards bringing significant improvement to the supply chain collaboration, which will help to generate an output of optimized supply chain strategies. Precisely, the implementation of the framework will facilitate the optima utilization of supply chain strategies.

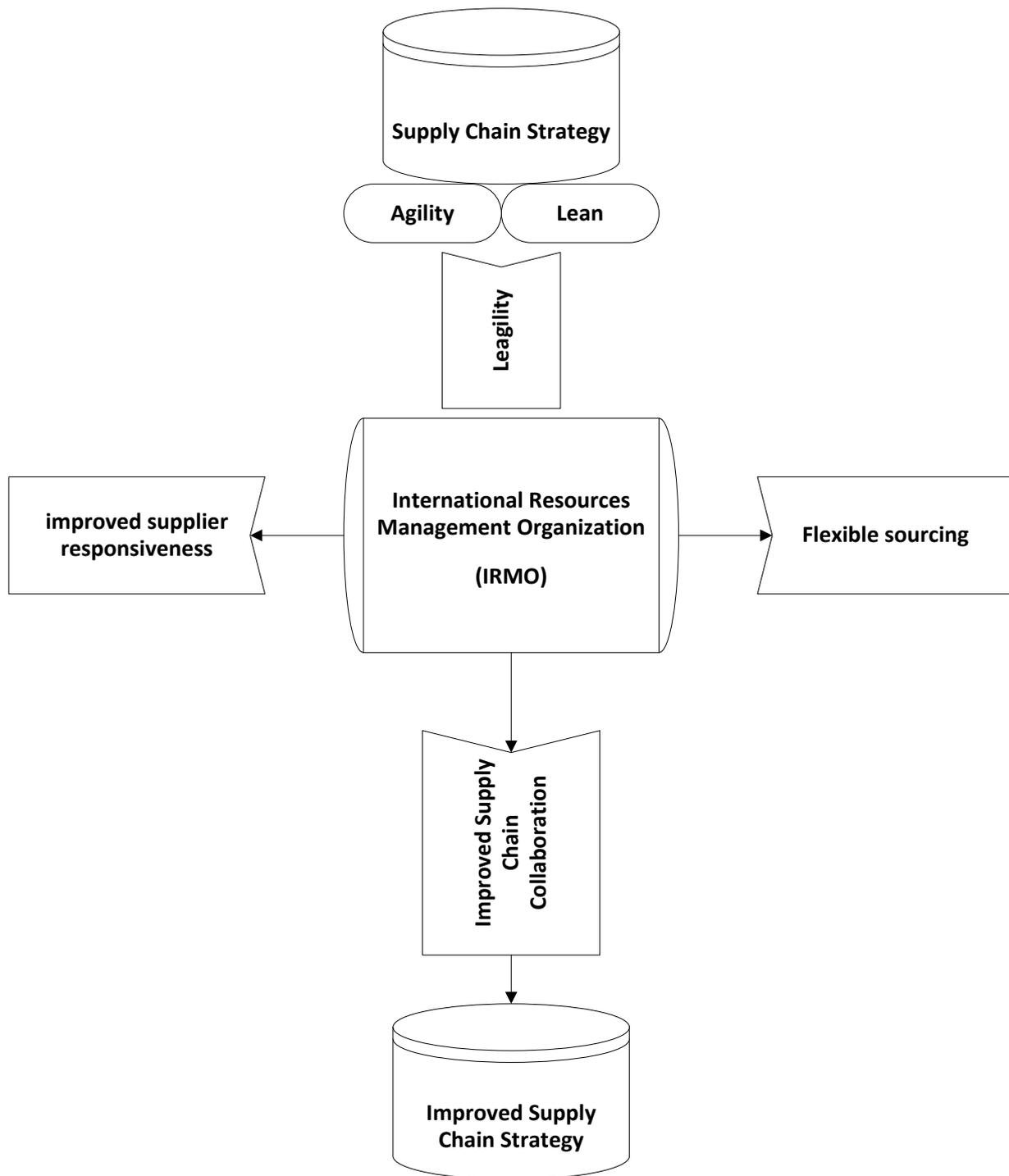


Figure 36: IRMO and supply chain strategies utilization

Source: Created by the author

The collaboration required here should have special characteristics to offer optimal outcomes. It has to be a global collaboration between the supply chains through single organization and this will represent a major change to the concept of the supply chain itself, as we will move

from the concept of the supply chain to another concept which is at a higher level of “global resources management”. This level is orchestrated by a single organization for the better management and utilization of the resources, on a global scale. Therefore, the IRMO is located at the heart of the framework and act as the tool for changing the nature of collaboration and the buyer-supplier relationships.

The collaboration at that level is completely different from what is currently happening between individual companies in supply chains. The currently known collaboration is done by supply chains – have a limited number of participants. However, the proposed framework is aimed to offer a unique type of collaboration that offers value to each participant – associated with the supply chain network as well as the global economy. Besides that, it also offers efficient use of the resources, which helping the businesses to sustain for longer periods.

Financing IRMO

If the size of IRMO and its arms worldwide - (i.e. via national offices) – is considered, it becomes obvious that large capital is required for establishing and operating such organization. However, this organization belongs to the UN, which indicates that financial support would be provided to the supply chains.

All the UN member countries pay their shares, which are later used by the UN to support different business activities. Likewise, IRMO would also be part of the UN activities and would work like other organizations that are currently operating under the umbrella of the UN. IRMO will be a non-profit organization and would act as an agency in the UN, so all the finance will be from the UN. Succinctly, no profit is expected to be achieved against the service that IRMO would provide to the global economy.

5. Validation of developed framework

In this section, the research findings are presented that are collected from the survey that was conducted with supply chain professionals. The main objective of conducting this activity was to assess the proposed framework – i.e., IRMO. Particularly, the hypotheses were addressed clearly in the questions to see the feedback of the supply chain professionals about the proposed framework, which was specifically designed to support the utilization of supply chain strategies under different circumstances. This very essentially points to test the hypotheses and validate them accordingly. In the remaining part of this section, the research findings are outlined about the proposed framework and possible modifications, the impact of the framework on the utilization of lean, agile and leagile strategies, possible benefits of IRMO, as well as potential obstacles to implementing the proposed framework and related IRMO.

5.1. Research findings

The findings of the current study are being outlined in this section. The findings are obtained by surveying supply chain professionals. The same individuals were contacted as in the first phase of the study. The details about the participants in the survey are provided in section 4.2.

1. The development of business environment and supply chain strategies utilization

The question is designed to measure the perspective of the supply chain professionals regarding the first hypothesis of the research. It is related to outlining the importance of the business strategies utilization for managing the supply chains.

The results revealed that 73% of the participants believe that it is a must for the supply chain to utilize adequate strategies, while only 8 % believed that it is needed to some extent. Also, 16 % of the respondents believed that it depends on the trends of the markets and the changes in the market to use adequate supply chain strategies. Only 3% of participants said there is no relationship between the development of the business environment and supply chain strategies utilization in the context of managing supply chains. The results are outlined in figure 37.

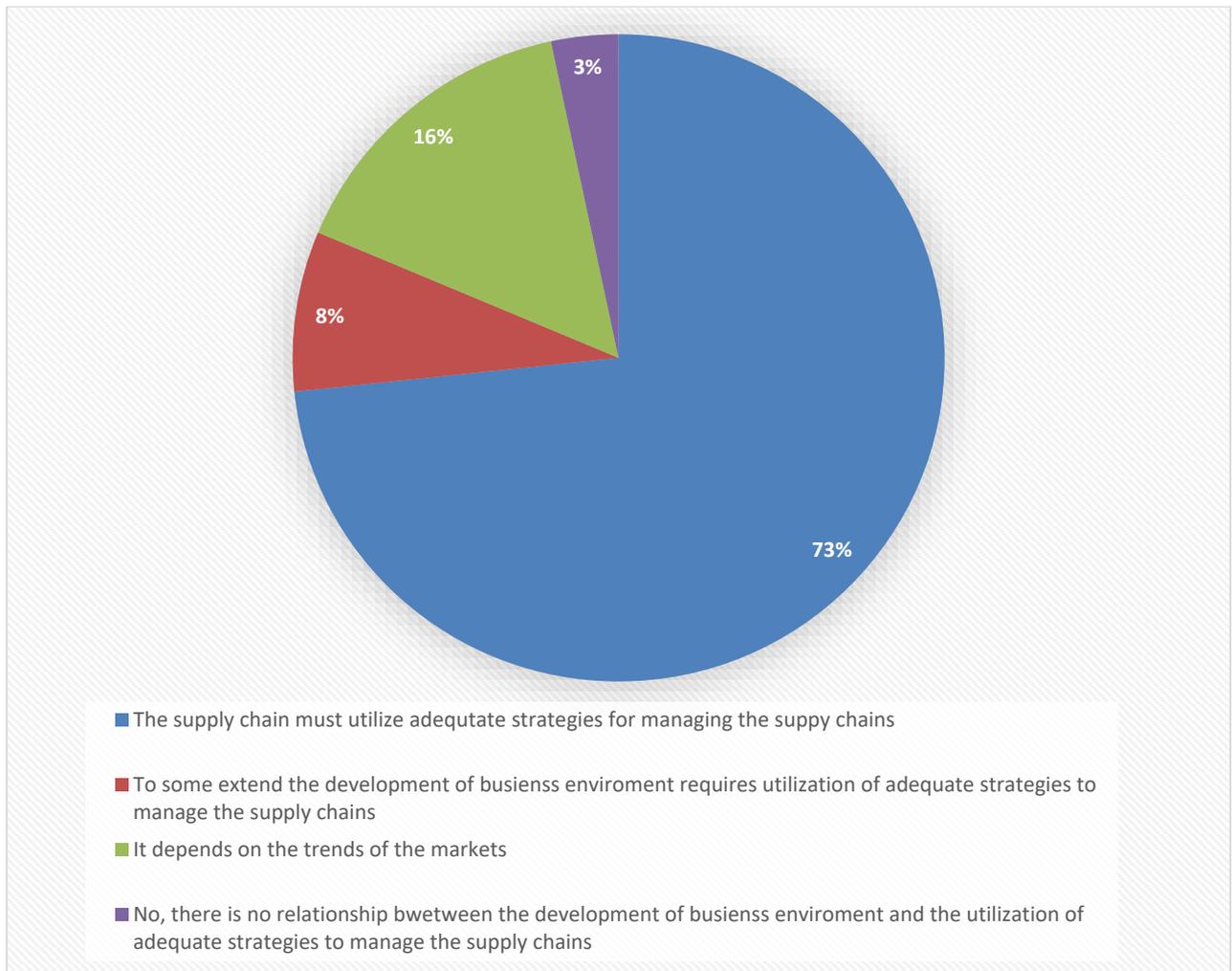


Figure 37: The development of business environment and supply chain strategies utilization

These results provide a clear implication that the supply chain professionals recognize the importance of always using adequate strategies to manage their supply chains. This is an indication of the necessity of having a framework to support the supply chain strategies' utilization in the current as well as in the future. The current changes to the global business environment and the expected changes in the future require the supply chains to get ready for managing such changes. H1 is supported by the above-outlined cognitions, and the findings are elaborated throughout the thesis.

2. The need for a framework to support the improvement of supply chain management

This question was designed to measure the perspective of the respondents regarding the second hypothesis of the research. The results showed that 98% of the participants believed that a new framework is needed to support the improvement of the current and future supply

chain management and to ensure the best utilization of adequate business strategies for managing the supply chains.

Majority of the participants (65%) believed that it is mandatory to have a new framework for managing the supply chain. Also, 11% said that a new framework is needed but not essential. 22% explained further to link this to the stability of the business environment. They were of the view that if the business environment is stable enough, then it is not essential to have a new framework. Also, if the business environment is unstable, then a new approach is needed in that case. The results are outlined in figure 38.

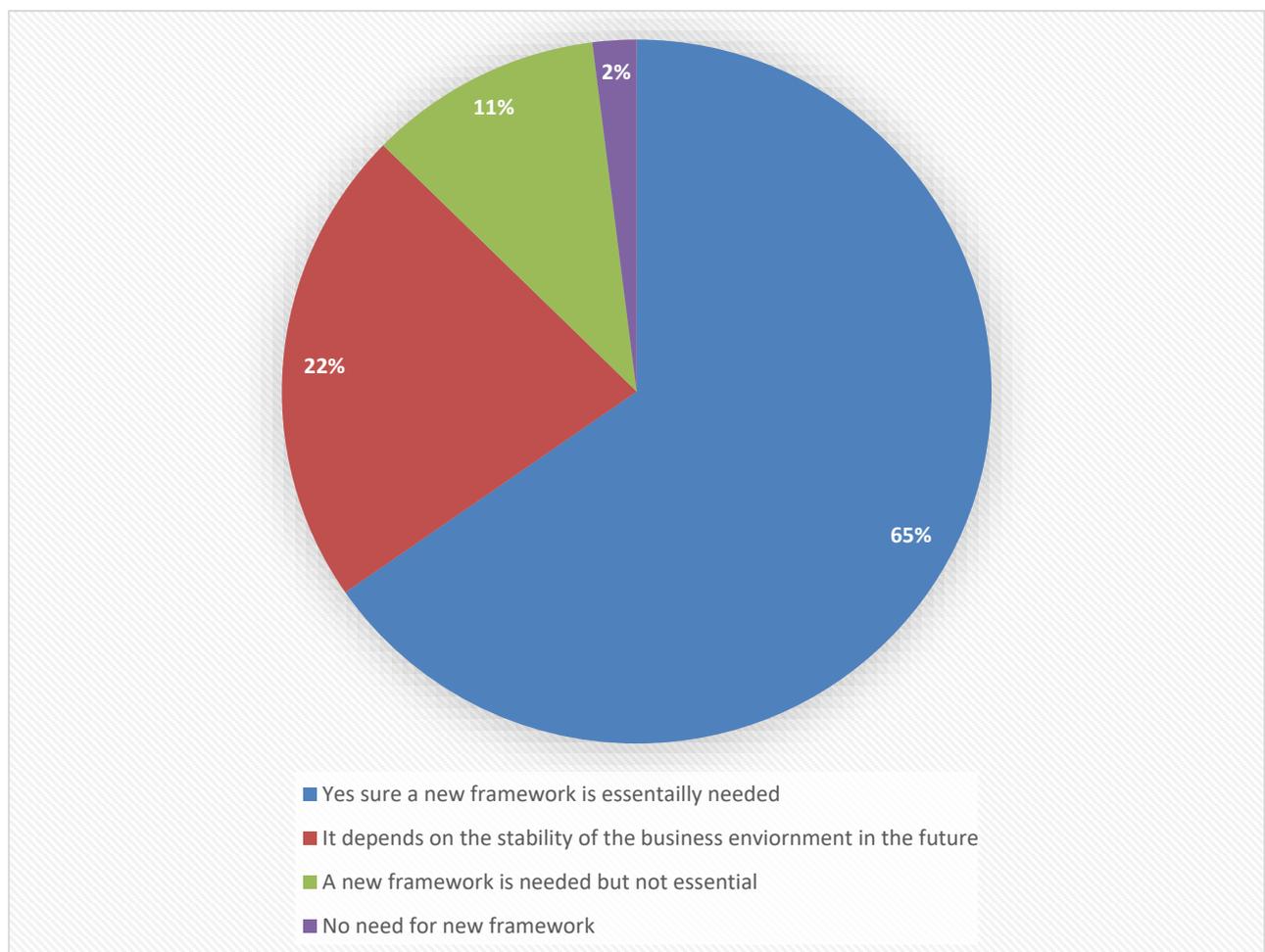


Figure 38: The need for a framework to support the improvement of supply chain management

These results give support to the research validity as the need for a new framework is not observed by the current researcher but is well supported and appreciated by the supply chain professionals in the past. Thus, a new framework is needed to achieve value to the supply

chains from practical as well as theoretical perspectives. These cognitions and the findings are elaborated throughout the research that supports the second hypothesis.

3. The developed framework and improving supply chain management in the predicted scenarios

This is the most important question in the survey as it is crucial to know the importance of a supply chain framework by professionals. Results revealed that 78% believed that the new framework would make improvements in supply chain management. This indicates the crucial feedback to support the validity of the framework. 13% of the respondents said that this framework would help the supply chain to some extent as they could not confirm the absolute benefits of its usage. This is because the respondents were of the view that the practical experiment is needed to confirm the absolute benefits of the new framework to the supply chain. Finally, 9% focused on future scenarios, and according to them, the level of the expected changes in the future global markets would determine the helpfulness of the newly developed framework. No one believed that there is no added value of the framework at all. The results are outlined in figure 39.

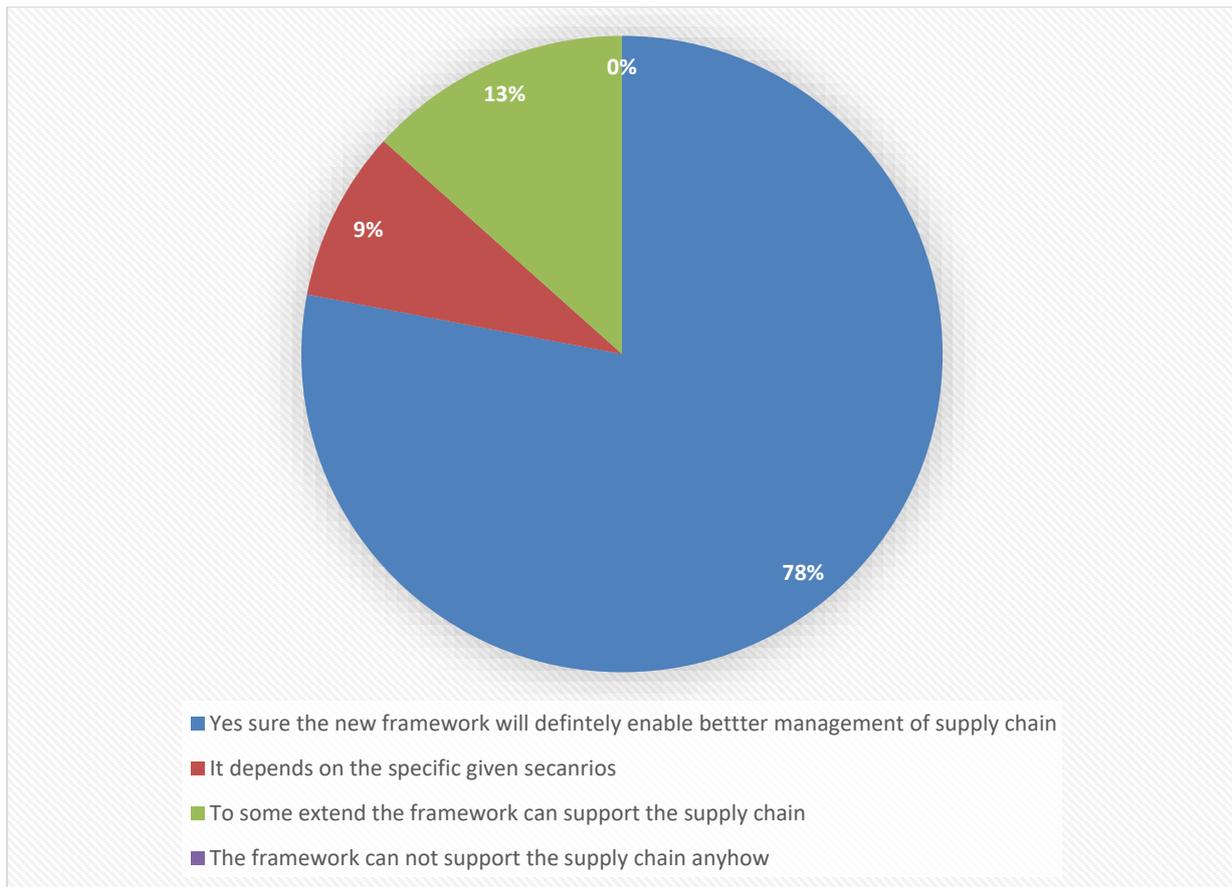


Figure 39: The developed framework and improving supply chain management in the predicted scenarios

Based on the responses, it is believed by the researcher that the framework is strong enough in improving the supply chain management, in the context of the predicted scenarios. There is consensus about the value of the framework, and this is a very important point for the validity of the research. The direction of the research initially started with an idea in mind of the researcher about this framework. The researcher aimed to validate the idea and to confirm its benefits. Based on the aforementioned cognitions and elaborated findings throughout the thesis, hypothesis 3 can be supported.

4. The proposed framework can help to change the nature of the global sourcing process

The researcher aimed to measure how the proposed framework is effective in terms of changing the global sourcing process. It can be seen from the results below that more than half of the participants believed that this framework is effective and would change the sourcing process. However, only 11% believed that there would be some improvement only. None of

the respondents answered that the framework does not have any impact on the improvement in the sourcing process. The results are outlined in figure 40.

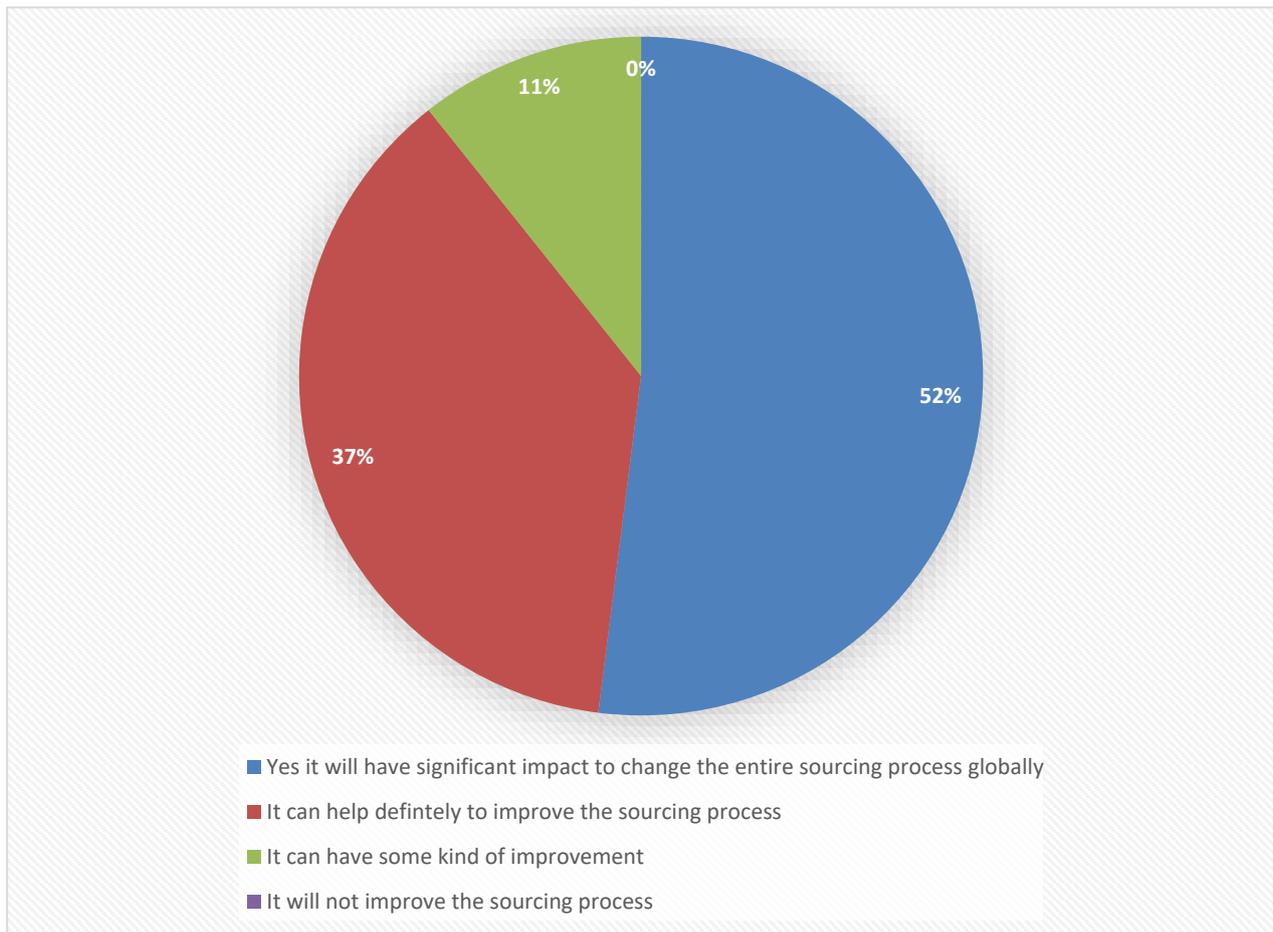


Figure 40: The proposed framework can help to change the nature of the global sourcing process

As it was researched earlier in the grounded theory, the selective code of this research was specifically to improve the global collaboration between the supply chains. Also, as highlighted clearly in the first phase of the survey, the global sourcing process needs significant improvement. In line with that, the proposed framework was developed to focus mainly on improving the global sourcing process.

The framework was represented to the supply chain professionals, and they were asked about its ability to improve the global sourcing process. There was consensus in the respondents' opinions regarding the contribution of the framework to improve the global sourcing process. This improvement could be done via the collaboration of the supply chain with another chain or with a limited number of business partners for global collaboration with all the supply chains.

5. The support and value of the proposed framework to lean, agility, and leagility strategies utilization

This was a very important question to measure the contribution of the proposed framework in the utilization of considered strategies. Results outlined that 84% of respondents believed this framework would create value to the supply chain strategies utilization and consequently enable them to work better in the future. 9% believed that this framework is very useful to the supply chain strategies utilization, but professional manpower is needed at the organizational level to implement this framework and utilize it. Further, 5% believed that the framework can work only on the predicted scenarios, while only 2% said that it would have a limited impact on the supply chain strategies utilization. The results are outlined in figure 41.

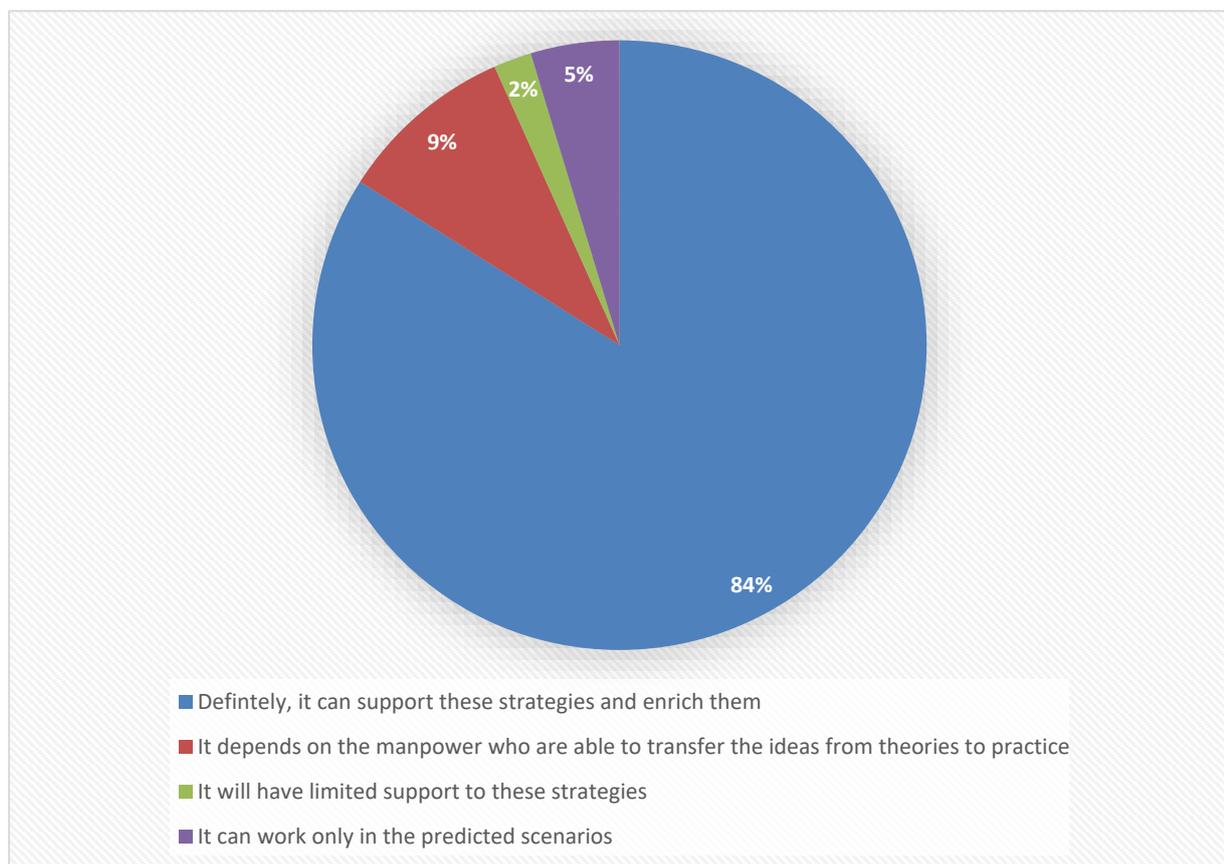


Figure 41: The support and value of the proposed framework for lean, agility, and leagility strategies utilization

These responses are very important because normally, the supply chain strategies are presented without exact tools for their implementation. The researcher has gained a

framework that can be used for implementation as well as enhancement of the supply chain strategies utilization in practice.

The support to the supply chain strategy utilization comes essentially from the ability of IRMO to improve the global sourcing process and enhance the collaboration of the supply chains. This was the main point highlighted by the participants themselves in the first phase of the research as the core idea of IRMO was extracted from the responses of the participants in the first phase of the research, which shows that the proposed framework can support the supply chain strategies utilization in supply chains.

6. The key obstacles for framework implementation

This question was designed to identify the key obstacles in the implementation of the framework in supply chain practice. To have a successful experiment, it is not only important to have a good proposal, but the proposal must be applicable. The frameworks have associated obstacles in the implementation; that is why it is important to understand them.

The results revealed that 60% of the participants believed that the most important obstacle in the implementation of the framework is the effort needed in this regard. The framework has a global nature, and efforts are required for its promotion. 17% responded that there would be resistance by the organization in the implementation of the proposed framework because people show resistance and like to stick to old and traditional systems. This is a logical and expected finding. 14% were concerned with the standardization of global sourcing rules worldwide. In that context, the respondents consider this as an obstacle because every part of the world has different rules, so efforts are needed to overcome this. Finally, 9% pointed out various obstacles other than the ones already mentioned above, but they were mostly related to the cost of implementation and financing IRMO. The results are outlined in figure 42.

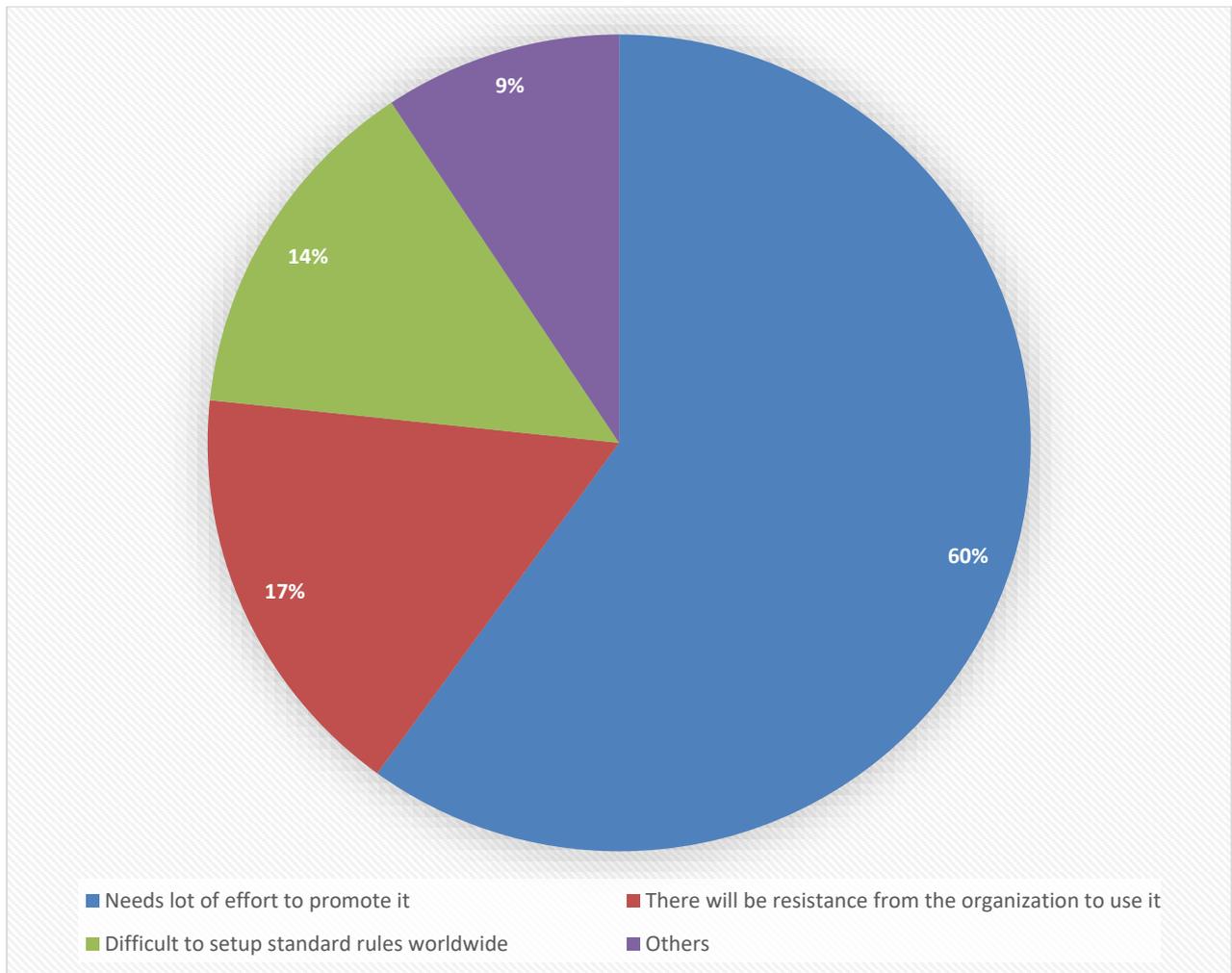


Figure 42: The key obstacles for framework implementation

The researcher aimed to highlight how to overcome the obstacles. The responses of the respondents are useful in understanding the robustness of the proposed framework. The researcher has focused on the introduction of IRMO at the initial stage of establishment, then its usage to address the resistance which may appear especially at the first phase of implementation. Accordingly, the researcher needs to address the concern of standard procedures of global sourcing. In each of these outlined points, the researcher tried to explain how the obstacles can be overcome to achieve the robustness required for the framework.

7. The most important benefits of framework implementation

From the participants' responses, it is evident that the researcher recognized all outlined benefits. That is why the study could not recommend one answer. This study has provided priority to the benefits, including effectiveness and competitive prices. Other studies

considered the reliability of the global sourcing as most important, while some recognized the benefit of enriching the supply chain strategy as useful. The results are outlined in figure 43.

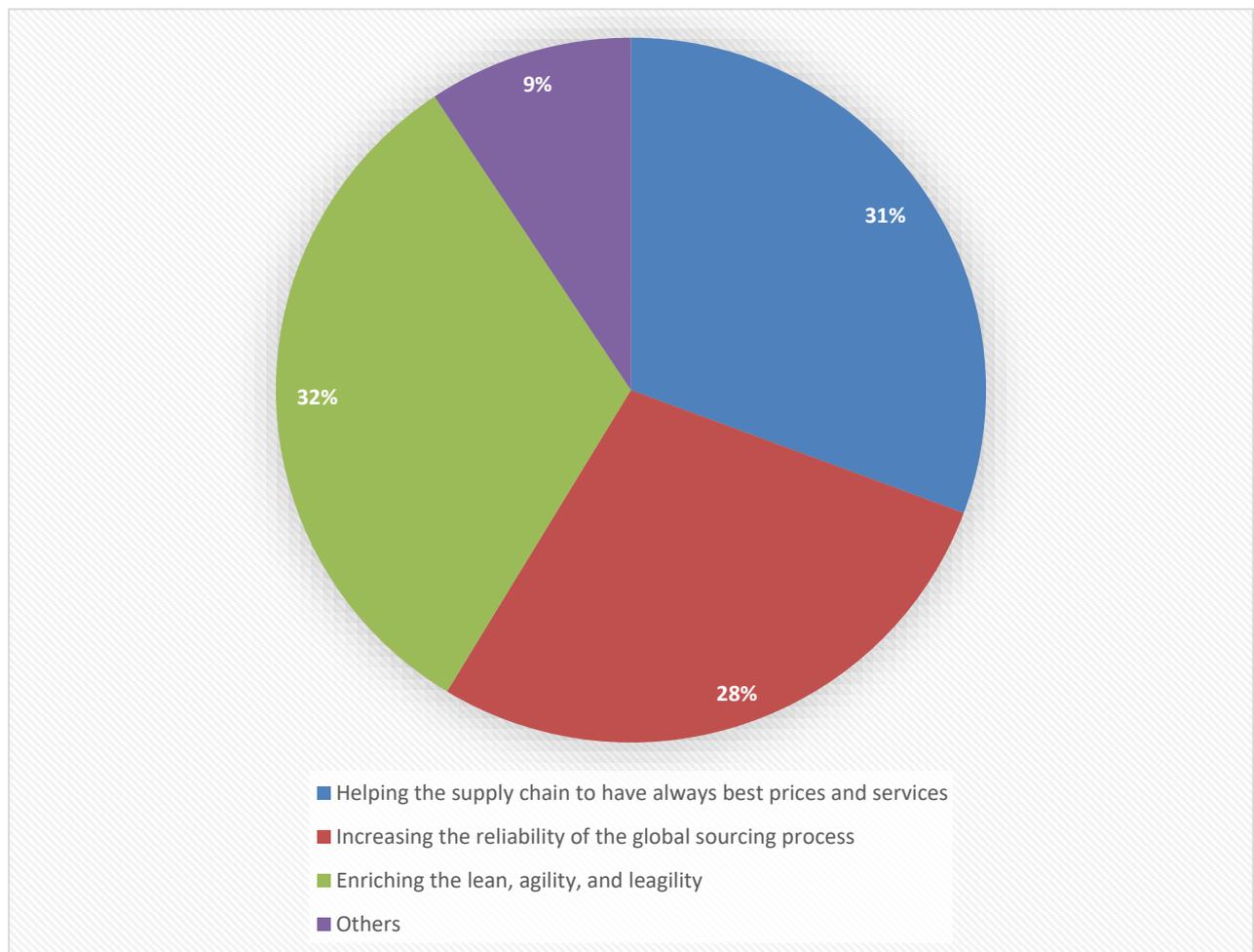


Figure 43: The most important benefits of framework implementation

It is evident from the findings that the participants have considered the ability of the framework to provide several benefits to the supply chains as an important factor. This is again another element for the framework validation. Also, it is very important for the participants to recognize the benefits of the framework; otherwise, it cannot be considered useful. If the framework is not beneficial, then it can be useless to be proposed as a solution.

8. Areas of improvement and suggestions to increase the robustness of the framework

This was a very important question to improve the proposed framework and ensure it is not structured completely from the perspective of the author, but the supply chain professionals contributed to its concept and recommended some areas of improvement. Results revealed that 55% of the participants believed that there were one or more areas of improvement.

However, 31% believed that the framework was perfect and can work fine without any suggestions from their side. Also, 14% could not decide whether the framework needed any kind of improvement or not. The results are outlined in figure 44.

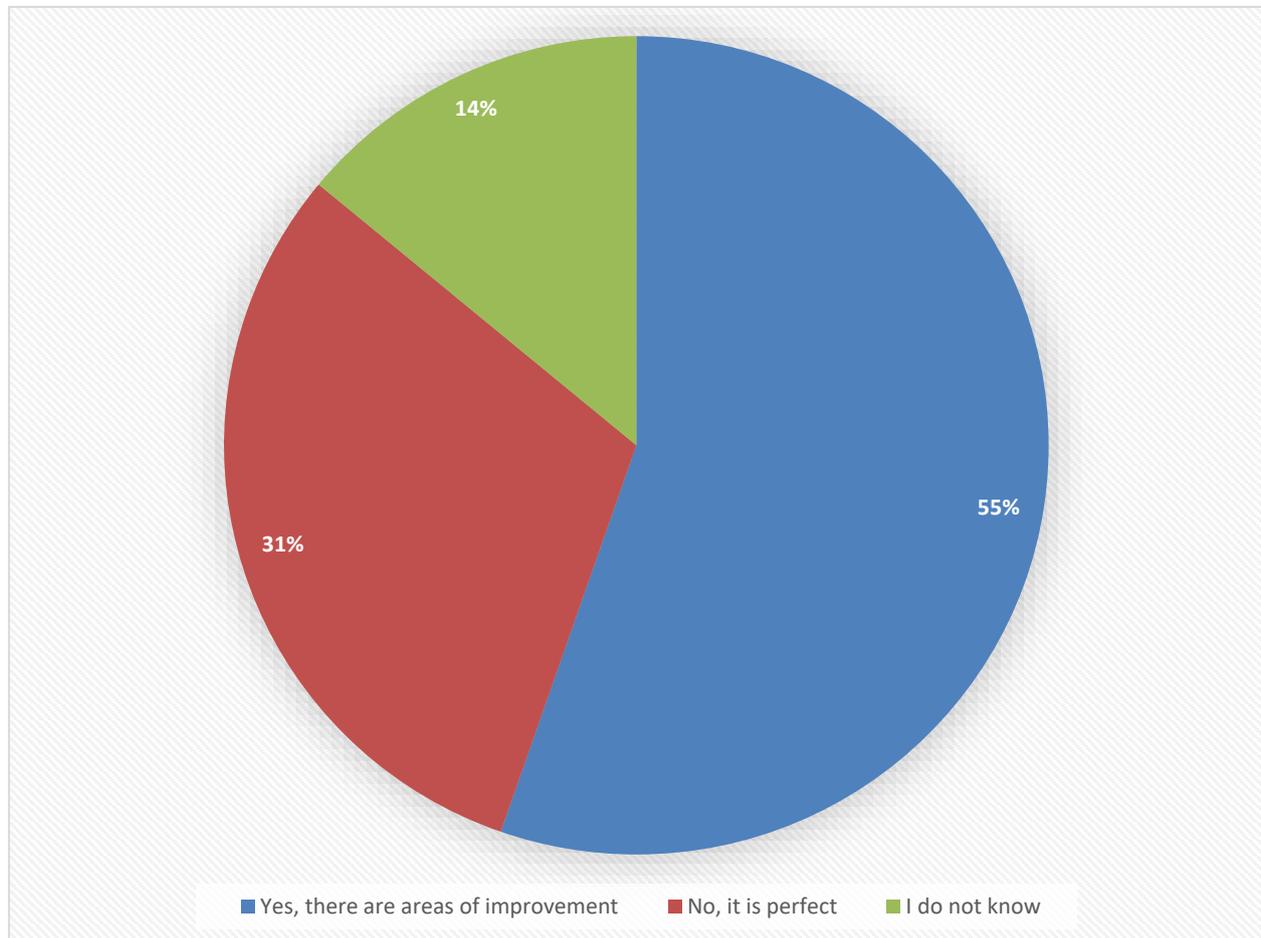


Figure 44: Areas of improvement and suggestions to increase the robustness of the framework

Mainly the respondents expressed their concerns regarding some obstacles for framework implementation. It is also important to note that the respondents provided suggestions for improvements as well. These suggestions focused on the financing of IRMO, the security of information, and promoting IRMO at the initial stage. These points are very important and are taken into consideration and are addressed later in the study. Thus, in the next sub-chapter, the suggestions for improving the framework are discussed.

5.2. Suggestions for improving the framework

As presented above, the framework was initially presented to the supply chain professionals. According to them, the proposed framework is usable and highly applicable. Moreover, they also believed that it would improve the global sourcing process and help the supply chains to implement perfect supply chain strategy. After getting the survey results, the supply chain professionals also suggested that this framework would help the supply chains to work better in the future scenarios as presented in the research if implemented appropriately. However, it is equally important to outline possible suggestions to improve the proposed framework.

Some of the supply chain professionals suggested possible areas of improvement for the framework. The following section of the research presents suggested areas of improvement based on the feedback received from the respondents in the survey. After that, the modifications to the framework are presented accordingly to address the suggestions of the supply chain professionals. Finally, the possible improvements proposed by the supply chain professionals are summarized that can be categorized into several areas.

- **Suggestions related to the Promotion of the Framework**

Some supply chain professionals believed that it is difficult for professionals to initiate an idea that can be globally implemented within the business practice without any difficulty. Thus, it is suggested to educate and promote all relevant parties and explain the proposed approach to them. From the perspective of supply chain professionals, it is recommended to address the proposal of this framework to one of the main countries of import and export, such as the USA or China. Contacting the chamber of commerce to initially educate the organizations about the framework would also work as a substantial idea. Next, it would be wise to have a trial period for some time, after that the proposal could go for global promotion and recommendation to the United Nations. This could work as an initial step to ensure successful proposal promotion and its usage afterwards.

- **Suggestions related to the initial financing of the framework**

The financing of IRMO is undoubtedly a very important issue that is highlighted as a prior suggestion for business practices. From the perspective of supply chain professionals, an appropriate emphasis should be given to the financing aspect during the phase of framework implementation. However, all the excellent ideas and proposals could not achieve success in

the real business environment because of the financial lacking. As per this group of professionals, it is important to have a system of subscription fees paid to the local chambers of commerce in each country that can be used to set up the global network of sourcing. At the later stage of framework development, there should be some sponsorship opportunities available for the large organizations who are interested in that special commercial promotion service.

- **Suggestions related to the information security**

The information security of the members of IRMO is highlighted by the supply chain professionals as one of the most important concerns. Since the framework is based on gathering and organizing the massive amount of information and presenting in front of the global organizations to utilize them, some of the supply chain professionals became highly concerned about their security of information. According to the supply chain professionals, the framework should focus more on the security of information ensuring that only the required information is collected without disclosing any sensitive information related to the confidentiality of the business of each organization.

The protocols of information security must also protect the huge amount of information against certain virus and hacker attacks that could be a real risk threatening valuable information within the organization. To overcome this, it is suggested to implement a strict software protection system that can block every kind of suspected messages coming from unknown sources. It could be an additional feature to back up all the information daily in multiple servers that ensures the organization to always hold a copy of the data bank. If the system faces any kind of aforementioned issues, this copy could be used as an alternative.

- **Concerns about political restrictions**

The supply chain professionals also suggested including clear rules for the members in the proposed organization IRMO. For example, if the UN put any restrictions for any company or country because of any reason, such as suspicions of financing terrorism, the information of these companies or countries must not be presented on the portal. The IRMO should be a UN entity, so it is obliged to follow the rules of the UN in this regard.

Ethics, Religions, and Morals Concerns

Lastly, the supply chain professionals also highlighted a highly critical aspect, on which the author has not put much attention in the proposal. It is related to the type of information presented on the portal of the proposed organization IRMO. For example, the proposal does not include any action on a company which offers goods or services against the ethics of religions. IRMO should identify the policies of the accepted or rejected information so that they can refine the information later by rejecting any subject against the ethics or any kind of support to terrorism, for instance.

Above-outlined suggestions were received from the supply chain professionals, in the frame of researching the validity of the model. There were no major suggestions about the core idea of the framework. These areas of possible suggestions would be considered in the modification of the proposed framework that is outlined in the next section.

5.3. Modifications to enhance the robustness of the framework

Based on the feedback of the supply chain professionals in the survey that was related to the possible modifications of the framework, the author focused on those areas that would offer more robustness to the framework. There are no modifications to the core idea of the framework but only to increase the robustness. Specifically, these modifications are related to the promotion of the framework at the initial stage, IT infrastructure, ERP system integrations, information security and integrity.

The initial step is to promote this framework and present it as a proposal to the concerned parties with a full explanation about IRMO. In this way, they can recognize the benefits of the framework and analyze the ways to facilitate the international business in that context of supply chain management and global sourcing process. Performing trials during the initial phases are also substantially important to ensure successful practice later.

A sponsorship opportunity is recommended at the initial stage of framework implementation to offer the ability for the promotion of IRMO as well. It is an important factor to think about financing the initial activities. Later on, when the members recognize the benefits and have enough ardency to the idea, they can pay membership fees. However, in the beginning, it is important to have the financial support of the first step of implementation before going further.

Another aspect of improving the framework is to have special IT support that can manage a huge amount of data and organize them very well, especially at the beginning. It is a very

significant point of suggestion for the success of the framework. A dedicated IT team should be assigned to handle the data bank and the networking process. In this regard, it is suitable to talk about the alignment of the business processes and set up standard rules of ERP integration facilities. This is to minimize human actions while gathering the data as much as possible. It also allows different ERP systems to communicate with the data bank of IRMO, at least for notifications of receiving Requests of Quotations (RFQ) and sales orders.

IT also plays a significant role in the information security to prevent any hackers and setup access limits to each user. That is why IT support is very much needed for implementation. The security limit for each user should be set up according to the requirement needed for the exact member. Any information related to the security of every country, even if it is related to the private sector – not the government – should not be presented in the portal of IRMO. For example, companies working in nuclear energy or weapons should not be presented on the portal.

The portal of IRMO should be designed for the commercial opportunities of commodities and services only and must not include any sensitive information of any country. It also should not include any information that goes against ethics, religions, or morals. The definition of these terms varies from society to society, so IRMO should only rely on international law in this regard. Whatever is allowed by international law, should be presented and vice versa.

5.4. The framework and future scenarios

The developed framework can support the supply chain strategies to work better in the future, especially in difficult circumstances such as a national crisis. Any effort that aims to improve the situation would be highly recommended. So, it is believed that the creation of this framework can help the supply chains to overcome most of the problems that are expected as a result of the developed scenarios. It can also create a new future for the supply chains.

When there exists a scarcity of resources and supply difficulty during the time of crisis, a need for a special type of collaboration to organize these limited resources rises. This need rises to reduce the negative impact of the crisis and allow all the supply chains to reach to each other quickly, easily, and with reliability. There should always be quick action to adopt the changes in the markets to become reliable. “To be reliable in an uncertain and changing environment, firms must be able to quickly respond to changes” (Prater et al., 2001, p. 823).

The proposed framework and related IRMO located in its centre can play a significant role to support the firms to respond quickly to the changes in the business environment in the existing scenarios as explained below. In the next paragraphs, three considerable scenarios are discussed.

Firstly, in the scenario of energy scarcity and this research, the resources would be limited. Thus, all the supply chains cannot keep up with this new situation. The sourcing options would be limited, and the supply chains could face difficulties in the process of sourcing. In these circumstances, IRMO can play a very important role to improve the sourcing process, as all the supply chains can meet and interact at one platform.

If any supply chain loses a supplier due to the unsustainability of their business with the alternative sources of energy, the business can easily find an alternative source through IRMO. The same aspect is also applicable for losing customers because the supply chains can get other customers through IRMO easily. IRMO is mainly concerned with global resources management. So, when there are limited resources, it becomes compulsory to manage these limited resources to survive in the future.

Being a global sourcing platform, IRMO would enable the supply chains to find easier alternate energy suppliers who can provide solutions for the scarcity of oil. This variety would help the supply chains to always find alternative sources of materials if any of their suppliers fail to supply due to major change. It would usually affect the global markets due to the scarcity of oil and transformation to other energy resources.

Secondly, the scenario of a new monetary system could represent major changes to the entire global economy and affect all the supply chains worldwide. Currently, significant effects can be observed on the business by making a slight change in the interest rate in Europe or USA. But in case of a new monetary system or any other events related to the changing of the monetary system, this would be a huge challenge for all types of businesses.

Some business could survive and adapt to the new system; however, others maybe not. Consequently, the entire portfolio of buyers and suppliers would change in the marketplace, so any supply chain needs to be adaptable and flexible enough for these upcoming changes. IRMO would help the supply chains to achieve this flexibility by changing their portfolios of suppliers along with the customers quickly, easily, and on a global scale.

Finally, in the frame of the possible wars' scenarios, it has been explained how the scenario would create troubles for logistics supply of materials due to wars destructions, and also because of the impact of wars on the financial statement of the nations. This would create much pressure for any supply chain to source the raw materials and deliver the finished products to the end customers. Many suppliers and customers may not be able to continue doing business in these circumstances. IRMO could help supply chains to reduce the impact of this scenario by facilitating the process of finding alternative suppliers and customers.

The logistics difficulties resulted by the wars would be major challenges for the logistics service providers such as shipping lines, freight forwarders, land transporters, and customs brokers. More challenges would be faced to create alternative routing of the shipments to deliver the materials safely far from the military activities in the region. The ability of the supply chain to find reliable logistics service providers during such conditions is a key success factor to operate the supply chain at the time of wars. IRMO could be very useful for the supply chains to find the right logistics partners who can provide innovative solutions and safe routing during the wars. As IRMO would not only have materials but also the database for the logistics service providers, it would enable the supply chains to have master data for the logistics providers worldwide.

Since IRMO would help better for the supply chain management under three possible scenarios, it would have a direct impact to improve the supply chain strategy utilization. Even if the energy sources are limited, the new monetary system is present, or there is a war in some part of the world, IRMO can help the supply chains to stay lean in that context. The common impact of all these scenarios is that they all would lead to creating major changes in the global market because of this limitation of the energy sources, a major change of the monetary system, or the negative effect of the wars.

To adopt these major changes in the market, there should be a very high level of flexibility to the supply chain strategy. This flexibility is provided by IRMO as it always provides the supply chains with a massive amount of data to utilize for alternative energy providers, alternative suppliers, and customers for materials and logistics service providers. Thus, the supply chain can manage the three scenarios effectively. Reaching to these parties quickly is one of the core principles of the agile strategy. Thus, IRMO can help the supply chains to stay agile within these scenarios

The demand fluctuation is extremely high within these scenarios. So, IRMO would help the supply chains to switch their operations between lean and agile strategies, whenever needed, and achieve the required balance of the leagile strategy.

5.5. The impact of the framework on lean, agile, and leagile strategies utilization

In this section, the impact of the proposed framework on lean, agile, and leagile strategies utilization in the frame of supply chain management is outlined. However, the anticipated future scenarios as outlined in above sub-chapter are also highlighted. It is based on the cognitions from this research, where it becomes evident that lean, agility, and leagility are key strategies for supply chain management, under unexpected scenarios in the future. Here, the challenge for the business is to develop a single strategy that can be implemented globally and support the individual business strategies in each country (Yip, 2002). IRMO represents this global framework that ultimately supports the lean, agile, and leagile strategies utilization by the individual organizations worldwide.

Zou and Cavusgil (2002) believed that if a global strategy is desired to develop, it must contain standardized rules and deploy the same to all countries. Using this centralized concept, the proposed framework within the organization works to standardize the process of global sourcing, facilitating the collaboration, and deploying the same to firms as supporting tool to their lean, agile, and leagile strategies utilization.

It must be kept in the mind that the key factor of controlling the cost in the future is related directly to the ability of the supply chain to find cheaper sources of raw materials. That is why all the multinational companies are currently concentrating on China and India to outsource the raw materials. Sometimes, these multinational companies also aim to establish productions plants over these countries to enjoy the cheap workforce and raw materials as well.

As described earlier, the framework would help the supply chain to be cost-effective, making it the core idea of the lean strategy. In the literature, many authors strongly believed that lean strategy essentially needs special type of partnership with the suppliers and working collaboratively upstream (Sako et al., 1995; Rich & Hines, 1997; Ikeda, 2000). This is the core idea which the framework tried to present.

Vonderembse et al. (2006) believed that the main focus of the agile supply chain is to make the proper interface between the supply chain and markets. For the agile strategy, the framework would play a fatal role to accelerate the activities of the supply chains. First, the outsourcing process would be done quickly because it is a very time-consuming task. However, until the supply chain finds and evaluates sources of supply and select reliable partners, the stock level in most cases become critical until the new stock is shipped and arrived. Consequently, this is affecting the ability of the company to supply on time, and there are always would be a possibility of losing a part of the market to the other competitors due to supply delay for customers. The proposed framework could help the supply chains to overcome this risk and supply on time because the time needed for outsourcing is shortened and all the other functions of the supply chain are consequently accelerated as well. The raw materials are available on time, and the other functions of the supply chain can work perfectly, such as production, sales, and distribution.

For the leagile strategy, the framework can help to implement the postponement technique very effectively. As described above, the supply chains can eliminate the stock level because all the sources of supply are always available. Thus, each company can postpone the assembly even at the last moment while the demand appears downstream the supply chain.

5.6. Possible benefits of IRMO to the supply chains and the global economy

The proposed framework and related IRMO creates offers several benefits to the global economy in general and especially to the supply chain operations, as a result of having multiple reliable sourcing options. The availability of multiple sourcing options will improve the flexibility across the supply chains and consequently the lead time of delivery as well (Ramasesh et al., 1991; Chopra & Sodhi, 2014). Several benefits of the framework and related IRMO are outlined below:

Benefits for the industry

- It will eliminate the time needed to search for business partners and will provide a very wide range of suppliers and/or customers in each industry, since the data bank will contain all the information of the companies, operating all across the globe.
- It will reduce the time needed for building the trust between two partners, and this is because all the companies registered in the database must be legal. Accordingly, there

is no risk of dealing with unknown partners, but only the reliable companies' operating legally will be registered in the database.

- It can help the supply chains to achieve the ultimate level of collaboration, with the selected business partners.
- It will be useful since all the supply chains worldwide can maintain a lower inventory level, because there is no risk of stocking piling for the suppliers of any material. There will always be several alternative options available in the database, which is ready to supply immediately. This can represent alternative sourcing channels over time; therefore, consequently, the supply chains can reduce the inventory level and safety stock.
- The supply chains can effectively operate by eliminating the cost as much as possible. The database will present all the companies in each industry with products and prices, so the decision-maker can select the best economical option.
- It will help the global economy to achieve fair competition practice; however, all the companies can compete fairly by presenting their products and prices in the database for all customers. In the end, the customer can select which option is convenient for him.
- It will not only help the supply chains to reduce the cost of materials but also to reduce the operational cost of the supply chain activities. However, it can also help in eliminating the time needed for searching for reliable partners and the time needed for outsourcing as well. Thus, the supply chain companies can hire a limited number of procurement employees; hence, minimizing the cost required for managing human resources.
- It will play a very important role to control the prices of commodities worldwide. IRMO would not do this function originally, because it has no power to instruct the companies to identify the prices of their products, but this will come automatically as a result of the fierce competition between all the companies worldwide. Each company will realize that the database of IRMO contains all its competitors – not only regionally but worldwide – hence; each company will be very competitive to obtain the orders. The buyers always will have the extreme scale of selections, and if the seller is not offering

competitive prices, the buyer can get the material from another source easily. This competition will work always as (automatic controlling agent) of the prices.

- It can help to achieve significant improvement within international trade. However, since decades, various companies have been obtaining their raw materials from traditional supply chain sources due to their lack of knowledge regarding alternative sources of supply, which may be much economical for them. Some traditional companies also do not want to face the risk of obtaining material from new and inexperienced suppliers due to lack of time. Finally, they discover that the new suppliers are not reliable enough, so they prefer the traditional sources, which they deal with for years to avoid this risk. With the existence of IRMO, the sourcing process will be easier and the companies would be able to choose the best sources of supply, and this will help the global economy to increase the international trade massively.
- As a result of the improvement of international trade, the logistics industry could be the greatest recipient. Moving the materials locally and internationally will help the logistics industry to grow rapidly. If the companies can get cheaper sources of raw materials, overseas, than what they have locally, the international shipping industry can achieve significant improvement in that case.

Benefits for the society and global economy

- It will optimize the usage of the resources globally by improving the organization of the outsourcing channels. However, the limited resources, especially during the difficult times need perfect control to share these resources (Dyer & Singh, 1998).
- It will help the world to achieve the best utilization of the natural resources available for mankind. Human beings waste a large number of natural resources nowadays, because of the conflict goals of the different countries and thousands of supply chains. Each party looks for its immediate benefit only, without considering the importance of natural resources human beings have on the planet. When a single organization gathers all parties together in one entity, certainly limited resources can be utilized in a better way.
- It can help the global economy to create more jobs as a result of improving international trade. The global economy is a chain of activities, and each activity affects the others – either directly or indirectly. If the international trade is improved, the production and

logistics will also be improved; consequently, more jobs can be created and much buying power will be added to the markets because the income of the new jobs will be spending in the markets again. This will increase the overall demand for the global economy entirely. It is a circle that is connected in a manner so that a similar concept of the supply chain is also applicable to the global economy.

- It can help the global economy to prevent the illegal business. As long as a single database for the legal businesses is available, any illegal business can be recognized very easily. The registration in IRMO will work as prequalification for any company worldwide, and thus any illegal business will not have the opportunity to work or operate on a large scale. Certainly, the illegal businesses will be there always as long as individuals live in this planet. IRMO will play a very important role to reduce the volume of the illegal business significantly.

5.7. Potential obstacles to implement the proposed framework and related IRMO

In this section, the possible and logical criticisms of the developed framework, i.e., IRMO is outlined. This is based on the feedback of the supply chain professionals, during the research and the author's critical thinking. It is important to take this into consideration to see how the potential obstacles can be overcome. The obstacles, which may appear while thinking to establish such a large organization and how it can be overcome, are also outlined in this section. These obstacles are related to business confidentiality, fair competition, and protective policies.

Business confidentiality

The confidential information is a very important subject to any supply chain, which should be considered while trying to check the possible obstacles to IRMO. One of the main obstacles to the personal sharing of information is to maintain the confidentiality of information (Sharma & Kumar, 2017, p. 48).

If some people or countries think that the existence of IRMO will break the confidentiality of the business in each country, they are probably mistaken. For example, there are large websites of e-procurement such as Amazon or E-bay and the companies worldwide present their products without any problem. Despite the fact that these websites are private companies,

they are still for-profit, but IRMO will be a UN agency and non-profit organization. This gives assurance to the companies, that all their information is secured and there will be a very little possibility to abuse the information somehow.

IRMO will not touch the confidential information of any company or country. It is just a data bank gathering all the information in a single portal to enable the companies to act appropriately while outsourcing. No sensitive information can be disclosed, such as the strategies and policies of the companies and how the business is running. IRMO is just a “collaboration tool” for the members of IRMO.

Fair competition

The fair competition is a very vital subject to the global business, especially with the growing trends of outsourcing and globalization (Chen & Guo, 2014). Some people may see the proposed organization IRMO against the fair competition principles. If all the products and prices are presented in a single market in the front of the customers, few companies only can obtain the orders, while the others cannot survive in this market if their products are not competitive enough to win the customers’ orders.

But this is an illusion. However, IRMO should be designed to prevent the monopolization and to allow all the organizations worldwide to compete fairly. To do that, the following points are emphasized here:

- There are already stock exchanges for traditional commodities such as gold, silver, copper, corn and oil, and the prices of such type of commodities are determined based on the demand and supply. There is no much difference between the same products produced in different countries.
- For other products, it has been noticed that each product has special characteristics, determining its identity in terms of quality and price, as well as a very important factor which is the service level offered to the customer. This is sure a unique element changing from one company to another. So, when the customers choose, they will not just choose the lowest price among the presented category, but they will look at all the features of the product before selection.
- The choices of the people are different and what somebody likes, it may not be recommended by another. So each product in the data base of IRMO will have its

market and customers. The winning companies in the market are those who can generate attractive features to the customers better and faster than the other competitors (Banchuen et al., 2017).

- The visibility of all the information about the products and their suppliers will push always all the companies to do “continuous improvement” to optimize their products and specialize their services, so they can get more customers always (Sharma & Kumar, 2017).

When the above points are considered, it can be realized that IRMO is not against the fair competition at all, but it can play a supportive role in the fair competition in this regard.

Protective policies

Most of the countries currently – or even all of them – do their best to support the local products, and this is normal practice to support the economy of any country (Dunn, 2015). Some countries implement protective policy through higher customs tariff duty for the imported products, and thus they give a competitive advantage for their products in the local markets (Diakantoni & Escaith, 2014). Some countries use to implement another technique of the protective policies through giving financial aids directly to some industries for those industries to support the macroeconomic status of the country entirely such as what the USA did with the automotive industry during the financial crisis in 2008 (Durusoy et al., 2016).

The protective policies can be seen as an obstacle for establishing IRMO because all the products will compete in one market with less control of the governments. But in fact, this kind of competition can help the countries to control the protective policy very well, because they can see the situation of the global market in a single portal, and consequently, they can determine better, if a protective policy is needed or not, and how it can be implemented.

Any protective policy will affect the competitiveness of the products in the portal of IMRO, however, the customers will have the opportunity to review everything before deciding on the purchase of a product. The price of the product is an essential element alongside quality, taxes, shipping cost, customs duty and shelf life which also must be considered (Banchuen et al., 2017).

The future is not about protective policies, but rather for the ability of the product to compete in the global markets without any support (Sulaymonov, 2017). The protective policy

is not the solution, but, a mediating action. The globalization trends of the markets are expected to break the borders with time, and the GATT agreement is initiated for this purpose which is being implemented currently gradually until the point (no borders for products) is reached (Baldwin, 2016).

6. Conclusions

6.1. Main cognitions

Cognitions have revealed that any supply chain cannot operate successfully without a clear strategy. The lean strategy is important for waste elimination; however, it has been criticized for not providing enough attention to the factor of “time” in the supply chain. Whereas, the agile strategy is developed for achieving speed and flexibility in the supply chain, but it has been criticized for not providing attention to controlling the costs in the supply chain. The merge between lean and agility resulting in the “leagility” strategy has utilized the benefits of both strategies while overcoming the weaknesses.

In general, business is an old practice happening since the beginning of mankind. In the entire history, people have been involved in developing new ways of doing business to achieve the maximum possible profit. For this purpose, supply chains and supply chain management were originally initiated. In the last decades, the supply chain has evolved dramatically through innovating new techniques for operations, such that this evolution has been dependent on the evolution of information technology, particularly in the last 20 years.

Initially, the activities of the supply chain were performed in the frame of several functions in the organizations, however, later, the concept of supply chain evolved through various tools, including “efficient consumer response”, “quick response”, “material resource planning”, “material resources planning II” and “enterprise resource planning”. All in all, the supply chain and supply chain managed are the most developed concepts.

The development of the supply chain concept has developed the significance of the presence of a strategy for the supply chain. This trend is increasing with the increase in the business relationships of the supply chain as a result of globalization. The continuous changes in the global markets have forced the researchers to seek for the best practices of supply chain management.

Currently, most of the researchers have observed the changes within the external business environment and are investigating the impact of these changes into the supply chain practice. In line with these cognitions, researchers are developing new techniques, models and frameworks for helping the supply chain to achieve the best practices aligned with the current changes occurring in the markets.

This research is not following the same approach, but, rather, it takes a proactive approach. It is aimed at predicting the scenarios of the future changes of the external business environment prior to its occurrence, thus, being prepared for utilizing the strategies perfectly with the changes in the global markets. This approach is the uniqueness of the research, however, due to the rapid changes in the business environment, there is no time for the researchers to study the changes and develop the models for handling the new changes, so in advance, the best strategy lies in being prepared for handling the change.

Since the research is related to the future changes of the global markets, therefore, to investigate the future, the history of the supply chain must be known. The research also discussed how the supply chain initiated and evolved until today. Thus, it is significant that every supply chain must implement a strategy which must be suitable and aligned with the requirements of the markets.

In the scenarios where the cost is a major concern, the lean strategy is required for eliminating the wastes from the supply chain, while, in the case where time is a priority, the agile strategy must be implemented for driving the supply chain faster while being aligned with the changes in the markets.

At a later stage, the evolution in the supply chain concept has reached to the leagile strategy which aims to merge the benefits of both lean and agility into single strategy i.e. leagility, while avoiding their weakness. This is mainly performed through a trade-off between the lean and agile strategies as per the situations facing the supply chain and utilizing the postponement technique.

These strategies are very useful for the supply chains as they play a significant role in drawing the best practices of supply chain management. However, there are many factors and future events whose occurrence will disturb the supply chain. Such that they may change the future of the supply chain concept, thus, making the current strategies ineffective for addressing the changes.

In this research, an insight about the history of the supply chain management was provided which is important to anticipate the future, along with detailing the utilization of current supply chain strategies, i.e. lean, agility and leagility. Particularly, the utilization of these strategies was subject to examination through specific scenarios planning of the future, thus, assessing whether these strategies can handle the scenarios.

To perform this, a detailed literature review was performed for understanding the history of the supply chain including the creation and formation of supply chain strategies. Besides, the core concept of lean, agility and leagility along with their implications on the supply chain was also been studied. In this regard, specific research methodologies were being used, such that scenario planning was used for developing future scenarios like energy scarcity, new monetary system and the threat of wars. This has been important for anticipating future changes in the global markets and analyzing their reactions towards these changes. Thus, the impact of these scenarios onto the supply chain strategies in terms of their utilization in the future was studied.

Besides the theoretical part of the research, it was significant to undertake practical research by obtaining information from the supply chain professionals who are currently working in the markets. In this regard, interviews were conducted from the supply chain professional to understand the vision of the people related to supply chain strategies, their applicability and suitability for the future, and the expected changes of the global markets. Thus, it was important to know the opinion of the professionals for the future challenges of the markets.

It was found that the supply chain strategies are useful, however, the supply chain professionals are still worried about future challenges. Such that they expressed their concerns mainly related to the global sourcing process which require supporting tools to work better in the future. There is a need for an innovative approach for drawing a new framework of the supply chain management facilitating global collaboration. This new framework will be able to address the difficult times and eliminate the negative consequences that resulted from the developed scenarios.

One of the most important research methods used in this research is the grounded theory with which the codes for all the information were used for reaching the core concept to build the framework. The theoretical saturation has led to the selective code of global collaboration as the core concept and so the proposed framework is built on that idea.

As the concept of supply chain management is fundamentally based on the relationships between the business partners, such that how these partners must interact and collaborate, thus the new proposed framework is focused on this core concept of supply chain management.

Since, it was important to research the current body of knowledge related to “collaboration” so a detailed literature review was performed for this subject to develop a new framework which will assist the supply chain strategies to work better in the future under certain circumstances.

The interviews with the supply chain professionals along with the principles of grounded theory research assisted in the second phase of the research where the framework was developed for the utilization of supply chain strategies under different circumstances and adjacent IRMO. It was proposed that a new organization IRMO must be established under the umbrella of UNs to facilitate the collaboration process between the supply chains worldwide. The collaboration will eventually allow the organization of resources, thus, ensuring to receive the best benefit for all the supply chain globally in a systematic manner affecting the global economy. The IRMO aims to work as the data bank for the legal companies globally, enabling all the parties to interact and collaborate quickly and reliably.

IRMO will utilize the information technology solutions to provide innovative collaborative tools to the companies worldwide, thus, helping the supply chains globally to compete fairly and access the resources easily, quickly and legally. IRMO will play a significant role in changing the future of the supply chain from a “chain of activities” to a “global network”. The technique of outsourcing will vary and methods of operating supply chains will also improve consequently.

After the development of the proposed framework, it was important to listen to the voices of supply chain professionals about their views for the framework in terms of whether this framework can help the supply chain strategies to work better in the future really or not.

In this regard, the second phase of the survey was conducted for testing and validating the proposed framework. A survey was conducted among the supply chain professionals accordingly which found that the proposed framework is useful if it is implemented in the supply chain. The professionals also believed that the framework will help the supply chain strategies to face the future challenges of the global markets. They also proposed some possible modifications and improvements to enhance the robustness of the framework.

The implementation of this approach is believed that the framework with its embedded IRMO will add value to all the supply chains worldwide and represent a supportive tool for global collaboration. Thus, if the innovative tool is added to the current strategies i.e.

lean, agility and leagility then the supply chain strategies can work better to face the difficult times expected in the global markets in the future.

All in all, the key research findings of the dissertation have helped to reinforce the current body of knowledge related to the supply chain strategies utilization, specifically their suitability in the future under different proposed scenarios. This research also extended to discuss the future scenarios affecting these strategies and utilization of these strategies under different scenarios.

The unique concept of this research is the realization that the current known supply chain strategies, lean, agility, and le-agility are required to support to work better in the future. This is, besides, to discover exactly what kind of supportive tool needed for these strategies. This kind of supportive tool has been successfully found in this research where the aim has been to identify a tool for improvement of the global sourcing practice, and based on that idea, a new framework has emerged. The key research findings have been summarized below:

- To run any supply chain successfully, there must be a strategy controlling the approach of doing business in general.
- The lean, agility, and le-agility are useful strategies for modern supply chains.
- One of the most important findings in this research is the instability in the future business environment and the essential need for the supply chain to keep up with the future trends of the markets through the ultimate level of flexibility and supply chain collaboration.
- It is obvious in this research that the supply chain strategies will work better in the specific presented scenarios if they are enhanced with the proposed framework developed especially in this research to improve the approach of global collaboration as well as supply chain strategies and their utilization.

The key scientific finding of this dissertation is that there is a need to support supply chain strategies utilization in the future under different circumstances. In the current circumstances, this support is needed to add value to the supply chain strategies. In the future, this support is essentially needed to evolve the concept of supply chain strategies and to add new dimensions to it.

This support could be in various areas related to the supply chain, but in this research, the feedback of the supply chain professionals, who were interviewed in the frame of grounded theory approach, have shown a specific area of support related to improving the global sourcing process. Therefore, the author tried to contribute here by creating a framework to fulfil this gap. The framework presented in this research represents major scientific finding by discovering the exact need of the supply chain professionals from a practical point of view and linking the same to the supply chain strategies and their utilization. Furthermore, it has been shown how the suggested framework can support the supply chain strategies in the future especially under difficult scenarios.

The proposed framework and its adjacent IRMO are developed to facilitate the “global collaborations”, so the first criteria of this framework are the global trend. The aim was to improve the outcome of the global sourcing process and collaboration entirely. Finally, the most important point is the implication of such improvement of “global collaboration” into the supply chain strategies, which adding value to lean, agility, and leagility and the utilization of these strategies significantly.

6.2. Statement about hypotheses

The importance of hypotheses in this research is very obvious as the hypotheses are related to the predictions, and the core idea of this dissertation is related to predictions of future scenarios and their impact on supply chain strategies’ utilization in the future through the framework and IRMO. Three postulated hypotheses are not designed for constants, but rather than this, they are designed for many variables, especially what it is related to the future scenarios.

Since the variables are measurable, the survey presented in this research was a very useful tool to measure these variables, especially related to the similarities and differences between supply chain strategies’ utilization, various future scenarios, and to measure the ability of these strategies to control the supply chain impeccably in the presented scenarios. The main goal of that process is to test the hypotheses and see if it should be accepted or rejected. When the researcher has clear hypotheses, he/she can reach to the Bayesian ideal consequently (Petzschner et al., 2015).

It has been ensured that these three hypotheses in the current dissertation are very clear and straightforward. This is very important to the quality of the research in order not to discuss vague hypotheses, which may be not clear enough to the reader of the research. This is, in addition to the effect of the unclear hypotheses to the testing process and validating such hypotheses accordingly, especially when the researcher has presented these hypotheses to the supply chain professionals in the third phase of the survey.

Additionally, if there were not enough explicitly in the hypotheses, the respondents will not have the ability to express their opinions, and consequently, the results of the research will not be valid. The in-depth research has been done in this dissertation and it was the most important factor that helped the author to generate the hypotheses.

After presenting the three hypotheses of this research, the researcher has been able to understand the supply chain strategies namely lean, agility, and leagility. The researcher has the clear idea about the future challenges of the global markets and what could happen in the presented scenarios, and what could be the impact of the scenarios into the supply chain strategies and the global business in general.

In the cases of high uncertainty, the researchers use to create many hypotheses (Mourougan, Sethuraman, 2017), but in this dissertation, the researcher has tried to be very specific by incorporating three hypotheses only to stay close to the core subject of the research and not to focus on generic discussion. Despite this, there is uncertainty associated with the subject of the research, as it is related to future scenarios and their impact of the supply chain strategies.

Postulating three hypotheses helped to create the proposed framework accordingly, starting from probabilities to reach to proven hypotheses theoretically and practically. The benefits of these three hypotheses in this research could be summarized as (Ary et al., 2013):

- They helped the author to extend the knowledge of supply chain strategies and provide a good explanation of the possible future scenarios.
- They provided straightforward statements linking the relationships of supply chain strategies utilization and future scenarios and present this relationship in a logical order.
- They helped in keeping the research towards specific findings while researching the subject of the dissertation as they identify the relationships between all the variables

in a systematic manner. Thus, the researcher can focus mainly on the relevant subject and ignore irrelevant information. The hypotheses guide the researcher about the exact information in the research.

- The main benefit of these hypotheses is that they helped the author to have a valid and logical result of this research by proving these hypotheses through a survey instrument. Hence, the researcher has reached to the point of the necessity of having a new framework for supply chain based on facilitating the global sourcing process.

Statement about hypothesis 1

The developed framework for managing future supply chains will enable improving management of supply chain, according to the predicted scenarios.

In this hypothesis, the predicted scenarios represented special conditions to the supply chain and in which supply chain management can occur in various circumstances, with the completely unstable business environment due to various economic and political factors. This hypothesis claimed that the developed framework can help the future supply chains to manage these scenarios through the significant improvement of the global sourcing process.

The predicted scenarios have global nature; they are not limited to a specific country or part of the world. To overcome this, the established framework has also a global nature to help to improve the management of the supply chain entirely.

To prove practical significance, the third phase of the research includes collecting interview responses of supply chain professionals. In this stage, the framework was presented to the supply chain professionals, and their opinions about the framework were collected.

The confirmation of this hypothesis is achieved as a result of the deep literature review of the subject (research stage 1), recording all the information and coding them using the grounded theory to emerge the framework based on that (research stage 2), and consequently when the framework was presented to the professionals to collect their opinions (research stage 3). The cognitions reveal, that the framework, gained supply chain professionals satisfaction as they believe, that it addresses their concerns which they expressed in their interviews (research stage 2), specifically related to the global sourcing and the impact of that in the future challenges facing the supply chain. This particular achievement of the proposed framework was very important to support hypothesis 1.

This is in addition to the suitability of the framework to the new trends of globalization now and extending the business partners worldwide. The core concept of the framework is also focused on achieving a higher level of global collaboration between the supply chains and organizing the available resources to all the countries worldwide perfectly.

The supply chain professionals confirmed that this proposed framework will help to achieve the best utilization lean, agility, and leagility and will support them to overcome the (un)expected changes of the global markets according to the predicted scenarios. The reason for this result is due to the ability of the framework to facilitate the sourcing process globally, which was the main concern of the supply chain professionals. It helps to advance the global collaboration between the supply chains, which will have a direct impact to support the supply chain strategies.

Statement about hypothesis 2

For the management of supply chains, a framework is needed, which will support the improvement of current and future supply chain management.

The supply chain management is a dynamic field, it is in continuously changing and evolving, while seeking always for the “best practice”. Any proposal for improving the supply chain practice is well recommended. As the business environment is changing continuously and rapidly, the supply chains need to keep up with these changes in the future.

The current research has presented an idea that a framework is needed to support the current and future supply chain management while explaining why the proposed framework is needed - especially in the future - to support the utilization of lean, agility, and leagility strategies.

One of the most important reasons, why the supply chains require a new framework to improve the current and future practice, is the evolution of the information technology, which has dramatically changed the ways of communications and is continuously developing new applications. As the information technology changed our life significantly, it is also affecting the supply chain management, as it is at the end part of life and human activities. These changes require the supply chains to adopt new approach and practices while using the most advanced tools. It is important to note that this can only be achieved by developing a new framework.

Similarly, like the two other hypotheses in this research, the current hypothesis has theoretical nature and practical implication. Theoretically, after researching the current status of utilization of supply chain strategies, this hypothesis was assuming there is a need for a new supportive framework, especially in the future, where big challenges might be encountered by the supply chains.

Practically, to validate this hypothesis, it was important to gather opinions from supply chain professionals, who confirmed that the currently known supply chain strategies are useful for the business without any doubt, but they are not fully satisfied with the ability of these strategies to appropriately work in the future. So, during the interviews (research stage 2), they suggested to focus on the global sourcing process and improving the global collaboration to support the supply chain strategies. Based on this feedback, the proposed framework is created to fill in this gap.

Based on the above cognitions hypothesis 2 can be supported, which suggests that a new framework is needed to support the utilization of supply chain strategies. This aspect acted as a trigger for the author to create the proposed framework and its related IRMO to fulfil the gap that was highlighted by the supply chain professionals during the interviews.

Statement about hypothesis 3

The continuous changes and development of business environment require supply chains to utilize adequate business strategies for managing supply chains.

This hypothesis addresses the importance of the business strategies to the supply chain, not only to apply any strategy but essentially to make sure that these strategies are adequate for the situations it faces.

It has been proven in this research that the businesses must continually improve their supply chain strategies to keep up with the evolving market conditions. Moreover, fixing specific strategies on long-term, without observing the external business environment and its development, will not help any business to be successful in the current time as well as in the future.

For managing supply chains in the current dynamic business environment, there must be an adequate strategy. However, the selection of the strategy should be made after considering

the external business environment. In other words, the supply chain should look first to the business environment before deciding or choose a particular strategy. Additionally, the supply chain should continuously review the selected strategy to ensure that it is matching with the changing business environment. This hypothesis is addressed through the literature review, which showed the importance of the strategy to the supply chains in general while illustrating how it has become vital for the success of the business.

The practical side of this hypothesis is addressed through the interviewing process that took place in the second phase of the research. The interview responses showed the real understanding of supply chain professionals about the supply chain strategies and their future implications. This is in addition to their emphasis on having a dynamic nature of any strategy that could easily handle the changes that might occur in the business environment. This trend is going to increase in the future, mainly due to the continual changes that are happening in the global business environment. Thus, it is important to ensure the adoption of the appropriate strategy that is not only suitable for today's business environment but also for the future.

6.3. Recommendations for further research

In any research work, it is important to include the future research section to elaborate on the areas that could be further explored. This section aims to open the door for the future researchers to find out much more in such a topic and enrich the academic knowledge accordingly. The most potential four areas of future research are discussed as follows:

Supply chain strategies: As the global markets are moving dynamically, further researches are required to recognize the recommended strategies that are suitable for future market changes. Accordingly, the utilization of supply chain strategies is a wide topic for future research. The current study has presented lean, agility, and leagility; however, other researchers could study all the aspects related to the supply chain strategies from different scopes – associated with current and future market conditions.

Global collaboration: The global collaboration is considered as a central topic for the future supply chain, so it could be a subject for further research. The researchers are encouraged to develop new approaches to global collaboration and innovative ways to work with other business partners worldwide. However, improving global collaboration will help to improve the

supply chain practice directly, which could be the aim of any business. Since information technology is in continuous development, this could be useful to evolve the collaboration in the supply chain. In particular, new software and information technology could be utilized to significantly facilitate collaboration.

Future scenarios: This is a very open topic for future research since the future is vague. The researches should try to develop future scenarios while anticipating the status of the supply chain practice within these scenarios. The current dissertation is limited to three scenarios only; however, the researches could work on more scenarios. The importance of creating more scenarios is that it will help the researchers to prepare the supply chains for different scenarios, even before their occurrence. In turn, this can act as a precautionary step to protect the supply chains from any sudden future event.

In 2020, the global economy has been severely impacted due to COVID-19 pandemic situation. Therefore, this could be an important topic for future research to study the impact of COVID-19 on global supply chains. This would also assist in understanding what the supply chains should do if other such viruses appear in the future.

IRMO future research: If the proposed IRMO is established, it will be highly recommended to have further research about the impact of the practical activities of this organization on the supply chain management. It also will be recommended to research the impact of the organization on the entire global economy. This will be a very rich topic for future researches - related to the activities of the organization, processes, areas of potential improvements, and best practice.

Finally, as IRMO is a new idea, more researches could be conducted in the context of its improvement and implementation.

References

1. Aberdeen group, (2006), *"The Lean Supply Chain Report"*, Aberdeen Group, Inc.
2. Adamczyk, S., Bullinger, A.C. and Möslin, K.M., (2012). "Innovation contests: A review, classification and outlook". *Creativity and Innovation Management*, 21 (4), PP. 335 - 360.
3. Adams, F.G., Richey, R.G., Autry, C.W., Morgan, T.R. and Gabler, C.B., (2014). "Supply chain collaboration, integration, and relational technology: How complex operant resources increase performance outcomes". *Journal of Business Logistics*, 35 (4), PP. 299 - 317.
4. Adnan, A., Safa, M., Lung, A., Muppala, S., (2013) "Improvement of outsourcing by employing Lean Philosophy", *International Journal of Enhanced Research In Science Technology & Engineering* , 2 (3), PP. 2319-7463
5. Ahmad, S. and Ullah, A., (2013). "Driving forces of collaboration in supply chain: A review". *Interdisciplinary Journal of Contemporary Research in Business*, 5 (7), PP. 39 - 69.
6. Akkermans, H. Bogerd, P. Yucesan, E. Van Wassenhove, L. (2003) "The impact of ERP on supply chain management: Exploratory findings from a European delphi study", *European Journal of Operational Research*, 146 (2), PP. 284 - 301.
7. Akhilesh, B. (2011) "Impact of Supply Chains Agility on Customer Satisfaction", *International Conference on E-business, Management and Economics*, 3, PP. 325 – 329.
8. Ali, R. Barrdear, J. Southgate, J. (2014). "Innovations in payment technologies and the emergence of digital currencies". *Bank of England Quarterly Bulletin*. 52 (3). PP. 262 - 275.
9. Alicke, K., Forsting, M., (2017) *Supply Chain Management Practice*, McKinsey & Company, Inc., Birkenwaldstraße 149, 70191 Stuttgart, Germany
10. Amer, M. Daim, T. Jetter, A. (2013) "A review of scenario planning", *Futures*, 42, PP 23 – 40.
11. Andreou, P.C., Louca, C. and Panayides, P.M., (2016). "The impact of vertical integration on inventory turnover and operating performance". *International Journal of Logistics Research and Applications*, 19 (3), PP. 218 - 238.
12. Andrianopoulos, A., (2015), *Essential Steps for Crisis Management and Crisis Containment*, available from

http://www.acg.edu/ckeditor_assets/attachments/1568/essential_steps_for_crisis_management_and_crisis_containment.pdf.

13. Angkiriwang, R., Pujawan, I.N. and Santosa, B., (2014). "Managing uncertainty through supply chain flexibility: reactive vs. proactive approaches". *Production & Manufacturing Research*, 2 (1), PP. 50 - 70.

14. APICS, (2016), SUPPLY CHAIN STRATEGY REPORT: MAKE THE MOST OF SUPPLY CHAIN STRATEGY, APICS supply chain council, available from <http://www.apics.org/docs/default-source/toc-pdfs/strategy-report-short.pdf>

15. Aulia, S.A., Sukati, I. and Sulaiman, Z., (2016). "A review: Customer perceived value and its Dimension". *Asian Journal of Social Sciences and Management Studies*, 3(2), PP.150-162.

16. Arica, E., Strandhagen, J. O., & Hvolby, H. H. (2012) "Handling unexpected events in production activity control systems". In *IFIP International Conference on Advances in Production Management Systems* (PP. 136-143). Springer Berlin Heidelberg.

17. Ary, D., Jacobs, L.C., Irvine, C.K.S. and Walker, D., (2013). Introduction to research in education. Cengage Learning.

18. Awasthi, A. and Grzybowska, K., (2014). "Barriers of the supply chain integration process. In Logistics Operations", *Supply Chain Management and Sustainability* (PP. 15-30). Springer International Publishing.

19. Baker, B. L., and Stock, J. R. (2015), "THE IMPORTANCE OF HISTORICAL RESEARCH IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT: A BIOGRAPHICAL PERSPECTIVE", available from file:///C:/Users/waleed%20Rashad/Downloads/THE_IMPORTANCE_OF_HISTORICAL_RESEARCH_IN_LOGISTICS.pdf

20. Bala, K., (2014). "Supply chain management: Some issues and challenges-A Review". *International Journal of Current Engineering and Technology*, 4 (2), PP. 947 - 953.

21. Baldwin, R., (2012) Global supply chains: why they emerged, why they matter, and where they are going., CTEI WORKING PAPERS, available from http://graduateinstitute.ch/files/live/sites/iheid/files/sites/ctei/shared/CTEI/working_papers/CTEI-2012-13.pdf

22. Baldwin, R., (2016). "The World Trade Organization and the future of multilateralism". *The Journal of Economic Perspectives*, 30 (1), PP. 95 - 115.
23. Ballou, R., (2007) "The evolution and future of logistics and supply chain management", *European Business Review*, 19 (4), PP. 332 – 348.
24. Ballou, R. (1978). *Basic Business Logistics*, Prentice-Hall.
25. Banchuen, P., Sadler, I. and Shee, H., (2017). "Supply chain collaboration aligns order-winning strategy with business outcomes". *IIMB Management Review*, 29, PP. 109 - 121.
26. Barash, D.P. and Webel, C.P., (2017). *Peace and conflict studies*. Sage Publications.
27. Barratt, M., (2004) "Understanding the meaning of collaboration in the supply chain", *Supply Chain Management an International Journal*, 9 (1) PP. 30 - 42.
28. Barry, J., (2004) "Supply chain risk in an uncertain global supply chain environment", *International Journal of Physical Distribution & Logistics Management*, 34 (9), PP. 695 – 697.
29. Bask, A., (2001) "Relationships amongst TPL providers and members of supply chains: A strategic perspective", *The Journal of Business and Industrial Marketing*, 16 (6), PP 470 - 486.
30. Basodan, H., (2016) "Process View of a Supply Chain", *International Journal of Scientific & Engineering Research*, 7 (4), PP. 663 -668.
31. Berg, B. L. (2001). *Qualitative research methods for the social sciences*. Needham Heights, MA: A Pearson Education Company.
32. Berlec, T., Kušar, J., Žerovnik, J. and Starbek, M., (2014). "Optimization of a product batch quantity". *Strojniški vestnik-Journal of Mechanical Engineering*, 60 (1), PP.35 - 42.
33. Bhamu, J. and Singh Sangwan, K., (2014). "Lean manufacturing: literature review and research issues". *International Journal of Operations & Production Management*, 34 (7), PP. 876 – 940.
34. Bhekithemba, V., and Lemohang, S., (2015) "An Analysis on Agile Manufacturing System", *International Journal of Industrial Engineering (SSRG-IJIE)*, 2 (3), PP. 36 – 40.
35. Blecker, T. ed., (2014). "Innovative methods in logistics and supply chain management: current issues and emerging practices" (Vol. 19). epubli.

36. Böhm, A., (2004). "Theoretical coding: text analysis in grounded theory." Dans U. Flick, E. von Kardorff, & I. Steinke (Éds), *A companion to qualitative research* (pp. 270-275).
37. Booth, R., (1996) "Agile Manufacturing", *Engineering Management Journal*, 6 (2), PP. 105 - 112.
38. Bordoloi, Sanjeev K., Cooper, William W., Matsuo, Hirofumi, (1999). "Flexibility, adaptability, and efficiency in manufacturing systems", *Production and Operations Management*, 8 (2), PP. 133 - 149.
39. Borges Lopes, R., Freitas, F. and Sousa, I., (2015). "Application of Lean Manufacturing Tools in the Food and Beverage Industries". *Journal of technology management & innovation*, 10 (3), PP. 120 - 130.
40. Botta-Genoulaz, V., Campagne, J.P., Llerena, D. and Pellegrin, C. eds., (2013). Supply chain performance: collaboration, alignment, and coordination. John Wiley & Sons.
41. Bowersox, D., Closs, D., (1996) *Logistical management, The Integrated Supply Chain Process*, McGraw-Hill, New York.
42. Bower, J., Hout, T., (1988) "Fast-cycle capability for competitive power", *Harvard Business Review*, 66 (6), PP. 110 - 118.
43. Boyce, W.S., Mano, H. and Kent, J.L., (2016). "The Influence of Collaboration in Procurement Relationships". *International Journal of Managing Value and Supply Chains (IJMVSC)*, 7 (3). PP. 1 -18
44. Brauner, P., Runge, S., Groten, M., Schuh, G., and Ziefle, M. (2013). "Human factors in supply chain management". In *International Conference on Human Interface and the Management of Information* (pp. 423-432). Springer Berlin Heidelberg.
45. Brecha, R.J., (2013). "Ten reasons to take peak oil seriously". *Sustainability*, 5 (2), PP. 664 - 694.
46. Bruce, M., Daly, L., (2011) "Adding Value: Challenges for UK apparel supply chain management", *Production Planning and Control*, 22, (3), PP. 210 – 220.
47. Burrell, G., Morgan, G., (1979) *sociological paradigms and organizational analysis*, Ashgate publishing company, Hants, UK.

48. Burt, D., Dobler, D. and Starling, S. (2003), *World Class Supply Management: The Key to Supply Chain Management*, 7th Edition, McGraw-Hill Irwin, New York.
49. Busch, J., (2010) *Terrorism and the Supply Chain — Strategies for Coping With a Form of Supply Risk We Can't Ignore*, available from <http://spendmatters.com/2010/11/01/terrorism-and-the-supply-chain-strategies-for-coping-with-a-form-of-supply-risk-we-cant-ignore/>
50. Cai, Y. and Zhu, D., (2013). *A Theoretical Exploration for Supply Chain Leagility Capability*. In *System Sciences (HICSS)*, 2013 46th Hawaii International Conference on (PP. 4126 - 4135). IEEE.
51. Canadian Electricity Association, (2013), *Power for the Future: Electricity's Role in a CANADIAN ENERGY STRATEGY*, available from <http://www.electricity.ca/media/ReportsPublications/PowerForTheFutureElectricityRoleCanadianEnergyStrategyE>
52. Cannon, J., Homburg, C., (2001) "Buyers-supplier relationships and customer firm costs", *Journal articles of Marketing*, 65 (1), PP. 29 - 44.
53. Cao, M. and Zhang, Q., (2013). *Supply chain collaboration: roles of interorganizational systems, trust, and collaborative culture*. Springer Science & Business Media.
54. Caro and Martínez-de-Albéniz, (2010), "The Impact of Quick Response in Inventory-Based Competition", *Manufacturing & Service Operations Management*, 12 (3), PP. 409 – 429.
55. Catherine, M., Panagiotis, T. , Damianos, P., Sakas, c., (2014) "The impact of Information Technology on the development of Supply Chain Competitive Advantage", *Procedia-Social and Behavioral Sciences*, 147, PP. 586 - 591.
56. Cebi F., Bayraktar D., (2003) "An integrated approach for supplier selection", *Logistics Information Management*, 16., (6) , pp 395 – 400.
57. Chandra, C., Kumar, S., (2001), "Enterprise architectural framework for supply-chain integration", *Industrial Management and Data Systems*, 101 (6), PP. 290 - 304.
58. Chang, K. and Lee, C., (2018). "North Korea and the East Asian Security order: competing views on what South Korea ought to do". *The Pacific Review*, 31 (2), PP. 245 - 255.
59. Chase, R., Aquilano, N., (1995) *Production and Operations Management*. R.D. Irwin Inc.

60. Chen, T., (2013). "A systematic cycle time reduction procedure for enhancing the competitiveness and sustainability of a semiconductor manufacturer". *Sustainability*, 5 (11), PP. 4637 - 4652.
61. Chen, W. and Shi, L., (2015). Nested Partitions for Large-Scale Optimization in Supply Chain Management. In *Supply Chain Management and Logistics: Innovative Strategies and Practical Solutions* (PP. 123-150). CRC Press.
62. Chen, J. and Guo, Z., (2014). "Strategic sourcing in the presence of uncertain supply and retail competition". *Production and Operations Management*, 23 (10), PP.1748 - 1760.
63. Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S. and Zhu, W., (2017). "Supply chain collaboration for sustainability: A literature review and future research agenda". *International Journal of Production Economics*.
64. Childerhouse, P. and Towill, D., (2000) "Engineering supply chains to match customer requirements", *Logistics Information Management*, 13 (6), PP. 337 - 345.
65. Chopra S., Meindl's, (2001) *Supply Chain Management: Strategy, Planning, and Operation*, 3rd ed, Prentice Hall, Englewood Cliffs, NJ.
66. Chopra, S. and Sodhi, M.S., (2004). "Managing risk to avoid supply-chain breakdown". *MIT Sloan management review*, 46 (1), PP.53 – 61.
67. Chopra, S. and Sodhi, M.S., (2014). "Reducing the risk of supply chain disruptions". *MIT Sloan Management Review*, 55 (3), PP. 73 - 80.
68. Choudhary, S. K., & Jadoun, R. S. (2016). "Study about the Types of Information Technology Service for Supply Chain Management". In *Proceedings of the World Congress on Engineering and Computer Science* (Vol. 2), available from http://www.iaeng.org/publication/WCECS2016/WCECS2016_pp1007-1012.pdf
69. Christiansen, P., Kotzab, H., Mikkola, J., (2007) "Coordination and sharing logistics information in leagile supply chains", *international journal of Procurement Management*, 1 (1/2), PP. 79 – 96.
70. Christopher, M., (1992), *Logistics and Supply chain management*, Pitman Publishing, London.

71. Christopher. M., Towill. D., (2001), "An Integrated Model for the Design of Agile Supply Chains", *International Journal of Physical Distribution and Logistics Management*, 31 (4), PP. 235 - 246.
72. Christopher. M., Towill. D., (2002), "Developing Market Specific Supply Chain Strategies ", *International Journal of Logistics Management*, 13, (1), PP. 1 - 14
73. Christopher, M., (2000) "The Agile Supply Chain. Competing in Volatile Markets", *Industrial Marketing Management*, 29 (1), PP. 37 - 44.
74. Christopher, M., Towill, D., (2000) "Supply Chain Migration from lean and functional to agile and customized", *International journal of Supply Chain Management*. 5 (4), PP. 206 - 213.
75. Christopher, M., (2005) *Logistics and Supply Chain Management: creating value, adding networks*, 3rd edition, Pearson Education Limited.
76. Christopher, M., (2011) *Logistics and Supply Chain Management*, 4th edition, Pearson Education Limited.
77. Christopher, M. and Ryals, L.J., (2014). "The supply chain becomes the demand chain". *Journal of Business Logistics*, 35 (1), PP. 29 - 35.
78. Christopher, M., (1998) "Relationships and alliances, embracing the era of network competition", in John Gattorna, 'Strategic Supply Chain Management', Gower Press, Aldershot Hampshire, UK.
79. Clancy, T. and Gresham, J., (2001). *Special forces: A guided tour of US Army Special Forces (Vol. 7)*. Penguin.
80. Cohen, F., (2006). *World War 3: We are losing it and most of us didn't even know we were fighting in it-Information Warfare Basics*. Fred Cohen & Associates.
81. Cohen, L., Manion, L. and Morrison, K., (2007). *Research methods in education*. Routledge.
82. Cohen, M.A. and Lee, H.L., (2020). "Designing the right global supply chain network". *Manufacturing & Service Operations Management*, 22 (1), PP. 15 – 24.

83. Collin J., Lorenzin D., (2006) "Plan for supply chain agility at Nokia", *International journal of physical distribution and logistics*, 36 (6), PP 418 – 430.
84. CONSTĂNGIOARĂ, A., FLORIAN, G.L. and BRAD, O.E., (2015) "COMPARATIVE STUDY OF LEAN AND AGILE ORGANIZATIONS. EVIDENCE FROM ROMANIA". *PROCEEDINGS OF THE 9th INTERNATIONAL MANAGEMENT CONFERENCE*, November 5th-6th, 2015, BUCHAREST, ROMANIA
85. Constantin Manuel and Oana DUMITRAȘCU, (2014), OUTSOURCING WITHIN A SUPPLY CHAIN MANAGEMENT FRAMEWORK, THE 8th INTERNATIONAL MANAGEMENT CONFERENCE, "MANAGEMENT CHALLENGES FOR SUSTAINABLE DEVELOPMENT", November 6th-7th, 2014, BUCHAREST, ROMANIA, available from <http://conferinta.management.ase.ro/archives/2014/pdf/31.pdf>
86. Corniani, M., (2008). "Push and pull policy in market-driven management". *Symphonya: Emerging Issues in Management*, (1), pp.45-64.
87. Cook, T., (2006) *Global Sourcing Logistics: How to Manage Risk and Gain Competitive Advantage in a Worldwide Marketplace*. AMACOM.
88. Coyle, J.J., Gibson, B.J., Langley, C.J. and Novack, R.A., (2013). *Managing supply chains: A logistics approach*. South-Western Cengage Learning.
89. Cox, A., Lamming, R., (1997) "Managing supply in the firm of the future", *European Journal of Purchasing and Supply Management*, 3, PP. 53 - 62.
90. Creswell, J. W. (1998), "Qualitative Inquiry and Research Design: Choosing Among Five Research Traditions", Sage Publications, Thousand Oaks.
91. Crowe, T., (1992), Integration is not synonymous with flexibility. *International Journal of Operations & Production Management*, 12(10), 27-35.
92. Croxton, K.L., Garcia-Dastugue, S.J., Lambert, D.M. and Rogers, D.S., (2001). "The supply chain management processes". *The International Journal of Logistics Management*, 12 (2), PP.13 - 36.
93. Cruijssen, F. (2006), *Horizontal Cooperation in Transport and Logistics*. PhD Thesis: Universiteit van Tilburg. The Netherlands.

94. Crumbly, J., and Fryling, M. (2013). "Rocky relationships: Enterprise resource planning and supply chain management". *Journal of Information Systems Applied Research*, 6 (2), PP. 31 - 40.
95. Cruz, A.V., (2015). Relationship between product quality and customer satisfaction, Walden Dissertations and Doctoral Studies.
96. Cucchiella, F. and D'Adamo, I., (2013). "Issue on supply chain of renewable energy". *Energy Conversion and Management*, 76, PP. 774 - 780.
97. Cuddington, John T., Daniel Jerrett, (2008) "Super Cycles in Real Metals Prices?" *IMF Staff Papers*, 55, (4), PP. 541 - 565.
98. C.Y. Lam, S.L. Chan, W.H. Ip and C.W. Lau, (2008) "Collaborative supply chain network using embedded genetic algorithms", *Journal of Industrial Management and Data Systems*, 108 (8), PP. 1101 - 1110.
99. Dabic, M., Potocan, V., Nedelko, Z., & Morgan, T. R. (2013). "Exploring the use of 25 leading business practices in transitioning market supply chains". *International Journal of Physical Distribution & Logistics Management*, 43 (10), PP. 833-851.
100. Dadkhah, K. (2009), *the Evolution of Macroeconomic Theory and Policy*, C Springer-Verlag Berlin Heidelberg.
101. Dash, A.K., (2013) "competitive advantage: its importance and impact on design of strategy". *International Journal of Application or Innovation in Engineering & Management*, 2 (12), PP. 7 – 11.
102. David, Y. (2014). *Is bitcoin a real currency? An economic appraisal*. New York University Stern School of Business and National Bureau of Economic Research.
103. Davies, G., (2010). *History of money*. University of Wales Press.
104. D'Avino, M., De Simone, V., and Schiraldi, M. M. (2014) "Revised MRP for reducing inventory level and smoothing order releases: a case in manufacturing industry", *Production Planning & Control*, 25 (10), PP. 814 - 820.
105. De Leeuw, E.D., Hox, J.J. and Dillman, D.A., (2008). *International handbook of survey methodology*. Taylor & Francis Group/Lawrence Erlbaum Associates.

106. Denzin, N., Lincoln, Y., (1984), Handbook of qualitative research, Newbury park, Sage publications.
107. De Treville, S., Bicer, I., Chavez-Demoulin, V., Hagspiel, V., Schürhoff, N., Tasserit, C. and Wager, S., (2014). *Valuing lead time. Journal of Operations Management*, 32(6), PP.337-346.
108. Deveshwar, A. and Rathee, R. (2010) "Challenges for Supply Chain Management in Today's Global Competitive Environment", *International Review of Business Research Papers*, 6 (2), PP. 194 – 203.
109. Devor, R., Graves, R., Mills, J., (1997) "Agile manufacturing research: accomplishments and opportunities", *IIE Transactions*, 29, PP. 813 – 823.
110. Diakantoni, A. and Escaith, H., (2014). "Trade in Tasks, Tariff Policy and Effective Protection Rates" *WTO Working Paper Series*, 2014-22. Available from https://www.wto.org/english/res_e/reser_e/ersd201422_e.pdf
111. Dobija, M. (2014). "The Global Currency Area a Way to Constructively End the Era of Reserve Currency". *Modern Economy*, 05 (04), PP. 289 - 302.
112. Dornier, P., Ernst, R., Fender, M., Kouvellis, P., (1998), *Global Operations and Logistics: Text and Cases*, Wiley & Sons, Inc., New York
113. Douglas M., Martha C.Cooper., Janus D. Pagh, (1998) "supply chain management: implementation issues and research opportunities", *The international journal of logistics management*, 9 (2). PP 1 – 19.
114. Drezner, S.M. and Hillestad, R.J., (1982). *Logistics models: evolution and future trends* (No. RAND/P-6748). RAND CORP SANTA MONICA CA.
115. Dunn, B. (2015). *Neither Free Trade nor Protection: A critical political economy of trade theory and practice*. Edward Elgar Publishing.
116. DURAN, C. and AKÇİ, Y, (2015) "IMPACT OF COMPETITIVE STRATEGIES AND SUPPLY CHAIN STRATEGIES ON THE FIRM PERFORMANCE UNDER ENVIRONMENTAL UNCERTAINTIES", *International Journal of Economics, Commerce and Management*, III (1), PP. 1 – 33.

117. Durusoy, S., Sica, E. and Beyhan, Z., (2016). "Economic Crisis and Protectionism Policies: The Case of the EU Countries". *International Journal of Humanities and Social Science*, 5 (6/1), PP. 57 - 68.
118. Dyer, J., Singh, H., (1998) "The relational view: co-operative strategy and sources of interorganisational competitive and advantage", *Academy of Management Review*, 23 (4), PP. 60 - 79.
119. Emmett, S. and Crocker, B., (2016). *The relationship-driven supply chain: creating a culture of collaboration throughout the chain*. CRC Press.
120. Eng, T., (2005) "The influence of a firm's cross-functional orientation on supply chain performance", *the international Journal of Supply Chain Management*, 41 (4), PP. 4 -16.
121. Enyinda, C.I., Ogbuehi, A. and Briggs, C., (2008). "Global supply chain risks management: A new battleground for gaining competitive advantage". *Proceedings of ASBBS*, 15 (1), PP. 278 – 292.
122. European Union, (2019), *Energy, transport and environment statistics, 2019 edition*, Printed by Imprimeries Bietlot Frères in Belgium, available from <https://ec.europa.eu/eurostat/documents/3217494/10165279/KS-DK-19-001-EN-N.pdf/76651a29-b817-eed4-f9f2-92bf692e1ed9>
123. EY, (2013), *Global oil and gas reserves study*, available from [http://www.ey.com/Publication/vwLUAssets/EY_-_Global_oil_and_gas_reserves_study_2013/\\$FILE/EY-Global-oil-and-gas-reserves-study-2013.pdf](http://www.ey.com/Publication/vwLUAssets/EY_-_Global_oil_and_gas_reserves_study_2013/$FILE/EY-Global-oil-and-gas-reserves-study-2013.pdf)
124. Fan, D., Li, Y. and Chen, L., (2016). "Configuring innovative societies: The crossvergent role of cultural and institutional varieties". *Technovation*, 66, PP. 43 - 56.
125. Fawcett, S., Wallin, C., Allred, C., Fawcett, A., & Magnan, G. M. (2011) "Information technology as an enabler of supply chain collaboration: a dynamic-capabilities perspective". *Journal of Supply Chain Management*, 47 (1), PP. 38 - 59.
126. Fayezi, S., Zutshi, A. and O'Loughlin, A., (2016). "Understanding and development of supply chain agility and flexibility: a structured literature review". *International Journal of Management Reviews*. Vol 00, PP. 1 – 30.

127. Fetterman, D.M., (1988). Excellence and equality: A qualitatively different perspective on gifted and talented education. SUNY Press.
128. Fleming, D., (2016). Lean Logic: A Dictionary for the Future and how to Survive it. Chelsea Green Publishing.
129. Fischer, S., (2003) "Globalization and its challenges", *The American Economic Review* , 93, (2), PP. 1 - 30.
130. Freeman, O., (2009), Scenario Planning. Neville Freeman Agency. Australia.
131. Fredendall, L., and Hill E., (2001), Basics of Supply Chain Management, St Lucie Press, New York.
132. Ganguly, A., Nilchiani, R. and Farr, J.V., (2009). "Evaluating agility in corporate enterprises". *International Journal of Production Economics*, 118 (2), PP. 410 - 423.
133. Gebhardt, G.F., Carpenter, G.S. and Sherry Jr, J.F., (2006). "Creating a market orientation: A longitudinal, multifirm, grounded analysis of cultural transformation", *Journal of marketing*, 70(4), PP.37-55.
134. George, J., (2008), "Creativity in Organizations", *The Academy of Management Annals*, 1 (1), PP. 439 - 477.
135. Georgescu, D.D., (2011). "Lean thinking and transferring lean management-the best defence against an economic recession?", *European Journal of Interdisciplinary Studies*, 3 (1), PP.4-20.
136. Gereffi, G., and Lee, J. (2012). "Why the world suddenly cares about global supply chains", *Journal of supply chain management*, 48, (3), PP. 24 - 32.
137. Gereffi, G., (2011), "Global Value Chains and International Competition", *Antitrust Bulletin*, 56 (1), PP. 37 - 64.
138. Germain, R., Iyer, K., (2006) "The interaction of internal and downstream integration and its association with performance", *Journal of Business Logistics*, 27 (2), PP. 29 - 53.
139. Gerwin, D., (1993) "Manufacturing flexibility: a strategic perspective", *Management Science*, 39 (4), PP. 395 - 410.

140. Geunes, J., Pardalos, P., Romeijn, H., (2002), Supply chain management, models, applications, and research directions. Kluwer academic publishers. Dordrecht.
141. Ghalekhondabi, I., Sormaz, D. and Weckman, G., (2016). "Multiple customer order decoupling points within a leagile MTS/MTO manufacturing supply chain with uncertain demands in two consecutive echelons". *OPSEARCH*, 53 (4), PP. 976 - 997.
142. Giunipero, L., Handfield, R.B., and Eltantawy, R. (2006). "Supply management's evolution: key skill sets for the supply manager of the future," *International Journal of Operations & Production Management*, 26 (7), PP. 822-844.
143. Glaser, B., (1978), Theoretical Sensitivity, Advances in the Methodology of Grounded Theory, Mill Valley, CA Sociology Press.
144. Glaser, B., and Struss, A., (1967), the discovery of grounded theory, strategies for qualitative research. Chicago, Aldine.
145. Gligor, D.M., Esmark, C.L. and Holcomb, M.C., (2015). "Performance outcomes of supply chain agility: when should you be agile?". *Journal of Operations Management*, 33, PP. 71 - 82.
146. Gligor, D.M. (2014). "The role of demand management in achieving supply chain agility". *Supply Chain Management: An International Journal*, 19 (5/6) , PP. 577 - 591.
147. Gligor, D.M., (2013). The concept of supply chain agility: Conceptualization, antecedents, and the impact on firm performance. PhD diss., University of Tennessee.
148. Goldsby, T., Griffis, S., Roath, A., (2006) "Modelling lean, agile and leagile supply chain strategies", *Journal of Business Logistics*, 27 (1), PP. 57 - 79.
149. Goldman, S., Nagel, R., Priess, K., (1995), Agile competitors and virtual organizations: strategies for enriching the customer. Van Nostrand Reinhold, United States.
150. Goldman, S., Nagel, R., (1993) "Management, technology and agility: The emergence of a new era in manufacturing", *International Journal of Technology Management*, 8 (1/2), PP.18 – 38.
151. Goodwin, D., (2001). The way we won: America's economic breakthrough during World War II. American Prospect, available from <http://prospect.org/article/way-we-won-americas-economic-breakthrough-during-world-war-ii>

152. GROSS, R., (2015). "Organizational downsizing: The past and present organizational strategy—a review". *International Journal of Research in Business Management*, 3 (1), PP. 23 - 30.
153. Gunasekaran, A., Lai,K., Cheng,T., (2008) "Responsive supply chain: a competitive strategy in a networked economy". *The International Journal of Management Science*, 36 (4), PP. 549 – 564.
154. Guo, C., Guan, Z., Chen, Y. and Li, L., (2015). "Optimization of Production System Based on Lean Thinking". *International Journal of u-and e-Service, Science and Technology*, 8 (9), PP.405 - 416.
155. Gustafsson, O. and Magnusson, J. (2016), INTER-ORGANIZATIONAL COLLABORATION – IN THEORY AND PRACTICE: Based on a multiple-case study in the automotive industry, Master's Thesis E 2016: 051, Chalmers University of Technology SE-412 96 Gothenburg, Sweden.
156. Hakami, A., Zhang, L. and Kumar, A., (2014). "Managing Upstream Supply Chain Complexity based on Purchasing Competencies-A Framework". *In The 2014 International Conference on Industrial Engineering and Operations Management. Bali, Indonesia.*
157. Hallam, C.R. and Contreras, C., (2016), "The interrelation of Lean and green manufacturing Practices: A case of push or pull in implementation". *In Management of Engineering and Technology (PICMET), Portland International Conference on* (pp. 1815-1823). IEEE.
158. Hamilton, J., (2005), Oil and the Macroeconomy, ||Palgrave Dictionary of Economics
159. Hamilton, J., (2005), How to talk to an economist about peak oil.|| Posted on Econbrowser blog: July 11, 2005. Available at http://www.econbrowser.com/archives/2005/07/how_to_talk_to.html
160. Hamrick, J.B., Smith, K.A., Griffiths, T.L. and Vul, E., (2015). Think again? The amount of mental simulation tracks uncertainty in the outcome. *In CogSci.*
161. Handfield, R., Nichols, E., (1999), Introduction to Supply Chain Management, Prentice Hall, New Jersey.
162. Handfield, R., Straube, F., Pfohl, H.C. and Wieland, A., (2013). "TRENDS AND STRATEGIES IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT: Embracing global logistics complexity to

drive market advantage". DVV Media Group GmbH, BVL International. Available from http://www.bvl.de/files/441/500/1032/1035/BVL_TrendsandStrategies_SCM_Logistics_2013.pdf

163. Hansen, A., (1945), *America's Role in the World Economy*, New York.

164. Hannah Kosow and Robert Gaßner, (2008), *Methods of future and scenario analysis: Overview, assessment, and selection criteria*, German Development Institute (DIE)

165. Haq, A.N. and Boddu, V., (2017). "Analysis of enablers for the implementation of leagile supply chain management using an integrated fuzzy QFD approach". *Journal of Intelligent Manufacturing*, 28 (1), PP. 1 - 12.

166. Harrison, A., Christopher, M., Van Hoek, R., (1999) "Creating the agile supply chain", *School of Management Working Paper*, Cranfield University, Cranfield, UK.

167. Harrison, A., (1997) "From leanness to agility", *Manufacturing Engineer*, 76 (6), PP. 257 – 260.

168. Harzer, T.S., (2013). *Value creation through mass customization: An empirical analysis of the requisite strategic capabilities* (Doctoral dissertation, Hochschulbibliothek der Rheinisch-Westfälischen Technischen Hochschule Aachen).

169. Hasan, K., Vural, Ç., Mustafa, B., (2012) "The Strategic Impact of Information Technologies on Supply Chain and Business Performance", *Journal of Business Research-Türk*, 4 (1), PP. 183 – 200.

170. Hashmi, H., Khan, N.R. and Haq, M.A., (2015). "The impact of lean management implementation on organizational operational performance". *LogForum*, 11 (4) PP. 375 – 385.

171. Hayes, R. H., & Pisano, G. P. (1994). "Beyond world-class - the new manufacturing strategy". *Harvard Business Review*, 72 (1), PP. 77-86.

172. Heckert, J., Miner, R., (1940), *Distribution Costs*, the Ronald Press Company, NY.

173. Heide, J., George J., (1990) "Alliances in Industrial Purchasing: The Determinants of Joint Action in Buyer-Supplier Relationships," *Journal of Marketing Research*, 27,(1), PP. 24 - 36.

174. Heisterberg, R. and Verma, A., (2014). *Creating Business Agility: How Convergence of Cloud, Social, Mobile, Video, and Big Data Enables Competitive Advantage*. John Wiley & Sons.

175. Herer, Y., Tzur, M., Yucesan, E., (2002) "Transshipments: An emerging inventory recourse to achieve supply chain leagility", *International Journal of Production Economics*, 80 (3), PP. 201 - 212.
176. Hill, C., & Hult, T. (2015). *Global Business Today*. New York: McGraw-Hill.
177. Hilletofth, P. (2012). Differentiation focused supply chain design. *Industrial management & Data Systems*, 112 (9), PP. 1274 - 1291.
178. Hines, P., Holweg, M., Rich, N., (2004) "Learning to evolve: A review of contemporary lean thinking", *International Journal of Operations and Production Management*, 24 (10), PP. 994 – 1011.
179. Hirsch, R., Roger, B., Robert, W., (2005), *Peaking World Oil Production: impacts, Mitigation and Risk Management*.
180. Hochman, S., Barrett, J., Hillman, M., (2007), *Response Management, Next Wave of Supply Chain Innovation? AMR Research* .
181. Holweg, M. and Rich, N., (2016) "Managing the Flow of Information and Materials across the Supply Chain, research gate, available from file:///C:/Users/waleed%20Rashad/Downloads/Managing_the_Flow_of_Information_and_Materials_across_the_Supply_Chain.pdf
182. Hormozi, A., (2001) "Agile manufacturing: the next logical step", *Benchmarking: An International Journal*, 8 (2), PP. 132 – 143.
183. Hoyt, J., & Huq, F., (2000) "From arms length to collaborative relationships in the supply chain; an evolutionary process", *International Journal of Physical Distribution and Logistics Management*, 30 (9), PP. 750 - 764.
184. Hrelja, R., Pettersson, F. and Westerdahl, S., (2016). "The qualities needed for a successful collaboration: A contribution to the conceptual understanding of collaboration for efficient public transport". *Sustainability*, 8 (6), PP. 542 - 557.
185. Huang, L., Song, J.S. and Tong, J., (2016). "Supply chain planning for random demand surges: Reactive capacity and safety stock". *Manufacturing & Service Operations Management*, 18 (4), PP. 509 - 524.

186. Hudnurkar, M., Jakhar, S. and Rathod, U., (2014). "Factors affecting collaboration in supply chain: a literature review". *Procedia-Social and Behavioral Sciences*, 133, PP. 189 - 202.
187. Huntington, S. P. (1997). *The Clash of Civilizations: Remaking of World Order*. New York: Touchstone.
188. Ikeda, M., (2000), *The new product development system of the Japanese automobile industry*. In Jurgens, U. (Ed.), *New Product Development and Production Networks*, Springer-Verlag, Berlin.
189. Infor, (2015), *Lean revisited: Taking a fresh look at lean manufacturing strategies*, 641 Avenue of the Americas, New York, NY 10011, available from <http://www.infor.com/content/industry-perspectives/taking-a-fresh-look-at-lean-manufacturing-strategies.pdf/>
190. Innes, A., (1913), "What is money?", *Banking Law Journal*, May: PP. 377 – 408.
191. Isaac, S., Michael, W., (1997), *Handbook in research and evaluation*, 3rd edition. San Diego, educational and industrial testing services.
192. Islam, M.S. and Tura, S., (2013). *Exploring the difference between Agile and Lean: A stakeholder perspective*, Uppsala University, UPPSALA, Sweden
193. Israr, M., and Gangele, A., (2013). " Multi-Criteria Optimization for Achieving Strategic Fit in Supply Chain (A Pareto Optimality Based Model)". *International Journal of Emerging Technology and Advanced Engineering*. 3, (6), PP. 262 – 272.
194. Ireland, R.K. and Crum, C., (2005). *Supply chain collaboration: How to implement CPFR and other best collaborative practices*. J. Ross Publishing.
195. Jacobs, F.R., Chase, R.B. and Lummus, R.R., (2014). *Operations and supply chain management*. McGraw-Hill Education.
196. Jacobs, F., and Weston, F., (2007) "Enterprise resource planning (ERP): A brief history", *Journal of Operations Management*, 25, PP.357 – 363.
197. Jassbi, J.A.V.A.D., Pilevari, N.A.Z.A.N.I.N. and Garmaki, M.A.H.D.I., (2014). "Role of time in agile supply chain". *International Journal of Industrial Engineering*, 25 (2), PP. 115 – 124.

198. Jeston, J., & Nelis, J. (2014). Business process management - practical guide to successful implementaions. London: Routledge.
199. Jia, F., Lamming, R., Sartor, M., Orzes, G., and Nassimbeni, G. (2014) "Global purchasing strategy and International Purchasing Offices: Evidence from case studies", *International Journal of Production Economics*, 154, PP. 284 - 298.
200. Jiang, B. and Qureshi, A., (2006), "Research on outsourcing results: current literature and future opportunities", *Management Decision*, 44 (1) , PP. 44 - 55
201. Jick, T., (1979) "mixing qualitative and quantitative methods: Triangulation in action", *administrative science quarterly*, 24 (4), PP. 602 – 611.
202. Jin, H., Anderson, A., Harrison, R., (2003) "The evolution of agile manufacturing", *Business Process Management*, 2 (9), PP.170 – 189.
203. Johansson, H., McHugh, P., Pendlebury, A., Wheeler, W., (1993), business process reengineering, Breakpoint strategies for market dominance, John Wiley and Sons, Chichester, UK.
204. John, G., (2015), THE CHANGING FACE OF SUPPLY CHAIN RISK MANAGEMENT, SCM World, available from <http://www.scmworld.com/wp-content/uploads/2017/01/The-Changing-Face-of-Supply-Chain-Risk-Management.pdf>
205. Johnson, R.A., 2014. Predicting future war. *Parameters*, 44 (1), PP. 65 - 76.
206. Johnson, J.S. and Sohi, R.S., (2016). "Understanding and resolving major contractual breaches in buyer–seller relationships: a grounded theory approach", *Journal of the Academy of Marketing Science*, 44(2), PP.185-205.
207. Jones, M., R. Naylor, B., Towill, D., (2000) "Engineering the leagile supply chain", *International journal of agile Management Systems*, 2 (1), PP. 54 – 61.
208. Jones, M., Rachel, James, B., Noyor., Towill, D., (2000) "matching your supply chain to marketplace", *Internatioanl journal of production research*, 38 (17), PP 65.
209. Joon Keränen, (2014), CUSTOMER VALUE ASSESSMENT IN BUSINESS MARKETS, Lappeenranta University of Technology, Lappeenranta, Finland

210. Joseph, R., Thomas, H., John, D., (2006), the future of supply chain management, part II, Technology, collaboration, Supply Chain Design, available from, <http://www.atkearney.com/knowledge/articles/2007/SCMR.Futures.Part2.pdf>
211. Juttner, U., Peck, H., Christopher, M., (2003) "Supply chain risk management: outlining an agenda for future research", *International Journal of Logistics Research and Applications*, 6 (4), PP. 197 - 210.
212. Kalafus, R. M. (2014). *The Innovative Society - Five essential conditions for fostering innovative activity*. West Conshohocken: Infinity Publishing.
213. Kamalapur, R., Lyth, D. and Houshyar, A., (2013). "Benefits of CPFR and VMI collaboration strategies: A simulation study". *JOSCM: Journal of Operations and Supply Chain Management*, 6 (2), PP. 59 – 73.
214. Karningsih, P.D., Pangesti, A.T. and Suef, M., (2019). "Lean Assessment Matrix: A Proposed Supporting Tool for Lean Manufacturing Implementation". *In IOP Conference Series: Materials Science and Engineering*, 598 (1), PP. 012082. IOP Publishing.
215. Katayama, H., and Bennett, D. (1999) "Agility, adaptability, and leanness: a comparison of concepts and a study of practice", *International Journal of Production Economics*, Vol. 60–61, (1), PP. 43 – 51.
216. Kerlinger, F., Lee, H., (2000), *Foundations of Behavioral Research*, 4th Edition, New York, Holt, Rinehart and Winston.
217. Kempainen, K., Vepsalainen, A., (2003) "Trends in industrial supply chains and networks", *International Journal of Physical Distribution and Logistics Management*, 33 (8), PP. 701 - 719.
218. Kersten, W., Blecker, T. and Ringle, C.M., (2013). *Sustainability and Collaboration in Supply Chain Management: A Comprehensive Insight Into Current Management Approaches*. BoD–Books on Demand.
219. Kersten, W., Blecker, T. and Ringle, C.M., (2015). *Innovations and strategies for logistics and supply chains*. epubli.

220. Ketsarapong, S., Suwantaranrangsri, K., Phusavat, K. and Lin, B., (2012). "Sustaining supply chain operations through lean manufacturing". *International Journal of Synergy and Research*, 1 (2), PP. 5 - 20.
221. Keynes, J., (1982), *The Collected Writings of John Maynard Keynes*, Volume XXVIII. Donald Moggridge, ed. London, UK and Basingstoke, UK, The MacMillan Press, Ltd.
222. Kim, S.H., (2014). "Postponement for designing mass-customized supply chains: categorization and framework for strategic decision making". *International Journal of Supply Chain Management*, 3 (1). PP. 1 - 11
223. Khan, J and Dalu R, (2015) "Lean and Agile Manufacturing as productivity enhancement techniques - a comparative study", *IOSR Journal of Mechanical and Civil Engineering*, 12 (1), PP 52-56.
224. Khan, M.A. and Hashim, M., (2014). *Organizational Change: Case Study of General Motors*. ASEE 2014 Zone I Conference, April 3-5, 2014, University of Bridgeport, Bridgeport, CT, USA.
225. Kilger, C. and Reuter, B., (2005). Collaborative planning. In *Supply chain management and advanced planning* (pp. 259-278). Springer Berlin Heidelberg.
226. Kogut, B., (1988). "Joint ventures: theoretical and empirical perspectives", *Strategic Management Journal*, 9 (4), PP. 319 - 332.
227. Končar, J., and Leković, S. (2013). *Implementation Of Rfid Technology In Supply Chain Management*. Available from <ftp://ftp.repec.org/opt/ReDIF/RePEc/osi/bulimm/PDF/BusinessLogisticsinModernManagement13/blimm1316.pdf>
228. Kopczak, L., and Johnson, M., (2003), "The Supply-chain Management Effect", *MIT Sloan Management Review*, 44 (3) PP. 27
229. Korpela, K., Hallikas, J. and Dahlberg, T., (2017), January. Digital supply chain transformation toward blockchain integration. In *proceedings of the 50th Hawaii international conference on system sciences*.
230. Kovacs, G., (2016) "LEAN MANUFACTURING AS A KEY TO SUCCESS". *Materials science and technology*, Number 1

231. Kovack, J., Stringfellow, P., Turner, J., Cho, R., (2005) "The house of competitiveness: The Marriage of Agile Manufacturing, Design for Six Sigma, and Lean Manufacturing with Quality Considerations", *Journal of Industrial Technology*, 21 (3), PP. 2 - 10.
232. Kozubikova, L., Kotaskova, A., Dvorsky, J., & Kljucnikov, A. (2019). The Impact of Political Factors' Perception on Suitability of International Business Environment: The Case of Startups. *Economics and Sociology*, 12 (1), PP. 61-79.
233. Krafcik, J., (1988) "Triumph of the Lean Production System," *Sloan Management Review*, 30 (1), PP. 41 - 52.
234. Krishnamurthy, R., Yauch, C., (2007), "Leagile manufacturing: A proposed corporate infrastructure", "International Journal of Operations and Production Management", 27 (6), PP. 588 – 604.
235. Krishnapriya, V. and Baral, R., (2014). "Supply chain integration-a competency based perspective". *International Journal of Managing Value and Supply Chains*, 5 (3), PP. 45 - 60.
236. Krueger, A., (2016), The IMF's power and constraints, ECB Forum on Central Banking, June 2016, available from <https://www.ecb.europa.eu/pub/pdf/other/ecbforumcentralbanking201606.en.pdf?d13a68ed5851b94ccde2b16eee913b8f>
237. Kugler, J., (2006) "The Asian Ascent: Opportunity for Peace or Precondition for War?", *International Studies Perspectives*, 7 (1), PP. 36 - 42.
238. Kuhn, T., (1962), *The Structure of Scientific Revolutions*, 1st. ed., the university of Chicago press Ltd., London.
239. Kulacki, G., (2016). *The Risk of Nuclear War with China: A Troubling Lack of Urgency*. Union of Concerned Scientists
240. Kumar Sharma, S. and Bhat, A., (2014). "Modelling supply chain agility enablers using ISM". *Journal of Modelling in Management*, 9 (2), PP.200 - 214.
241. Kurbel, K. E. (2013). *Enterprise resource planning and supply chain management*. Berlin, Springer.

242. Kurniawan, R., Zailani, S.H., Iranmanesh, M. and Rajagopal, P., (2017). "The effects of vulnerability mitigation strategies on supply chain effectiveness: risk culture as moderator". *Supply Chain Management: An International Journal*, 22 (1). PP. 1 - 34
243. La Londe, Bernard, J., (1997) "Supply Chain Management: Myth or Reality?", *Supply Chain Management Review*, 1, spring, PP. 6 - 7
244. Lee, P., Yeung, A., Cheng, T., (2009) "Supplier alliances and environmental uncertainty: An empirical study", *International Journal of Production Economics*, 120 (1), PP. 190 - 204
245. Lee, H., Ng, S., (1997) "Introduction to the Special Issue on Global Supply Chain Management", *Production and Operations Management*, 6 (3), PP.191 - 192.
246. Lee, H., (2004) "The triple-A supply chain", *Harvard Business Review*, 82 (10), PP. 102 - 112.
247. Lehmacher, W., (2017). *The Global Supply Chain: How Technology and Circular Thinking Transform Our Future*. Springer.
248. Levi, D., Kaminsky, P., Levi, E., (2009), *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies*, McGraw-Hill, Third Edition.
249. Levy, J., (2003) "Economic Interdependence, Opportunity Costs, and Peace" in Edward D. Mansfield and Brian Pollins (ed), *Economic Interdependence and International Conflict, New Perspectives on an Enduring Debate*, Michigan Press, PP. 127 - 147.
250. Li, L., (2014). *Managing Supply Chain and Logistics: Competitive Strategy for a Sustainable Future*. World Scientific Publishing Co Inc.
251. Li, Z., Fei, W., Zhou, E., Gajpal, Y. and Chen, X., (2019). "The Impact of Lead Time Uncertainty on Supply Chain Performance Considering Carbon Cost". *Sustainability*, 11 (22), PP.6457.
252. Liker, J. K., & Meier, D. (2006). *The Toyota Way Fieldbook: A Practical Guide for Implementing Toyota's 4Ps*. New York, London: McGraw-Hill.
253. Linne, A., and Ekhall, C, J., (2013) *Lean Capacity Planning : planning for maximising customer value*, CHALMERS UNIVERSITY OF TECHNOLOGY Gothenburg, Sweden.

254. Lotfi, Z., Mukhtar, M., Sahran, S. and Zadeh, A.T., (2013). "Information sharing in supply chain management". *Procedia Technology*, 11, PP. 298 - 304.
255. Lawson, R., (2002), "The implementation and impact of operations strategies in fast moving supply systems", *Supply Chain Management an International Journal*, 7 (3), PP. 146 - 163.
256. Liu, Y., (2013). "An Approach to Real Multi-tier Inventory Strategy and Optimization", *Research Journal of Applied Sciences, Engineering and Technology*, 6 (7), PP. 1178 – 1183.
257. Liu, T. and Woo, W.T., (2018). "Understanding the US-China trade war". *China Economic Journal*, 11 (3), PP. 319-340.
258. Lukin, A., (2019). "The US–China Trade War and China's Strategic Future". *Survival*, 61 (1), PP. 23-50.
259. Lummus, R., and Alber, K., (1997), *Supply Chain Management: Balancing the Supply Chain with Customer Demand*, The Educational and Resource Foundation of APICS, Falls Church.
260. Lummus, R., and Vokurka, R. (1999), "Defining supply chain management: a historical perspective and practical guidelines", *Industrial Management & Data Systems*, 99 (1), PP. 11 - 17.
261. MacCarthy, B. , and Jayarathne, P., (2012). "Sustainable collaborative supply networks in the international clothing industry: A comparative analysis of two retailers". *Production Planning & Control*, 23 (4), PP. 252 – 268
262. Majanoja, A.M., Loney, M.C., Wörlund, B., Linko, L. and Leppänen, V., (2014). "A Globally Integrated Supply Chain Delivery Quality Strategy: Transformation Insights at the Nokia Devices Unit". *American Journal of Industrial and Business Management*, 4, PP. 413 – 431.
263. Makinen, G.E., (2003). *Inflation: Causes, Costs, and Current Status*. Congressional Research Service, Library of Congress, Order Code RL30344, available from <https://www.policyalmanac.org/economic/archive/inflation.pdf>
264. Malshe, A. and Sohi, R.S., (2009). "What makes strategy making across the sales-marketing interface more successful?", *Journal of the Academy of Marketing Science*, 37(4), PP.400-421.

265. Mamun Habib, (2011). "SupplyChain Management (SCM): Theory and Evolution", Supply Chain Management - Applications and Simulations, ISBN: 978-953-307-250-0, InTech, Available from: <http://www.intechopen.com/books/supply-chain-management-applications-and-simulations/supply-chainmanagement-scm-theory-and-evolution>
266. Mamun Habib, (2014). " Supply Chain Management (SCM): Its Future Implications", *Open Journal of Social Sciences*, 2, PP. 238 - 246Manuj, I., and Mentzer, J., (2008) "Global supply chain risk management strategies", *International Journal of Physical Distribution and Logistics Management*, 38 (3), PP. 192 – 223.
267. Manuj, I. and Sahin, F., (2011). "A model of supply chain and supply chain decision-making complexity". *International Journal of Physical Distribution & Logistics Management*, 41 (5), PP. 511 - 549.
268. Manuj, I. and Mentzer, J.T., (2008). "Global supply chain risk management strategies". *International Journal of Physical Distribution & Logistics Management*, 38 (3), PP. 192 - 223.
269. Marchi, B. and Zanoni, S., (2017). "Supply chain management for improved energy efficiency: Review and opportunities". *Energies*, 10 (10), p.1618.
270. Marinagi, C., Trivellas, P. and Reklitis, P., (2015). "Information quality and supply chain performance: The mediating role of information sharing". *Procedia-Social and Behavioral Sciences*, 175, PP. 473 - 479.
271. Margaret C. Harrell, Melissa A. Bradley, (2009) "Data Collection Methods : Semi-Structured Interviews and Focus Groups", NATIONAL DEFENSE RESEARCH INSTITUTE, RAND Corporation
272. Masson, R., Iosif, L., MacKerron, G., Fernie, J., (2007) "Managing complexity in agile global fashion industry supply chains", *International Journal of Logistics Management*, 18 (2), PP. 238 - 254.
273. Mathiyazhagan, T., and Deoki, N., (2010) "Survey research method ", *Media Mimansa*, 4 (1), PP. 34 – 82.

274. Matopoulos, A., Barros, A.C. and Van der Vorst, J.G.A.J., (2015). Resource-efficient supply chains: a research framework, literature review and research agenda. *Supply Chain Management: An International Journal*, 20 (2), PP. 218 - 236.
275. Mavengere, N., (2013). "Information Systems Role in Strategic Agility: A supply chain context". Tampere University Press.
276. McCallin, A., (2003) "Designing a grounded theory study: Some practicalities". *Nursing in Critical Care*, 8 (5), PP. 203 - 208.
277. McCracken, G. (1988). The long interview. Newbury Park, CA: Sage
278. McCutcheon, D., Stuart, F., (2000) "Issues in the Choice of Supplier Alliance Partners", *Journal of Operations Management*, 18, (3), PP. 279 - 301.
279. McCullen, P., Towill, D., (2001) "Achieving lean supply through agile manufacturing", *Integrated Manufacturing Systems*, 12 (7), PP. 524 – 533.
280. McCullen, P., and Towill, D., (2000), "Practical Ways of Reducing Bullwhip: the case of the Glosuch global supply chain", *International Journal of Operations Management*, 26, (10), PP. 24 – 30
281. McFarlane, D.A., (2013) "The strategic importance of customer value". *Atlantic Marketing Journal*, 2 (1), PP.62 - 75.
282. McIntire, M.J., (2014). Supply chain visibility: From theory to practice. Ashgate Publishing, Ltd.
283. Meixell, M., Gargeya, V., (2005) "Global supply chain: A literature review and critique", *Transportation Research Part E*, 41 (6), PP. 531 - 550.
284. Mello, J. and Flint, D.J., (2009). "A refined view of grounded theory and its application to logistics research", *Journal of business logistics*, 30(1), PP.107-125.
285. Miah, M.R., Roy, H.N., Saha, S., Parvez, M.S., Alom, M.J. and Dhar, N.R.,(2013) "Is Leagile Supply Chain Suitable for Apparel Manufacturing Organizations? A Multicriteria Decision Making Perspective". *International Journal of Scientific & Engineering Research*, 4 (8), PP. 933 - 938

286. Miclo, R., Fontanili, F., Lauras, M., Lamothe, J., and Milian, B. (2016). "An empirical comparison of MRPII and Demand-Driven MRP". *IFAC-PapersOnLine*, 49 (12), PP. 1725 - 1730.
287. Milovanović, G. and Popović, G., (2019). "The hyper-personalized supply chains". *Industry 4.0*, 4 (3), PP.124-127.
288. Minnich, D. and Maier, F., 2006. Supply Chain Responsiveness and Efficiency: Complementing Or Contradicting Each Other?. School of Business Administration, International University in Germany, available from <https://www.systemdynamics.org/conferences/2006/proceed/papers/MINNI308.pdf>
289. Mishra, S., & Kumar, B., (2014), "Understanding Diversity: A Multicultural Perspective", *IOSR Journal of Humanities and Social Science*, 19 (9), PP. 62 – 66.
290. Merritt, W., (2012) "The Use of War to Profit", *justices policy journal*, 9 (1), PP. 1 – 30.
291. Mohan, R., Patra, M.D. and Kapur, M., (2013). The International Monetary System: Where Are We and Where Do We Need to Go? (No. 13-224). International Monetary Fund.
292. Mohr, G.A., Fear, E. and Sinclair, R., (2015). World War 3: When and how will it End? Australian Self-Publishing Group.
293. Monczka, R., Morgan, J., (1997) "What's wrong with supply chain management? " ,*Purchasing*, 122 (1), PP. 69 - 73.
294. Monczka, R., Morgan J., Trent, R., Handfield, B., (1998), *Purchasing and Supply Chain Management*, South-Western, Cincinnati, OH.
295. Monk, E., and Wagner, B. (2012). *Concepts in enterprise resource planning*. Cengage Learning.
296. Monk, E., & Wagner, B. (2006). *Concepts in Enterprise Resource Planning*. Boston: Thomson Course Technology.
297. Montoya-Torres, J.R. and Ortiz-Vargas, D.A., (2014). "Collaboration and information sharing in dyadic supply chains: A literature review over the period 2000–2012". *Estudios Gerenciales*, 30 (133), PP. 343 - 354.
298. Morse, J., Stern, P., Corbin, J., Bowers, B., Charmaz, K., Clarke, A., (2009). *Developing Grounded Theory: The Second Generation*. Walnut Creek: Left Coast Press.

299. Murrigan, T., (2010). Peak, energy, climate change and the collapse of global civilization: The current peak oil crisis. *Global Climate Change, Human Security & Democracy*.
300. Morlok, E., Chang, D., (2004) "Measuring capacity flexibility of a transportation system", *Transportation Research Part A: Policy and Practice*, 38 (6), PP. 405 - 420.
301. Mourougan, S., Sethuraman, K., (2017) "Hypothesis Development and Testing", *IOSR Journal of Business and Management (IOSR-JBM)*, 19 (5), PP 34 - 40
302. Msimangira, K., Venkatraman, S., (2014) "Supply chain management integration: Critical problems and solutions", *Operations and Supply Chain Management*, 7 (1), PP. 23 - 31.
303. Myerson, P. (2012). *Lean Supply Chain and Logistics Management*. New York, NY: McGraw-Hill.
304. Nag, R., D. Hambrick, M. Chen., (2007) "What Is Strategic Management, Really? Inductive Derivation of a Consensus Definition of the Field.", *Strategic Management Journal*, 28 (9) PP. 935 – 955.
305. Nahid Golafshani., (2003) "Understanding Reliability and Validity in Qualitative Research", *The Qualitative Report*, 8 (4) PP. 597 – 607.
306. Nalbantis, I., Efstratiadis, A., Rozos, E., Kopsiafti, M. and Koutsoyiannis, D., (2011). "Holistic versus monomeric strategies for hydrological modelling of human-modified hydrosystems". *Hydrology and Earth System Sciences*, 15 (3), PP.743.
307. Naim, M.M. and Gosling, J., (2011). "Leanness, agility and leagile supply chains". *International Journal of Production Economics*, 131 (1), PP. 342 - 354.
308. Naylor, J., Naim, M., Berry, D., (1999) "Legality: integrating the lean and agile manufacturing paradigms in the total supply chain", *International Journal of Production Economics*, 62, (1 / 2), PP. 107 - 118.
309. Nedelko, Z., & Potočan, V. (2016). "Management practices utilization in organizations – a comparison between catching up and well-developed economies". *Management (Croatia)*, 21, PP. 1-20.
310. Nel, J.D. and Badenhorst-Weiss, J.A., (2015). "Theoretical guidelines to manage agile supply chains". *European Journal of Business and Social Sciences*, 4 (3), PP. 136 - 150.

311. New, S., (2003) "There maybe Troubles Ahead", *Supply management*, 8 (1), PP. 16 – 20.
312. Nishiguchi, T., Beaudet, A., (1998) "Case Study: The Toyota Group and the Aisin Fire", *Sloan Management Review*, 40, (1), PP. 49 - 59.
313. Nitin Pandhi , Kulvinder Singh, and Sandeep Singh, (2015) "A Contrast: VSM, JIT, and MRP-II", *International Journal of Current Engineering and Technology*, 5, (1), PP. 385 – 388.
314. Noda, T., (2015). "Integration of lean operation and pricing strategy in retail". *Journal of Marketing Development and Competitiveness*, 9 (1), PP. 50 – 60.
315. Nye Jr and Joseph S., (2004). "Old Wars and future wars: Causation and prevention", *In Power in the Global Information Age* (pp. 21-28). Routledge.
316. Ohno, T (1988), *The Toyota Productive System: Beyond large Scale Production*, Productivity Press, Portland, Oregon, Productivity Press.
317. Oliver, R., Webber, M., (1982) "supply chain management : logistics catches up with strategy" *outlook*, 5 (1), PP. 42 47.
318. Oliveira, A. and Gimeno, A., (2014). *Managing Supply Chain Networks: Building Competitive Advantage in Fluid and Complex Environments*. Pearson Education.
319. Omar, A., Davis-Sramek, B., Myers, M.B. and Mentzer, J.T., (2012). "A global analysis of orientation, coordination, and flexibility in supply chains". *Journal of Business Logistics*, 33 (2), PP. 128 - 144.
320. ORTEC Consulting, (2016), *Strategic Alignment*, white paper, available from, file:///C:/Users/waleed%20Rashad/Downloads/ORTEC%20Consulting%20White%20Paper%20Lasting%20Business%20Improvement%20Strategic%20Alignment%20EN.pdf , accessed: 05/04/2017
321. Osborn, S., (2009). *Building a positive future for Bristol after Peak Oil*. Bristol Local Strategic Partnership, available from http://transitionbristol.net/wp-content/uploads/2013/03/Peak-Oil-Report_01.pdf
322. Özpolat, K., Dresner, M., Yao, Y., (2014) "A Dark Side of Long-Term VMI Relationships: Supply Chain Trust" , College of Business Administration University of Rhode Island, WORKING

PAPER SERIES, No 12, available from

<http://web.uri.edu/business/files/OzpolatYaoDresner.pdf>

323. Pagh, J., Cooper, M., (1998) “supply chain postponement and speculations strategies: how to choose the right strategy”, *journal of business logistics*, 19 (2), PP. 13 – 33.
324. Park, J., Song, J., (2004) “A resource-based view of strategic alliances and firm value in the electronic marketplace”, *Journal of Management*, 30 (1), PP. 7 - 27.
325. Patton, M. Q. (2002). *Qualitative research & Evaluation methods*. Thousand Oaks, CA: Sage Publications.
326. Paiva, E.L., Teixeira, R., Vieira, L.M. and Finger, A.B., (2014). “Supply chain planning and trust: two sides of the same coin”. *Industrial Management & Data Systems*, 114 (3), PP. 405-420.
327. Peltz, E., Cox, A.G., Chan, E.W., Hart, G.E., Sommerhauser, D., Hawkins, C. and Connor, K., (2015). *Improving DLA Supply Chain Agility: Lead Times, Order Quantities, and Information Flow*. Published by the RAND Corporation, Santa Monica, Calif.
328. Perks, P. S., and Oosthuizen, N. (2013) “Exploring Supplier Negotiation Best Practices and Supplier Relationships Strategies in South Africa”, *Review of Integrative Business and Economics Research*, 2 (1), PP. 333 – 350.
329. Petar, R., (2014). *A conceptual framework for supply: supply chain systems architecture and integration design based on practice and theory in the North Wales slate mining industry* (Doctoral dissertation, University of South Wales).
330. Peters, J., Hogensen, A., (1999) “New directions for the warehouse”, *Supply Chain Management Review*, Global Supplement, PP. 23 - 5.
331. Peter Desnoyers, (2008), “Distributed data collection: achieving, indexing, and analysis”, University of Massachusetts, USA.
332. Pettersson, A. and Segerstedt, A., (2013). “To evaluate cost savings in a supply chain: Two examples from Ericsson in the telecom industry”. *Operations and Supply Chain Management*, 6 (3), PP. 94 - 102.

333. Petzschner, F.H., Glasauer, S. and Stephan, K.E., (2015). "A Bayesian perspective on magnitude estimation". *Trends in cognitive sciences*, 19 (5), PP. 285 - 293.
334. Pfohl, H.C., Yahsi, B. and Kurnaz, T., (2017). Concept and Diffusion-Factors of Industry 4.0 in the Supply Chain. In *Dynamics in Logistics* (PP. 381-390). Springer International Publishing.
335. Plossl, G., Wight, O., (1973) "capacity planning and control", *Journal of the American production and inventory control society*, 14 (3), PP. 31 – 67.
336. Pomponi, F., Fratocchi, L., Tafuri, S.R. and Palumbo, M., (2013). Horizontal collaboration in logistics: a comprehensive framework. *Research in Logistics & Production*, 3. PP. 243 - 254
337. Popp, J., MacKean, G.L., Casebeer, A., Milward, H.B. and Lindstrom, R.R., (2014). Inter-organizational networks: A critical review of the literature to Inform practice, available from http://sls.royalroads.ca/sites/default/files/files/interorganizational_networks_a_critical_review_of_the_literature_to_inform_practice.pdf
338. Porter, M. E. (1996). "What is strategy?" *Harvard Business Review*, 74(6), PP. 61 - 78.
339. Pourhejazy, P., Kwon, O.K., Chang, Y.T. and Park, H.K., (2017). "Evaluating Resiliency of Supply Chain Network: A Data Envelopment Analysis Approach". *Sustainability*, 9 (2), PP. 255 – 274.
340. Potocan, V., & Nedelko, Z. (2017). *Supply chain management and management tools*. Harlow: Pearson Education.
341. Powell, D. and Arica, E., (2015). To Pull or Not to Pull: A Concept Lost in Translation?. *American Journal of Management*, 15(2), PP .64 - 76.
342. Pradhan, G, M., (2016) "Contingency planning an approach of crisis decision making", *Journal of Interdisciplinary Studies*, 2 (2), PP. 1 – 7
343. Pramanik, R., (2015). *Interorganizational Collaboration in Crisis Response Management: Exploring the Conditions for Improving Collaborative Behaviour Across Organizational Borders*. Division of Risk Management and Societal Safety, Lund University.
344. Prasad, S., Tata, J., Motwani, J., (2001) "International supply chain management: Learning and evolving networks", *Global Journal of Flexible Systems Management*, 2 (2), PP. 31 – 36.

345. Prasanna, S.R., Haavisto, I., Kovács, G., (2016) Organizational culture and supply chain collaboration: a humanitarian context, Humlog Institute, Hanken School of Economics, Helsinki, available from <https://www.pomsmeetings.org/ConfPapers/065/065-1287.pdf>
346. Prater, E., Biehl, M., Smith, M., (2001) “International supply chain agility: tradeoffs between flexibility and uncertainty”, *International Journal of Operations and Production Management*, 21 (5/6), PP. 823 – 839.
347. Privratsky, K.L., (2014). Logistics in the Falklands War. Pen and Sword military, south Yorkshire.
348. Pérez Arroyave, H.D., (2013) Aligning the supply chain to business strategy Alineando, Universidad de La Sabana, available from <file:///C:/Users/waleed%20Rashad/Downloads/Hern%C3%A1n%20David%20Perez%20Arroyave.pdf>
349. POP, A., (2016) “scenarios for the future of the international monetary system”, *Knowledge Horizons – Economics*, 8 (1), PP. 80 – 83.
350. Prince, J., Kay, J., (2003) “Combining lean and agile characteristics: Creation of virtual groups by enhanced production flow analysis”, *International journal Production Economics*, 85 (3), PP. 305 – 318.
351. Purvis, J., Gosling, M., Naim, (2014) “The development of a lean, agile and leagile supply network taxonomy based on differing types of flexibility”, *International Journal of Production Economics*. 151, PP. 100 - 111.
352. PWC, (2013), “Next-generation supply chains Efficient, fast and tailored”, Global Supply Chain Survey, available from <https://www.pwc.com/mx/es/industrias/archivo/20150827-jr-next-generation-supply-chains-pdf.pdf>
353. PWC, (2015), The World in 2050 Will the shift in global economic power continue, available from <https://www.pwc.com/gx/en/issues/the-economy/assets/world-in-2050-february-2015.pdf>
354. Qais Faryadi, (2012), “How to Write Your PhD Proposal: A Step-By-Step Guide”, *American International Journal of Contemporary Research*, 2 (4), PP. 111 – 115.

355. Qrunfleh, S. and Tarafdar, M., (2013). "Lean and agile supply chain strategies and supply chain responsiveness: the role of strategic supplier partnership and postponement". *Supply Chain Management: An International Journal*, 18 (6), PP. 571 - 582.
356. Ralston, P., (2014). Supply chain collaboration: A literature review and empirical analysis to investigate uncertainty and collaborative benefits in regards to their practical impact on collaboration and performance, graduate Theses and Dissertations, Paper 13798, Iowa State University.
357. Ramana, D.V., Rao, K.N. and Kumar, J.S., (2016). "A Critical Review on Supply Chain Strategies and their Performance". *International Journal of Engineering Science*, 6 (5) PP. 4525 - 4545.
358. Ramana, D.V., Kumar, J.S. and Rao, K.N., (2013). "Prioritization of Performance Metrics For Lean & Agile Supply Chains", *International Journal of Advancements in Research & Technology*, 2 (8), PP. 188 -194
359. Ramasesh, R., Ord, J., Hayya, J., Pan, A., (1991) "Sole Versus Dual Sourcing in Stochastic Lead Time", *Inventory Models Management Science*, 37, (4), PP. 428 - 443.
360. Rambaree, K., (2013). "Three Methods Of Qualitative Data Analysis Using ATLAS". ti: 'A Posse Ad Esse'. In ATLAS. ti User Conference 2013, 12-14 September 2013, Technische Universität Berlin, Germany (Vol. 1, PP. 1-15). Universitätsverlag der TU Berlin.
361. Randall, W.S. and Mello, J.E., (2012). "Grounded theory: an inductive method for supply chain research". *International Journal of Physical Distribution & Logistics Management*, 42(8/9), PP. 863 - 880.
362. Rashad, W. and Gumzej, R., (2014). "The Information Technology in Supply Chain Integration: Case Study of Reda Chemicals with Elemica". *International Journal of Supply Chain Management*, 3, (1), PP. 62 - 69.
363. Rafique, R., Mun, K.G. and Zhao, Y., (2015). "Energy supply chain design: A dynamic model for energy security, economic prosperity, and environmental sustainability". Working paper, Rutgers Business School-Newark and New Brunswick
364. .

365. Ryan, M.J., Evers, D.R., Potter, A.T., Purvis, L. and Gosling, J., (2017). "3D printing the future: scenarios for supply chains reviewed". *International Journal of Physical Distribution & Logistics Management*. 47 (10), PP. 992-1014
366. Razmi, J., Seifoory, M. and Pishvaei, M.S., (2011). "A Fuzzy Multi-Attribute Decision Making Model for Selecting the Best Supply Chain Strategy: Lean, Agile or Leagile". *Journal of Industrial Engineering*, 45 (2), PP.127 - 142.
367. Reichhart, A., Holweg, M., (2007) "Creating the customer responsive supply chain: a reconciliation of concepts", *International Journal of Operations & Production Management*, 27 (11), PP. 1144 - 1172.
368. Rich, N., Hines, P., (1997) "Supply chain management and time based competition: the role of the supplier association", *International Journal of Physical Distribution and Logistics Management*, 27 (3), PP. 210 - 226.
369. Richards, C., (1996) "Agile manufacturing: beyond lean?", *Production and Inventory Management Journal*, 37 (2), PP. 60 - 64.
370. Robin, H., Inderfurth, K., Sadrieh, A., & Voigt, G. (2015), "Strategic inventory and supply chain behavior", *Production and Operations Management*, 24 (8), PP. 1329 - 1345.
371. Rodrigue, J. P. (1998, November 2). Evolution of logistical integration, from <http://people.hofstra.edu/geotrans/eng/ch5en/conc5en/evolutionlogistics.html>
372. Rodrigue, J.P., Slack, B. and Comtois, C., (2017). "Green Logistics". *Handbook of Logistics and Supply-Chain Management*, 2, PP.339-350.
373. Roh, J., Hong, P. and Min, H., (2014) "Implementation of a responsive supply chain strategy in global complexity: The case of manufacturing firms". *International Journal of Production Economics*, 147, PP.198 - 210.
374. Romano, P., (2003), "Co-ordination and integration mechanisms to manage logistics processes across supply networks", *Journal of Purchasing and Supply Management* 9, PP. 119 – 134.
375. Ross, D.F., (2016). Introduction to e-supply chain management: engaging technology to build market-winning business partnerships. CRC Press.

376. Rossini, M. and Staudacher, A.P., (2016). "Lean Supply Chain Planning: A Performance Evaluation through Simulation". In *MATEC Web of Conferences* (Vol. 81, p. 06002). EDP Sciences.
377. Rossignoli, C. and Ricciardi, F., 2015. Inter-organizational relationships: towards a dynamic model for understanding business network performance. Springer.
378. Rothbard, M.N., (2002). *History of Money and Banking in the United States: The Colonial Era to World War II*, A. Ludwig von Mises Institute.
379. Sabath, R., Fontanella, J., (2002) "The unfulfilled promise of supply chain collaboration", *Supply Chain Management Review*, July/August, PP. 24 - 29.
380. Saenz, M.J., Ubaghs, E. and Cuevas, A.I., (2015). *Enabling Horizontal Collaboration Through Continuous Relational Learning*. Springer.
381. Safaei, M., 2014. *Delivery Time Uncertainty in Dynamic Supply Networks*. PhD dissertation, Bremen university, Germany.
382. Sako, M., Lamming, R., Helper, S., (1995) "Supplier relations in the UK car industry: good news – bad news", *European Journal of Purchasing and Supply Management*, 1(4), PP. 237 - 248.
383. Salvi, V.Z. and Mayerle, S.F., (2014). "LEAGILITY and PARETO: Increasing Services Level through a Combination of LEAGILITY and ABC Curve". *Business and Management Research*, 3 (2), PP. 81- 92
384. Salvi, V.Z. and Mayerle, S.F., (2014). "Postponement in a Cold Food Chain: Production in Brazil". *International Business Research*, 7 (9), PP.130 – 140.
385. Sangari, M.S., Razmi, J. and Zolfaghari, S., (2015). "Developing a practical evaluation framework for identifying critical factors to achieve supply chain agility". *Measurement*, 62, PP. 205 - 214.
386. Savolainen, T., & Ikonen, M., (2015) "Trust as Intellectual Capital in Pursuing Flexibility in Business Contracting". *Flexibility in Contracting*, PP.209 – 225.
387. Schlichter, D.S., (2011). *Paper money collapse: the folly of elastic money and the coming monetary breakdown*. John Wiley & Sons.

388. Schnetzler, M., A. Sennheiser, P. Schönsleben, (2007) "A Decomposition Based Approach for the Development of a Supply Chain Strategy", *International Journal of Production Economics*, 105 (1), PP. 21– 42.
389. Schwartz, P., (1991), *The Art of the Long View: planning for the future in uncertain world*. New York, Doubleday.
390. Seebacher, G. and Winkler, H., (2015). "A capability approach to evaluate supply chain flexibility". *International Journal of Production Economics*, 167, PP. 177-186.
391. Sezen, B., Erdogan, S., (2009) "Lean philosophy in strategic supply chain management and value creating", *Journal of Global Strategic Management*, 05, PP. 68 – 72.
392. Sillanpää, I. and Sillanpää, S., (2014) "Supply Chain Strategy: Empirical Case Study in Europe and Asia". *Management (18544223)*, 9 (2). PP. 95 – 115
393. SILLANPÄÄ, I., (2014). *Implementing supply chain strategy*. Väitöskirja. Vaasan yliopisto.
394. Simangunsong, E., Hendry, L., and Stevenson, M., (2012) "Supply-chain uncertainty: a review and theoretical foundation for future research", *International Journal of Production Research*, 50, (16), PP. 4493 – 4523
395. Simchi-Levi, D., Kaminsky, P., Simchi-Levi, E., (2009), *Designing and managing the supply chain: Concepts, strategies and case studies*, Boston, McGraw-Hill.
396. Simmons, O.E., (2011). "Book Review: Essentials of Accessible Grounded Theory". *The Grounded Theory Review*, 10 (3), PP. 67-85.
397. Singhry, H.B., Abd Rahman, A. and Ng, S.I., (2015). "Measurement for supply chain collaboration and supply chain performance of manufacturing companies". *International Journal of Economics and Management*, 9 (S), PP.1 - 22.
398. Singh, H., Garg, R. and Sachdeva, A., (2018). "Supply chain collaboration: A state-of-the-art literature review". *Uncertain Supply Chain Management*, 6 (2), PP. 149 - 180.
399. Shahmansouri, S., Esfahan, M.D. and Niki, N., (2013). Explain the Theory of Competitive Advantage and Comparison with Industries based on Advanced Technology, *International Journal of Economy, Management and Social Sciences*, 2 (10), PP. 841 - 848

400. Shararah, M.A. (2013), "A value stream map in motion", *Industrial Engineer*, 45 (5) , PP. 46 - 50.
401. Sharafi, H., Zhang, Z., (1999) "A method for achieving agility in manufacturing organizations: an introduction", *International journal of production economics*, 62 (1/2), PP. 7 – 22.
402. Sharma, A. and Kumar, R., (2017), "Sharing of Information in Supply Chain Management", *International Journal of Science, Engineering and Technology Research (IJSETR)*, 6, (1), PP. 45 – 50.
403. Sharp, J., Irani, Z., Desai, S., (1999) "Working towards agile manufacturing in the UK industry", *International Journal of Production Economics*, 62 (1-2), PP. 155 – 169.
404. Shah, R., Ward, P., (2007) "Defining and developing measures of lean production", *Journal of operations management*, 25 (4), PP. 785 – 805.
405. Shahmarichatghieh, M., Tolonen, A. and Haapasalo, H., (2015). "Product life cycle, technology life cycle and market life cycle; similarities, differences and applications". *In Technology, Innovation and Industrial Management Joint International Conference*. PP. 1143 – 1151.
406. Shaw, M. and Martin, S., (2000). "Theory of the global state: Globality as an unfinished revolution", *Cambridge University Press*, (Vol. 73).
407. Sheffi, Y., (2001). "Supply chain management under the threat of international terrorism". *The International Journal of logistics management*, 12 (2), PP. 1 - 11.
408. Shri Jaya., and Anil Kumar., (2016) "Impact of Supply Chain Management Strategies on Changing Market Condition", *IOSR Journal of Business and Management*, 18 (1), PP. 109 – 111.
409. Shukla, S., Tiwari, M., Wan, H., Shankar, R, (2010), "Optimization of the supply chain network: Simulation", *Computers & Industrial Engineering*, 58(1), PP. 29 – 39.
410. Slack, N., (1983) "Flexibility as a manufacturing objective", *International Journal of Operations and Production Management*, 7 (4) PP. 35 - 45.

411. Oláh Slack, N., Chambers, S., Johnston, R., (2010), operations management, sixth edition, Prentice Hall, Pearson Education, UK.
412. Slack, N. and Brandon-Jones, A., (2018). Operations and process management: principles and practice for strategic impact. Pearson UK.
413. Ślusarczyk, B., (2018) "Industry 4.0: are we ready?", *Polish Journal of Management Studies*, 17, (1), PP. 232 – 248.
414. Smart, P., Tranfield, D., Deasley, P., Levene, R., Rowe, A., Corley, J., (2003) "Integrating 'lean' and 'high reliability' thinking", *Proceedings of the Institution of Mechanical Engineers Part B-Journal of Engineering Manufacture*, 217, (5), PP. 733 - 739.
415. Smith, M., (2016). Collaboration for Resilience: How Collaboration among Business, Government and NGOs could be the Key to Living with Turbulence and Change in the 21st Century. Gland, Switzerland: IUCN. 16pp, available from <https://portals.iucn.org/library/sites/library/files/documents/2016-047.pdf>
416. Smit, B., (2002). "Atlas. ti for qualitative data analysis". *Perspectives in education*, 20 (3), PP. 65-75.
417. Solaimani, S., Gulyaz, E., van der Veen, J.A. and Venugopal, V., (2015). Enablers and Inhibitors of Collaborative Supply Chains: An integrative framework. Production and Operations Management Society. Available from <https://www.pomsmeetings.org/confpapers/060/060-0140.pdf>
418. Soltan, H. and Mostafa, S., (2015), "Lean and agile performance framework for manufacturing enterprises". *Procedia Manufacturing*, 2, PP. 476 - 484.
419. Soosay, C., Hyland, P., Ferrer, M., (2008) "Supply chain collaboration: capabilities for continuous innovation", *Supply Chain Management*, 13, PP. 160 - 169.
420. Speier, C., Whipple, J.M., Closs, D.J. and Voss, M.D., (2011). "Global supply chain design considerations: Mitigating product safety and security risks". *Journal of operations management*, 29 (7-8), PP. 721 - 736.
421. Spina, D., Di Serio, L.C., Brito, L.A. and Duarte, A.L.D.C.M., (2015). "The Influence of Supply Chain Management Practices in the Enterprise Performance". *American Journal of Management*, 15 (2), PP. 54 - 64

422. Stadtler, H. and Kilger, C., (2005). Supply chain management and advanced planning. Concepts, Models, Software and Case Studies, Springer Berlin Heidelberg, New York.
423. Stahl, M., (2013), World War 3 Coming Soon!, WestBow Press, Bloomington.
424. Stalk, G., (1988) "Time: The next source of competitive advantage", *Harvard Business Review*, 66 (4), PP. 41 – 51.
425. Steve Chapman, Tony K. Arnold, Ann K. Gatewood, Lloyd Clive, (2016) "Introduction to Materials Management, 8th edition, Published by Pearson.
426. Stevens, Graham C., (1989) "Integrating the Supply Chains", *International Journal of Physical Distribution and Materials Management*, 8, (8), PP. 3 – 8.
427. Stevenson, M., Spring, M., (2007) "Flexibility from a SC perspective: definition and review", *International Journal of Operations and Production Management*, 27 (7), PP. 685 - 713.
428. Stock, J., Boyer, S., (2009) "Developing a consensus definition of supply chain management: A qualitative study", *International Journal of Physical Distribution and Logistics Management*, 39 (8), PP. 690 – 711.
429. Strauss, A., Corbin, J., (1990), basics of qualitative research: grounded theory procedures and techniques, Sage, Newbury Park, CA, London.
430. Strauss, A. and Corbin, J., 1998. Basics of qualitative research techniques. Thousand Oaks, CA: Sage publications.
431. Suarez-Barraza, M.F., Miguel-Davila, J.Á. and Vasquez-García, C.F., (2016). "Supply chain value stream mapping: a new tool of operation management". *International Journal of Quality & Reliability Management*, 33 (4), PP.518 - 534.
432. Sukati, I., Hamid, A.B., Baharun, R. and Jamal, N.M., (2014). "The moderating role of market, firm and supply chain factors on the relationship between information technology practices and supply chain agility". *American Journal of Industrial and Business Management*, 4, PP. 258-266.
433. Sulaymonov, A., (2017). "Privileges of Free Trade, Factors and Arguments towards Protectionism". *Int J Econ Manag Sci*, 6 (3), available from

<https://www.omicsonline.org/open-access/privileges-of-free-trade-factors-and-arguments-towards-protectionism-2162-6359-1000426.pdf>

434. Suleiman, M., (2013). Oil demand, oil prices, economic growth and the resource curse: An empirical analysis. University of Surrey, England.
435. Svinicki, M.D., (2010). "A guidebook on conceptual frameworks for research in engineering education". *Rigorous Research in Engineering Education*, 7 (13), pp.1-53.
436. Swafford, P., Ghosh, S., Murthy, N., (2006) "The antecedents of supply chain agility of a firm: Scale development and model testing", *Journal of Operations Management*, 24, PP. 170 - 188.
437. Sweeney, E., 2013. Supply chain" mega-trends": Current Status and Future Trends. LinkLine:*Journal of the Chartered Institute of Logistics and Transport (CILT) in Ireland*, Spring , PP. 31 - 34
438. Swierczek, A., (2013) "The effect of material and information decoupling points on supply chain collaboration", University of Economics in Katowicem, Poland, available from <https://www.pomsmeetings.org/confpapers/043/043-0333.pdf>
439. Swink, M., Melnyk, S.A., Cooper, M.B. and Hartley, J.L., (2014). *Managing Operations: Across the Supply Chain*. New York, NY: McGraw-Hill/Irwin.
440. Sugimori, Y., Kusunoki, K., Cho, F., Uchikawa, S.,(1977) "Toyota production system and kanban system: materialization of just in time and respect for human system", *International Journal of production Research*, 15, (6), PP. 553 – 564.
441. Tachizawa, E., Thomsen, C., (2007) "Drivers and sources of supply flexibility: an exploratory study", *International journal of operations and production management*, 27(10), PP. 1115 – 1136.
442. Tammen, Ronald, Douglas, L., Carole, A., Brian, E., Jacek, K., Allan, S., Mark, A., Organski, (2000) *Power Transitions*, New York: Chatham House Publishers.
443. Tanaka, T., (1996). Possible economic consequences of digital cash. *First Monday*, 1(2).

444. Tassava, C., (2008), "The American Economy during World War II". EH.Net Encyclopedia, edited by Robert Whaples. available from <http://eh.net/encyclopedia/the-american-economy-during-world-war-ii/>
445. Tilton, J., (2003), *On Borrowed Time? Assessing the Threat of Mineral Depletion*, RFF Press.
446. Tesfay, Y.Y., Sakita, B.M. and Mawrides, E.K., (2014). "Developing a new market strategy from supply chain management perspective: A case of Jotun in Brazil". *International Journal of Supply Chain Management*, 3 (2), PP. 94 - 110.
447. Timothy Bresnahan and Jonathan Levin, (2012), *Vertical Integration and Market Structure*, Stanford University, Stanford CA 94305, available from <https://web.stanford.edu/~jtleivin/Papers/VICchapter.pdf>
448. Thomas P. Wise and Reuben Daniel , (2015), "Agile Readiness – Four Spheres of Lean and Agile Transformation," Gower Publishing Co. Available from <https://www.cognizant.com/whitepapers/Agile-And-Lean-Transformation-Creating-a-Foundation-for-Success-codex1609.pdf>
449. Thomson, A.M. and Perry, J.L. (2006) "Collaboration Processes: Inside the Black Box". *Public Administration Review*, 66 (1), PP. 20 - 32.
450. Tomas, H., David, C., and David, F., (2014) "How Global Should Your Supply Chains Be?", *Global EDGE business review*, 8 (2), PP. 1 – 12.
451. Tseng, T.L., Gung, R.R. and Huang, C.C., (2013). "Performance Evaluation for Pull-Type Supply Chains Using an Agent-Based Approach", *American Journal of Industrial and Business Management*, 3, PP. 91 – 100.
452. Tseng, K.C., (2015). "The aftermath of financial crisis and the great recession and what to do about them". *Investment management and financial innovations*, (12,1), pp.9-18.
453. Trappey, A.J., Trappey, C.V., Chang, S.W., Lee, W.T. and Hsu, T.N., (2016). "A one-stop logistic services framework supporting global supply chain collaboration". *Journal of Systems Science and Systems Engineering*, 25 (2), PP. 229 - 253.

454. Triffin, R., (1964). The evolution of the international monetary system: Historical reappraisal and future perspectives. International Finance Section, Department of Economics, Princeton University.
455. Trilateral Commission, (2009), Seeking Opportunities in Crisis Trilateral Cooperation in Meeting Global Challenges, available from http://trilateral.org/download/doc/seeking_opportunities2.pdf
456. Tushi, T.E., (2014). “Holistic service marketing strategies and corporate objectives of firms”. *Global Journal of Management and Business Research*, 14 (1). PP. 7 – 27.
457. Ueki, Y., (2013). “Formation of supply chain collaboration and firm performance in the Thai automotive and electronics industries”, IDE discussion paper No. 415, available from <http://www.ide.go.jp/English/Publish/Download/Dp/pdf/415.pdf>
458. Ugochukwu, P., Engström, J. and Langstrand, J., (2012). “Lean in the supply chain: a literature review”. *Management and production engineering review*, 3 (4), PP. 87 - 96.
459. UN, 2020, UN charter, available from <https://www.un.org/en/sections/un-charter/un-charter-full-text/>
460. Upton, D., (1994) “The management of manufacturing flexibility”, *California Management Review*, 36 (2), PP. 72 - 89.
461. Van Hoek, R., (2001) “The rediscovery of postponement: a literature review and directions for research”, *Journal of Operations Management*, 19 (2), PP. 161 - 184.
462. Van der., Heijden, (2000), “Scenarios and forecasting: two perspectives”, *Technological Forecasting and Social Change*, 65 (1), PP. 31 – 6.
463. Vanichchinchai, A., (2019). “The effect of lean manufacturing on a supply chain relationship and performance”. *Sustainability*, 11(20), PP.5751.
464. Vasilev, J. (2013). “The change from ERP II to ERP III systems”. *In Proceedings of International Conference on Application of Information and Communication Technology and Statistics in Economy and Education (ICAICTSEE) (p. 382). International Conference on Application of Information and Communication Technology and Statistics and Economy and Education (ICAICTSEE).*

465. Vastag, G., Kasarda, J., Boone T., (1994) "Logistical support for manufacturing agility in global markets", *International Journal of Operations Production Management*, 14 (11), PP. 73 - 85.
466. Vijayashree, M. and Uthayakumar, R., (2016). "Inventory models involving lead time crashing cost as an exponential function". *Int J Manag Value Supply Chains*, 7(2), pp.29-39.
467. Vishal Vikramsinha, (2015) "Role of information technology in supply chain management", *International Journal of Management Research & Review*, 5 (6), PP. 369 - 379
468. Vonderembse, M., Uppal, M., Huang, S., Dismukes, J., (2006) "Designing supply chains: Towards theory development", *International Journal of Production Economics*, 100 (2), PP. 223 – 238.
469. Von See, B. and Kalogerakis, K., (2015). "Innovation Contests in Logistics. In Innovations and Strategies for Logistics and Supply Chains: Technologies, Business Models and Risk Management". *Proceedings of the Hamburg International Conference of Logistics (HICL)*, Vol. 20 (PP. 3-29). Berlin: epubli GmbH.
470. Waters, D., (2009), *Supply Chain Management: An Introduction to Logistics*, London, Palgrave Macmillan.
471. Waters, D., (2003), *Logistics: An Introduction to Supply Chain Management*, Houndmills, Basingstoke, Hampshire, New York
472. Watts, N., Hahn, C., Sohn, B., (1993) "manufacturing flexibility: concept and measurement", *operations management review*, 9 (4), PP. 33 - 44.
473. Weinberg, A., (1978) "Reflections on the energy wars", *American Scientist*, 66 (2), PP. 153 - 158.
474. Wendler, R., (2013), "The structure of agility from different perspectives". In *Computer Science and Information Systems (FedCSIS), 2013 Federated Conference on*, PP. 1165–1172. IEEE.
475. Wetherly, P., & Otter, D. (2014). *The Business Environment: Themes and Issues in a Globalizing World*. Oxford: OUP Oxford.

476. Wieland, A. and Marcus Wallenburg, C., (2012). "Dealing with supply chain risks: Linking risk management practices and strategies to performance". *International Journal of Physical Distribution & Logistics Management*, 42 (10), PP.887 - 905.
477. Wikner, J. and Johansson, E., (2015). "Inventory classification based on decoupling points". *Production & Manufacturing Research*, 3 (1), PP. 218 - 235.
478. Wilson, J., (2014) "Henry Ford vs. assembly line balancing", *International Journal of Production Research*, 52 (3) PP. 757 - 765
479. Womack, J., Jones, D., Roos, D., (1990) , *The Machine that Changed the World: The story of Lean Production*, Rawson Associate, New York.
480. Womak, L., Jones, D., (1996), *Lean Thinking*, Simon and Schuster Ed, New York.
481. World Energy Council, (2016), *World Energy Resources*, available from <https://www.worldenergy.org/wp-content/uploads/2016/10/World-Energy-Resources-Full-report-2016.10.03.pdf>
482. World Energy Council, (2019), *World Energy Scenarios 2019*, London , United Kingdom, available from https://www.worldenergy.org/assets/downloads/Scenarios_Report_FINAL_for_website.pdf
483. World Economic Forum, (2013), *Energy Vision 2013 Energy transitions: Past and Future*, available from http://www3.weforum.org/docs/WEF_EN_EnergyVision_Report_2013.pdf
484. Wray, L., (1990), *Money and Credit in Capitalist Economies: The Endogenous Money Approach*. Aldershot, UK: Edward Elgar.
485. Wray, L., (1998), *Understanding Modern Money: The Key to Full Employment and Price Stability*. Cheltenham, UK: Edward Elgar.
486. Wray, L.R., (2012). *Introduction to an alternative history of money*, Levy Economics Institute of Bard College, Working Paper No. 717, available from http://www.levyinstitute.org/pubs/wp_717.pdf
487. Wu, K.J., Tseng, M.L., Chiu, A.S. and Lim, M.K., (2017). "Achieving competitive advantage through supply chain agility under uncertainty: A novel multi-criteria decision-making structure". *International Journal of Production Economics*, 190, PP. 96 - 107.

488. Wu, C. and Barnes, D., (2018). "Design of agile supply chains including the trade-off between number of partners and reliability". *The International Journal of Advanced Manufacturing Technology*, 97 (9-12), PP. 3683-3700.
489. Wu, Y., Wang, J. and Li, C., (2019). "Decisions of Supply Chain Considering Chain-to-Chain Competition and Service Negative Spillover Effect". *Sustainability*, 11(6), PP.1612.
490. Xiaoxun, Y. and Jiajun, L., (2016) "The Role of Postponement Strategies to Reduce Supply Chain Risk". *International Journal of Liberal Arts and Social Science*, 4 (4), PP. 57 - 64
491. Yang, K. and Wang, E., (2014). "Optimal control of decoupling point with deteriorating items". *Journal of Industrial Engineering and Management*, 7 (5), PP.1368 1384.
492. Yen-Ting Lin, Ali K. Parlakturk, Jayashankar M. Swaminathan, (2012), "Vertical Integration under Competition: Forward, Backward, or No Integration?", The University of San Diego, San Diego, CA 92110, available from <http://public.kenan-flagler.unc.edu/faculty/parlakturk/papers/P9-Vertical%20Integration-POMS-F.pdf>
493. Yi, W.S., Jamal, N.B.M. and Chin, T.A., (2016). "Exploring Supply Chain Collaboration: Evolution, Definition and Benefits". *The Social Sciences*, 11 (11), PP. 2845 - 2851.
494. Yip, G., (2002), *Total Global Strategy*, London Prentice-Hall.
495. Yusuf, Y., Gunasekaran, A., Adeleye, E., Sivayoganathan, K., (2004) "Agile supply chain capabilities: Determinants of competitive objectives", *European Journal of Operational Research*, 159 (2), PP. 379 – 392.
496. Zailani, S., Premkumar, R., Fernando, Y., (2008) "Factors influencing the effectiveness of operational information sharing within supply chain channels in Malaysia", *Operations and Supply Chain Management*, 1 (2), PP. 85 – 100.
497. Zafar Iqbal and Aasim Munir, (2013) "Outsourcing: A Review of Trends, Winners & Losers and Future Directions", *International Journal of Business and Social Science*, 4, (8), PP. 91 – 107
498. Zitzmann, I., (2014). "How to cope with uncertainty in supply chains?—conceptual framework for agility, robustness, resilience, continuity and anti-fragility in supply chains". *Next generation supply chains: trends and opportunities*. Springer, Berlin, PP.361 - 377.

499. Zhang, H. and Zhao, G., (2008). "Strategic Selection of Push-Pull Supply Chain". *Modern Applied Science*, 2(1), pp.23-26.
500. Zhou, W., Huang, W. and Zhang, R., (2014). "A two-stage queueing network on form postponement supply chain with correlated demands". *Applied Mathematical Modelling*, 38 (11), PP. 2734 - 2743.
501. Zou G., Cavusgil S., (2002) "The GMS: a broad conceptualization of global marketing strategy and its effect on firm performance", *Journal of Marketing*, 66, PP. 40-57.