

DIGITALES ARCHIV

ZBW – Leibniz-Informationszentrum Wirtschaft
ZBW – Leibniz Information Centre for Economics

Loulos, Vasilis; Giarmas, Vangelis; Aidonis, Dimitris

Article

Strategic supply chain design : a foresight based approach involving the middle management

Provided in Cooperation with:

Technological Educational Institute (TEI), Thessaly

Reference: Loulos, Vasilis/Giarmas, Vangelis et. al. (2018). Strategic supply chain design : a foresight based approach involving the middle management. In: MIBES transactions 12 (1), S. 104 - 117.

This Version is available at:
<http://hdl.handle.net/11159/2850>

Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics
Düsternbrooker Weg 120
24105 Kiel (Germany)
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)
<https://www.zbw.eu/econis-archiv/>

Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte.

<https://zbw.eu/econis-archiv/terms-of-use>

Terms of use:

This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence.

Strategic supply chain design: a foresight based approach involving the middle management

Vasilis Loulos

WMG

Warwick University

v.loulos@warwick.ac.uk

Vangelis Giarmas

International Hellenic University (IHU)

egiarmas@gmail.com

Dimitris Aidonis

Department of Logistics

Technological Educational Institute Central Macedonia

daidonis77@gmail.com

Abstract

Anti-globalization rhetoric and protectionist policies have made the task of developing supply chain strategies more difficult. In times of increasing uncertainty, network design and supply chain strategy are becoming a relevant contributor to the long-term corporate strategy both on global and local environments. Well-designed supply chain networks, real time visibility and investment in the right skills and capabilities ensure significant cost reduction in inventory holding, production and logistics cost, as well as potential for service level improvement. In this paper, an approach is presented that describes how a foresight-based supply chain network design approach can leverage the potential of middle management. It contributes by adapting an existing foresight based approach to the needs of strategic supply chain design projects and it provides a methodological framework defining key strategic activities and outputs that can be used from corporate supply chain departments and academy for the needs of supply chain network design assessments. The framework is applied in a global manufacturing company and in particular in a supply chain network design assessment in India, considering changing strategic context and scenario development

Keywords: *supply chain network design, strategy, foresight based theory, distribution management and middle management.*

JEL Classification: L23, M11

The imperative

The current times are characterized by exponential change, new and transformed markets; relationships within and between companies are changing due to shifting global value chains and diverse customer, supplier and competitor landscapes and technologies are increasing continuously. At the same time, capabilities such as know-how, competencies, intellectual assets and skills are becoming more demanding when it comes to gaining competitive advantages, and in global environments expertise and knowledge are dispersed (Darkow, 2014).

According to Perez- Franco, et al. (2016) supply chain strategy of a business unit (BU) is the collection of general and specific objectives set for the supply chain of the BU, the decisions and policies to support them, with the purpose that supply chain strategy supports the overall business strategy, given the BUs characteristics and specifics. Past consolidated research (Hofmann, 2010; Kahn, 2007) clearly indicated that strong are the links between business unit strategies with supply chain strategies and capabilities, especially on the global network design level which can be used as a lever for corporate strategy. Same research concludes that an alignment between corporate strategy and supply chain strategy impacts the performance of the corporation. However, it's not only performance affected; well-designed supply chain networks, real time visibility and investment in the right skills and capabilities ensure significant cost reduction in inventory holding, production and logistics cost, as well as potential for service level improvement. All in all, they contribute to the supply chain triangle including cash, cost and service (Desmet, 2018) Historically, global supply chain strategy can be developed using different approaches and enablers. Examples in literature include product based strategies (Fischer, 1997), designed vs implemented strategies (Withington, 1996), blue ocean strategies (Chan Kim, 2015), Conceptual System Assessment and Reformulation (CSAR) (Perez- Franco, et al., 2016), foresight based strategies (Darkow, 2014) and data driven strategies (IfM, 2017). Considering the topic of strategic network design, there is a plenty of recent scientific research. The main focus can be categorized in the three big categories:

- *Supply chain strategy and global supply chain network design perspectives:* (HBR, 2005) ; (Vereecke, et al., 2008) ; (Melo, et al., 2009) ; (Ferdows, et al., 2016) ; (Pibernik, 2017) ; (Manufacturing, 2017) ; (Desmet, 2018) ; (Blokdyk, 2018).
- *Operations research models and network optimization focus:* (Boonmee, et al., 2017) ; (de Keizer, et al., 2017) ; (Farahani, et al., 2010); (Melo, et al., 2010) ; (Martel & Klibi, 2016) ; (Bassett & Gardner, 2013) ; (Catt, 2007) ; (de Kok & Graves, 2003).
- *Strategy development or strategy as practice focus:* (Fischer, 1997) ; (Darkow, 2014) ; (Chan Kim, 2015) ; (Manufacturing, 2017).

The recent anti-globalization rhetoric and protectionist policies have made the task of developing global supply chain network design more difficult. In times of increasingly uncertain, volatile markets and industry consolidation, business analytics and organizational expertise are becoming a relevant contributor to the long-term strategy of multinational companies by informing and influencing decisions in an educated way. A variety of business analytics tools and capabilities are in place to support top management's strategic decision-making. However, leaders cannot claim to have the full scope of knowledge and capabilities required for creating a long-term, robust and implementable strategy, especially, when it comes to data and information. For this reason, many companies create inside Centers of Expertise (CoEs) with experts with the relevant detailed knowledge about future developments and organizational capabilities. This pool of people with their insights contribute towards supply chain strategy development, alongside with the business analytics tools in an integrative approach.

One of the key challenges that those CoEs or strategy departments face is the typical focus of day-to-day operations on the short to medium term. People fight and focus to ensure that the product is at the right time at the right customer at the expected quality. Therefore, resources (physical, time and monetary) for network design projects can be limited and require careful management.

Although there is strong evidence that supply chain strategy development and global network designed are well approached, there is lack of research combining strategy development approaches and strategic supply chain network design. In this paper, a methodological approach is presented that describes how a supply chain network project can typically occur leveraging both the potential of advanced analytics tools and organizational expertise in an integrative approach. For this reason the following research questions are being addressed:

- RQ 1: What is a typical network design process and how does foresight based strategy works?
- RQ2: What are the links between network design processes and foresight based strategy?

The main output of this paper is the development of a methodological framework for network design projects, leveraging the expertise inside the organization as well and network design and business analytics capabilities. This framework is then applied in a supply chain network design project of a multinational manufacturing company. The case focuses on India, and includes 8 middle managers plus their staff (around 20 people) from 4 countries. The case presents the highly structured process that top and middle management followed in order to sign-off the design of the future distribution network of India, contributing to strategy development as practice in terms of ideas, data, time, resources and analytical work. The project was finally implemented, delivering immediate benefits, quantitative and qualitative.

The remaining of the paper is structured as following: chapter two presents a literature review about supply chain network design and foresight based strategies, chapter three presents the framework proposed and chapter four presents the application of this framework in a multinational company, with conclusions as well as recommendations for future research.

Setting up the context: a review of latest research in strategic network design and strategy development

Strategic network design: Perspectives of pioneering approaches

In the last 30 years, as companies have extended their global reach to access new markets and resources, the academic study of global production networks has accelerated in parallel. Arguably, the earliest work in the area goes back to the 1960s, and by the 1980s and 90s researchers were starting to identify the importance of considering the production network as a whole rather than focusing on factories in isolation. In 1998, Yongjiang Shi and Mike Gregory published the work ''International Manufacturing Networks'' and laid the foundations for some of the most pioneering approaches to research in global asset footprint manufacturing.

Manufacturing and logistics footprint strategy or supply chain network design is the practice of locating and rationalizing the facilities within the supply chain, determining the capacity of these facilities, determining how to source demand through the network and selecting modes of transportation in a manner that provides the required level of customer service at the lowest cost. Supply chain network design models are effective business cases and provide the most efficient way to solve such problems. This is a powerful decision support functionality that enables to better understand and evaluate complex supply chain relationships (Spinnaker, 2006).

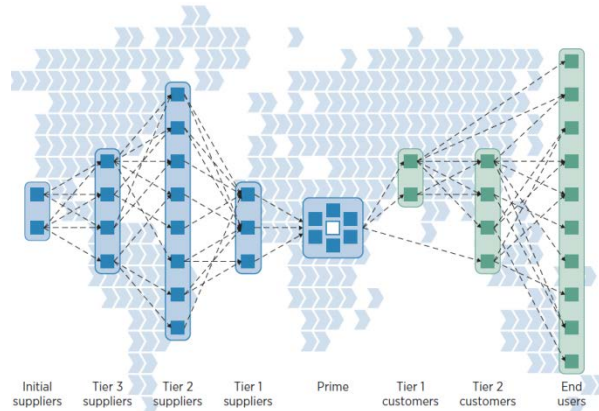


Figure 1. Typical supply chain model

Strategic supply chain design is an operations research/mathematical exercise and indeed a lot of authors put a significant effort to develop models that optimize networks (examples as mentioned include de Kok & Graves, 2003; Catt, 2007; Farahani, et al., 2010; Melo, et al., 2010; Bassett & Gardner, 2013; Martel & Klibi, 2016; Boonmee, et al., 2017; de Keizer, et al., 2017;). However, it's out of the objectives of this research to review models and key findings or approaches, as it is focused on more strategic perspectives.

The main drivers of network design optimization are traditionally cost reduction, service improvement, cash increase and supply-demand balance. Christopher & Towill (2006) addressed the simultaneous need for improved responsiveness to customer demand with the rise of off-shore sourcing by presenting a supply chain strategy taxonomy (lean, agile, "leagile"), assessing supply and demand characteristics. This approach is highly suitable considering product specific supply chain strategies but it did not encompass the element of facility location (an indication is made considering the lead time ranges between geographical locations).

Melo, et al. (2009) conducted a structured literature review of facility location models in the context of supply chain management. The authors identified basic features that such models must capture to support decision-making involved in strategic supply chain planning such as location decisions, network strategy (as per Christopher and Towill 2006), reverse logistics, performance management and optimization techniques.

Looking back to recent research, Perez- Franco, et al. (2016) presented a literature review about ways of supply chain strategy development and they provided a clear evidence how supply chain strategy fit in the business unit strategy (Figure 2). According to the authors, empirical applications of Fischer's (1997) view, matrixing product types and supply chain types have produced mixed and inconclusive results, however, it is considered one of the most influential approaches. Another approach considered in their research is a comprehensive framework for the development of supply chain strategy 'Customer-Product-Process-Resource' and it's highly focused on the business model of manufacturing companies (for example, make-to-order) (Martinez-Olvera & Shunk, 2006). Same authors refer to the methodology Supply Chain Design Decomposition as a systematic way of development and operationalization of supply chain strategy. However, this approach was designed to support new supply chain strategy and not reformulation of existing supply chain strategy. Typical network design methodologies consider both approaches, since a core element is the utilization of existing assets (plants, distribution centers,

transportation fleets etc.). Perez- Franco, et al. (2016) they finally presented a framework for supply chain strategy evaluation, called Conceptual System Assessment and Reformulation (CSAR) using a range of criteria including clarity, feasibility, sufficiency, parsimony, coverage, compatibility, synergy and support. Cambridge Institute for Manufacturing (IfM) focused huge part of its research in long term footprint strategy. It is fully fair and the author of current work is fully aligned with IfM statement that footprint strategy is not a short term restructuring project involving off shoring and outsourcing, coupled with the establishment of production footholds in key emerging markets. Approaches like that underestimate the advantages of – and the potential barriers to – implementing a successful footprint strategy. They also ignore the fact that the target is constantly changing as macroeconomics and technologies shift. Footprint strategy is a repeatable, long-term process that needs to be embedded in annual business planning. Implementation is via a portfolio of projects which are continually refreshed and tested for consistency and alignment (Singh Srai & Christodoulou, 2014). The same institute has developed approach addresses four key questions: Why does a network need to evolve? What is the basis of a company's distinctive market position? Where should each type of plant be located and how many of each should be doing what? How best to achieve the transition and monitor its success?

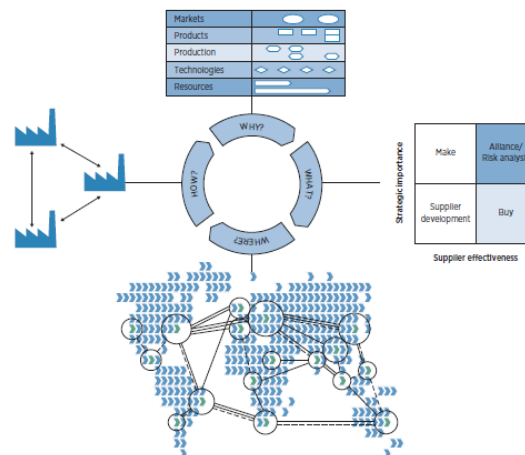


Figure 2. Four-step approach for developing a production footprint strategy as per Cambridge Institute of Manufacturing

Finally and most recently (2018), Desmet presented in his book a structured analysis of the supply chain triangle of service, cost and cash. In particular, he used the model of Treacy & Wiersema (1995) to the supply chain triangle to demonstrate the impact of different supply chain strategies in key financial metrics such as gross margin as a service metric, inventory turns as a cash metric and low total cost (excluding COGS) as a cost metric. This is a wider classification of the context of supply chain strategy, but, indeed, the network design strategies can be used as a lever to optimize this triangle.

A foresight based strategy development approach

The foresight based theory is a result of multitude of theories. Checking the development of management theory since 1940, five main schools can be identified as contributors: prediction of thinking (mainly developed prior to 1940), management thinking (from 1940

onwards), futurology and systems thinking (1970 onwards) and dialectic thinking (2010 onwards). "Future research is no glance into a crystal ball, but has involved into a young meta-discipline of management that builds upon own theories, concepts, tools and rationales" (von de Gracht, 2012).

Foresight logic is not forecasting but foresight which can be defined as a systematic, participatory, future intelligence gathering, mid-to-long term vision building process. Three key aspects of foresight is the anticipation (thinking about the future), the action (shaping the future) and the appropriation (debating about the future) (von de Gracht, 2012)

The integration of foresight logic and the strategy-as-practice research stream enhance the development of strategy theory. Martinet (2010) proposed using scenarios and weak signals in order to identify opportunities and threats approaches that are more related to corporate foresight than to strategic management in our connotation today. The connection of corporate foresight to the strategic management literature is substantiated in the reference to competitive advantage research. Here, the seminal works by Penrose (Penrose, 1959) primarily laid the foundation for defining the need to achieve competitive advantages by bundling valuable, rare, non-imitable and non-substitutable resources. Amit and Schoemaker (1993) referred to the issues of uncertainty and complexity.

Darkow (2014) used in her research work a lot the concept of foresight based theory or "Delphi" based theory (2012), applied in the supply chain and logistics area. She defines supply chain strategy as "all of decisions patterns related to supply chain activities and compliant with the overall business strategy, an approach fully aligned with Perez- Franco, et al. (2016). She believes that the methodological challenges in strategy development are the future of business environment, the translation to company needs, the stakeholder's involvement and the robustness of strategy.

A foresight based strategic supply chain network design approach

Foundation

As stated earlier, one of the key challenges that strategy departments face is the typical focus of day-to-day operations on the short to medium term. People fight and focus to ensure that the product is at the right time at the right customer at the expected quality. Therefore, resources (physical, time and monetary) for network design projects can be limited and require careful management. At the same time, strategic network design requires dispersed expertise with organization and a cross-functional including supply chain, sales, finance, logistics and production organizations in global and regional level. At the same time, numerous analytics solution exist in the market that require technical skills (analytical, modelling etc.) that typically the strategy team compete at, but also the translation of business requirements to analysis.

To solve this problem, I propose a methodological framework for strategic supply chain design projects/processes using the foresight approach to leverage the potential of middle and top management. This overarching approach can be used in most of the areas of network analysis and design (i.e. production, end-to-end supply, service and global value networks). It deploys tailored tools and strategic activities specific to each area. Singh Srai & Christodoulou (2014)

introduced first a four-step process for strategic design of global networks. This includes the changing of strategic context, the analysis of the current network, the design of the future network and the network transformation. Darkow (2014) presented a foresight based strategy development approach. It is a cyclical process consisting of five stages: strategic intelligence, strategic foresight, strategic options, strategy assessment and decision and strategy implementation and review.

For the purposes of the study, I merged the two frameworks and I explore the relation between the two of them. I further contribute to research by defining the foresight strategy development approach as enabler for strategic network design and I further define the outputs and the key strategic activities needed to be performed considering this process.

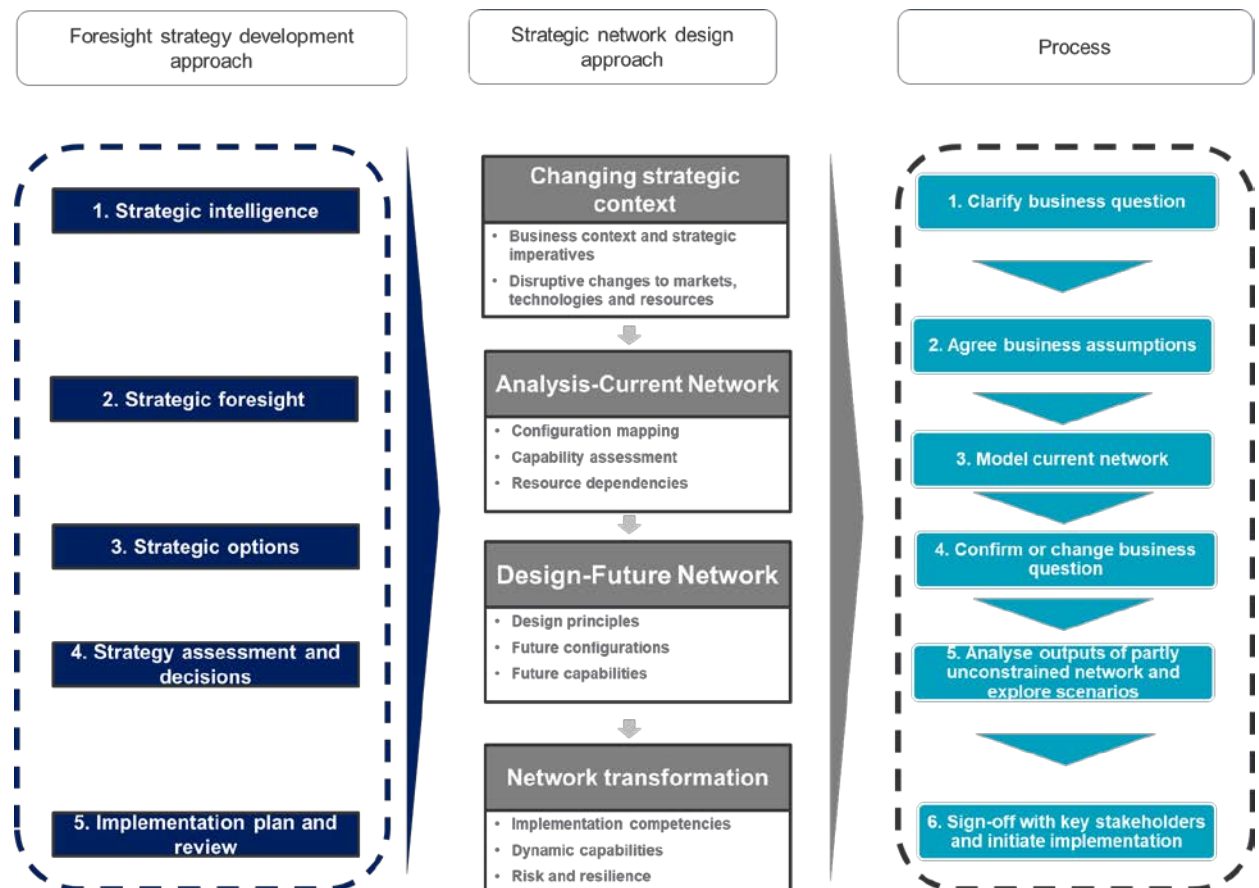


Figure 3. A foresight based approach for strategic supply chain network design

Stage 1: Changing the strategic context

As per Singh Srail & Christodoulou (2014) the process of strategic network design starts with analyzing the change of strategic context. This typically covers the business and technology drivers relating to the scope of the challenge – and resulting in clear articulation of the strategic imperatives. The question what is the purpose of the new network is a basic outcome of this phase. As per same authors, cost reduction, service improvement, gaining competitive advantage across the end to end supply chain, developing a successful service supply network and configuring global value networks for emerging and

disruptive technologies are the main strategic imperatives that articulate.

With regards to cost reduction, a recent research from SCM World (2018) claims that "cost remains paramount but firms are taking a more holistic view". The increased competition especially from China and India shows that cost remains a key driver of manufacturing and sourcing decisions in many sectors. The diminishing of labor arbitrage benefits, combined with higher logistics costs and import duties, has put the spotlight more intensely on total landed costs as the assessment criteria when comparing different locations or weighing the benefits of reshoring or nearshoring production facilities. At the same time, long distance supply chains are becoming more costly. Manufacturing capacity shortages in China for products like chemicals and electrical appliances - the result of tougher environmental regulations and higher domestic demand respectively - have also pushed up costs and forced companies to place orders further in advance. That's also why lead-time reduction is assuming a greater importance. Capacity problems not only increase costs, but also extend what may already be long lead times even further. Reducing these and improving speed to market are assuming greater significance for many companies. Moreover, the political rhetoric around free trade agreements such as NAFTA, and how issues like Britain's exit from the European Union ("Brexit") could impact global networks. Global trade factors are weighing more heavily than in the past. Tariffs have certainly moved up the agenda during the past decade. Other factors that enter the equation include tax rates, currency exchange movements, international sanctions and government incentives to set up manufacturing operations in, say, Indonesia or India. All of those factors, in parallel with of heightened uncertainty could lead to an argument that the case for localization is further strengthen (Gartner, 2018).

Strategic intelligence and foresight work are enablers that can be used when analyzing and considering the changing strategic context. Strategic intelligence and foresight here have an external and internal dimension. The external analysis refers to the identification of the most relevant drivers and forces within the macroeconomic environment and relevant factors in the industry environment. Here, main uncertainties and trends are identified by desk research, and interviews conducted with internal and external experts as well as in internal workshop discussions. For the internal analysis, historical performance and data is identified and strengths and weaknesses derived. On the top of that is really important to have a future perspective about changes in the supply chain environment such as future customer and market requirements, new product introduction. This is a phase that, middle management involvement is ensured by calling upon them as internal experts for interviews and discussions and using their expertise in identifying the organization's future landscape. Aligning that approach globally and cross-functionally, ensures that an intercultural background of stakeholders is considered in strategy approach. The streamline of those discussions provides as output the formulation of business question that the network design exercise aims to answer (Darkow, 2014).

Stage 2: Analysis-Current Network

This is about creating a deep understanding about the current network in terms of configuration and capabilities. It has to do with understanding the total cost of operations, the current service levels provided and other constraints such as capacity constraints, inventory constraints or transportation constraints. In this stage, there are a

lot of data that needs to be collected in order to agree the level of analysis granularity, as well as to make sure that modelling strategy serves the purpose of the business questions. In this phase, the strategic intelligence and foresight work plays important role. From strategic intelligence perspective, all internal stakeholders need to get involved in order to collect the input for current network analysis, align the as-is network analysis, but also identify optimization focus for scenarios. From foresight work perspective, there is an element of evaluating relevance and interaction of driving forces and factors, but also deciding for relevant forces and factors that ensure a better and more thorough understanding of the current network. The output of this phase is a common agreement between the internal stakeholders about the assumptions that makes sense to be considered, and of course a modelling exercise, depicting the as-is network.

Stage 3: Analysis-Future Network

This is the key creative activity that designs the future network. This requires "distillation of the fundamental network design principles and the evaluation of a range of future configuration options leading to an agreed vision" (Singh Srai & Christodoulou, 2014). The stage contains four integrated elements from foresight based theory described in Darkow's (2014) framework: strategic intelligence, foresight work, strategic options and strategy assessment and decision. Collecting and analyzing future business requirements as well as creating and validating the scenarios are important parts of strategic intelligence and foresight work. The strategic options is the phase of foresight cycle that links the future network design with the overall corporate vision, mission and objectives. It includes deriving scenarios based on implications, and the detailed definition of scenarios as strategic options. Typical methods to deploy this phase are SWOT analysis, and cross-functional workshops. Finally, strategy assessment and decision contains various strategic activities such as building the business case, checking for scenario robustness of strategy, aligning scenarios with other regional strategy work streams and finally develop a proposal for future network design, usually with 2 or 3 maximum different alternatives. A typical approach in the phase of the design of the future network is the definition of the 'unconstrained network'. As mentioned in chapter 3.3., the analysis of the current network optimizes the objectives subject to a set of constraints (inventory, transportation, capacity). The unconstrained approach can be considered as a design from scratch or in a blank page. Taking all of those into consideration, typical outputs of this phase is the development of unconstrained network and the realization of scenarios agreed with internal stakeholders.

Stage 4: Network Transformation

This phase involves the network transformation - not just defining the executable projects but, crucially, identifying the organizational competences and resources required for implementation. This phase entails preparing a strategic roadmap, the detailed business case for the scenarios that will be realized and an implementation plan with targets to be achieved in the years ahead. Detailed measures for the strategic choices made during the previous phase are often linked to fields of expertise or market segments.

The steps described above usually are the main focus of Central (or global) Network Design team and need to be increasingly aligned with specialist teams coming from the Centers of Expertise that are focused on implementing the strategy and are often later responsible for daily operations. Due to the continuous involvement of middle management throughout the process, it is very likely that greater strategic consensus, and therefore a better implementation result, can be achieved (Darkow, 2014). Liedtka (2014) additionally states that strategic change may be facilitated due to the participative approach in strategy development. The advantage of including middle managers in the creation of scenarios, detailed roadmaps and business cases lies in strategic measures being executed more smoothly during the implementation phase and it helps the 'buy in' from the organization to the global supply chain network design teams and needs to be structured and in a process oriented way. The network design process is a continuous review process in a regular basis (usually once per two years), where the strategy is continuously checked with regard to the implementation status and appropriateness in light of changing business environments. The network assessments might be refreshed every two or three years, but fundamental elements such as data collection (rough cut capacity, inventory levels) should be yearly updated.

Strategic supply chain network design integrating a foresight based approach: a case study

The framework proposed is applied in a project of a global manufacturer from the area of agrochemicals, with core business the crop protection and the seeds products. The company is proud of its strong R&D productivity and in 2015 boasted the highest Sales Income to R&D ratio within the industry. The company has a strong product pipeline with 7 new lead crop protection products expected to be introduced around 2022. This poses opportunities and challenges with supply chain development for new products whilst it rationalizes its existing portfolio to comply with remedies, and also seeks to take advantage of remedies for other mergers within the industry whilst rival firms are also following suit.

In order to observe and analyze how the organization dealt with the approach, a qualitative, case-based approach was taken. Case study analysis involves the in-depth study of the research object, which comprised conducting and analyzing interviews, and making personal observations. The advantage of this research method is gaining in-depth familiarity with the situation following a long period of personal observation. Snow and Thomas (1994) even support the idea of enhancing observation by participating in the organization or entity of interest, here within strategy development.

The main focus of the supply chain network design project is the re-design of the future distribution network in India. As of today, the structure of the network includes four primary warehouses (primary network) and twenty six secondary warehouses (secondary network). The main operating model is that primary warehouses source the secondary warehouses and the secondary source the final retailer. In some cases the primary network sources the retailer. In the context of new "Go-to-market" strategy (GTM) and the implementation of the new unified taxation cross-country in India, the leadership team decided to initiate a project for the re-design of India. Key agreement was a short term improvement in a 2 years horizon and an establishment of a review process to ensure the sustainability of the network on the long term.

The purpose of this network design project is to set direction and alignment with a strategic view of supply chain. The project kicked off in September 2017 with all internal stakeholders, including the 8 middle and senior managers from the region, and the global supply chain network design team. Those managers and staff have a different cultural, functional and educational background. Overall, representatives from the following 3 countries were included in the process: United Kingdom, Switzerland and India. Representatives from the following functions were involved: supply chain network design, India Supply, India Logistics, India Finance, Global Finance and Global Logistics.

The main goal of the case study is to describe how the foresight based approach helped involving the middle management in the process of network design and ensure a "buy-in" from the organization. Tables 1-5 shows the key strategic activities performed (''what'') the outcome (''why'') and the methods and means used to achieve the outcomes ("how").

The whole process lasted three months. After the completion of the project the company performs a final workshop in a GDD format (Good, Difficult and Different).

The "good" points captured are the following:

- Assessment was completed on time and Project funding after being discussed for a long time.
- Deep insights into changes in materials flows and likely impact to the changes
- Good connection with global community (Supply Chain, Planning & Finance)
- Confirmed what we were doing, discuss trade-off decisions to be made.
- Senior Stakeholder discussions was very positive. Able to present data required quickly.
- Good engagement across the functions during the assessment answering questions.
- Communication was good and open to discuss challenges and ideas
- Financial numbers were aligned well to the assessment findings
- Scenarios were sensible
- Data and assumptions were clear.
- Hands on learning for the team doing the assessment.

Difficult points were recorded the following:

- Too many slides being shared during the weekly check-ins with team members.
- Involved a lot of people during various stages of the assessment.
- Clarity of communication who, what information to be shared and when to share.
- Issues of confidentially - what we communicate with whom?
- What is the standard of reporting? Especially with regards to financial results?
- Clarity of the project management methodology and which stage does this fits into?
- Who is accountable for guiding client, or Project team through the PM methodology and Stage Gates.

To be different in the future the following points were recorded:

- To agree data accuracy versus speed of the Project at the start of the assessment.
- Teeing into the PM CoE and BPC early on in the assessment.
- Clear confidentiality agreements.
- Agree at the beginning how the targeted benefits will presented (e.g. NPV, or other?)
- To develop assessment template/checklist to help with future projects.
- The knowledge transfer roadmap to be visible from Assessment start to G0 Entry Approval.

The foresight-based strategy development approach in a multinational manufacturing company shows why and how middle management should be included in strategic decision-making. The analysis showed how, and for which tasks, top and middle management were involved in a comprehensive set of 11 activities. The structured approach helped a lot the discussions as well as to create a shared understanding of the future trends and challenges. However, the following points were considered as challenges in the methodology:

- Representatives of various countries had different levels of knowledge about future business requirements and the market, while different hierarchical levels had diverse interests that they sought to realize by strategic planning in Asia.
- Virtual project was challenging due to distant work. Alignments and calls needed sometimes to be remotely and that created complexity in the overall project management.
- The intercultural backgrounds contributed to an integrative and comprehensive set of strategic measures that was supported by all of the internal stakeholders.
- Skills and knowledge about strategy development from middle management were heterogeneous.
- Some managers seemed to be more reluctant to adapt a long-term view, and workshop discussions tended to be narrowed down to daily operational problems. Strategy staff and the top management team had to adjust and steer the discussion to get it back on track, focusing on the strategic issues.

As per future research, the approached could be rolled out to other companies and other projects. The approach uses methods such as workshops, interviews and discussions that are usually subject to personal interests and conflicts (eg. between functions). It would be interesting to apply theories of behavioral science to decision making in supply chain management, an area that is still not fully being researched.

References

- Amit, R., Schoemaker, P., 1993, "Strategic assets and organizational rent", *Strategic Management Journal*, Issue 34, p. 1689-1709
- Bassett, M. & Gardner, L., 2013, "Designing optimal global supply chains", *Annual Operations Research*, Issue 203, pp. 187-216.
- Blokdyk, G., 2018, "Strategic network design". 2nd ed., CreateSpace Independent Publishing Platform.

- Boonmee, C., Arimura, A. & Asada, T., 2017, "Facility location optimization model for emergency humanitarian logistics", *International Journal of Disaster Risk Reduction*, Volume 24, pp. 485-498.
- Catt, P., 2007, "Assessing the Cost of Forecast Error", *The International Journal of Applied Forecasting*, Issue 2, pp. 113-118.
- Chan Kim, W., 2015, "Blue Ocean Strategy, Expanded Edition: How to Create Uncontested Market Space and Make the Competition Irrelevant", Revised (eds), New York, *Harvard Business Review Press*.
- Darkow, I., 2014, "Developing Supply Chain Strategies -A foresight based approach to integrate expertised dispersed within and outside organisation", *BVL Verlag*, Proceedings of International Conference in Logistics, pp. 97-126.
- De Keizer, M., 2017, "Logistics network design for perishable products with heterogeneous quality decay", *European Journal of Operational Research*, Issue 262, pp. 5635-549.
- De Kok, A. & Graves, S., 2003, "Supply Chain Design: Safety Stock Placement and supply chain configuration", *Handbooks in OR & MS*, Issue 11, pp. 1-38.
- Desmet, B., 2018, "Supply Chain Strategy and financial metrics", Belgium, *Kogan Page*.
- Farahani, R. Z. & Steadie Seifi, M., 2010, "Multiple criteria facility location problems: A survey", *Applied Mathematical Modelling*, Issue 34, p. 1689-1709.
- Ferdows, K., 2016, "Delaying the global production network into congruent subnetworks", *Journal of Operations Management*, Issue 41, pp. 63-74.
- Fischer, M., 1997, "What is the right supply chain for your product?" *Harvard Business Review*, Issue 2, pp. 105-116.
- Garner, 2018, "Where is next for globalisation", *Garnter Website*.
- HBR, 2005, "LEGO GROUP: AN OUTSOURCING JOURNEY", *Harvard Business Review*, Issue 3(12), pp. 1-16.
- Institute of Manufacturing Cambridge University, 2017, "Next Generation Supply Chains: Making the right decisions about digitalization", Cambridge University Publications.
- Martel, A. & Klibi, W., 2016, "Designing Value-Creating Supply Chain Networks". 1st ed. Switzerland: *Springer International Publishing Switzerland*.
- Martinez-Olvera, C. & Shunk, D., 2006, "Comprehensive framework for the development of a supply chain strategy", *International Journal of Production Research*, Issue 21(41), pp. 4511-4528.
- Melo, M., Nickel, S. & Saldanha-da-Gama, F., 2009, "Facility location and supply chain management - A review", *European Journal of Operational Research*, Issue 196, pp. 401-4012.
- Melo, T., Nickel, S. & Saldanha-da-Gama, F., 2010, "Network design decisions in supply chain planning", s.l.: *Fraunhofer-Institut für Techno- und Wirtschaftsmathematik*.
- Penrose, E., 1959, "The Theory of the Growth of the Firm", New York: *John Wiley & Sons*.
- Perez- Franco, R., Phadnis, S., Caplice, C. & Sheffi, Y., 2016 "Rethinking supply chain strategy as a conceptual system", *International Journal of Production Economics*, Issue 182, pp. 384-396.
- Pibernik, R., 2017, "Strategic Network Design", *Lehrstuhl für Logistik und Quantitative Methoden*.
- Singh Srail, J. & Christodoulou, P., 2014, "Strategic approaches to configuring international production, supply and service operations", Cambridge University Press.

- Spinnaker, 2006, Perspectives and methodologies to tackle the most challenging supply chain dilemmas, s.l.: Spinnaker.
- Treacy, M. & Wiersema, F., 1995, "The discipline of market leaders: choose your customers, narrow your focus, dominate your market", *Addison-Wesley Publishing Company*
- Vereecke, A., De Meyer, A. & Van Dierdonck, R., 2008, "The strategic role of the plant in international networks: a longitudinal study", *Cambridge white papers*, Cambridge Judge Business School.
- von de Gracht, H., 2012, Lecture on corporate foresight and strategic management
- Withington, R., 1996, "Strategy as practice". *Long range planning*, Issue 5(29), pp. 731-735.