Collection of High Graded Student Papers on Innovations in Logistics and Supply Chain Management

Course Minor Supply Chain Management

at

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Programme Logistics Management.

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Table of contents

Introduction by the supervisors

In the past, supply-chain managers' key challenge was to cut costs along a single line of suppliers. Now companies are hyper-connected by networks, mobile and social media, and speed has become more important. Product lifecycles are shorter and more fluid, and customers are pressing for swift and exciting innovations, quicker development, and faster delivery. As a result, supply chains are facing huge strategic challenges.

The papers which are included are written by students of the minor Supply Chain Management at Rotterdam University of Applied Sciences, a part of the School of Built Environment, Programme Logistics Management. During this course, today's best practices and future emerging practices which may be disruptive for today's logistics and supply chains were covered. Students were assigned to write an academic paper, using an APA assignment template. The paper had to meet the following criteria: (a) at least ten articles and or textbooks must be used, (b) at least thirty percent of the articles used for the paper shall be peer reviewed, (c) the paper should not be less than five but not exceed six pages (excluding title page and appendices and bibliography), and (d) the paper shall comply with the APA style.

Papers were written on subjects assigned to the students. The table below shows the subjects covered. The papers presented here are the 10 best papers, all graded with at least a 7 out of 10. For many students this was a first encounter with writing an assignment strictly following the APA style rules, therefore the assignments included here may still include some deviations from APA.

Subject
The impact of 3D printing on traditional Supply Chains
The impact of Cross Chain Control Centre (4C) on supply chains
Supply Chain Finance and Supply Chain Management
Ethics and Supply Chain Management
Big Data and Supply Chain Management
Block chains and Supply Chain Management
Managing first, second and third tier suppliers
The sustainable and circular supply chains
Online shopping: challenge for supply chains?
Effects of customs and trade compliance on Supply Chains (for instance TTIP, CETA)
How to measure the effectiveness of a supply chain?

Analysing the Military Supply Chain using Big Data Analytics

Group 15

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Abstract

Not only companies are using Big Data to improve internal processes to survive. Also, The Netherlands Ministry of Defence is adapting to a world where the need for real-time information is crucial to the mission and Supply Chain Management within the ministry. In this article, the authors explain the phenomenon Big Data and how the ministry uses Big Data Analytics to improve processes in order to keep the world a safe place.'

Keywords

Supply Chain Management; Big Data Analytics; Defence; Information Systems

Analysing the Military Supply Chain using Big Data Analytics

The decisions and investments made today will determine the assets and capabilities of the Netherlands Ministry of Defence (MoD) for the next decades. The defence organization has many options about how best to equip, organize, supply and maintain its armed forces in order to keep the nation as safe as possible (Morgan, et al., 2017). However, the current developments ask the ministry to not only be fully operational at all time, but also being more cost efficient. For this reason, the analysis of big data will be an important part of the decision-making process within the organization. The analytics of the data can support both operations and business operations sides of the MoD in order to guarantee both requirements. In this article, the need for Big Data Analytics (BDA) will be explained while focussing on the military Supply Chain.

Big Data Analytics (BDA)

In recent years, the analysis of Big Data has become common practice within the private sector. The analysis is possible by processing large amounts of data in a more effective manner. Using the information retrieved from the data contributes to the profitability of a company. For example, Supermarket chain Albert Heijn introduced the so-called ‘Bonus Kaart’ in order to retrieve more detailed information about customers, visits and consumption patterns (demand). From this data, Albert Heijn is not only able to predict customer demand but also the reaction on sales. Management uses this information to improve its internal supply chain processes varying form safety stocks to storage locations and transportation movements (Seegers, 2015). Besides the profit

sector, Big Data Analytics (BDA) is also becoming the standard in the public sector (IBM, sd). According to Davenport (Competing on Analytics, 2007), business analytics can be defined as 'the broad use of data and quantitative analysis for decision-making within organizations. In a closed-loop cycle for continuous learning and improvement. It encompasses query and reporting, but aspires to greater levels of mathematical sophistication. It includes analytics, of course, but involves harnessing them to meet defined business objectives.' Many companies are struggling with BDA. According to the commentary of C. Boulanger on the article of T. Davenport (2007), many organizations are investing in the analytics and analysis, but often have dissection systems, disagreements about KPI's, and no internal ownership.

The availability of Data at the MoD

Within the Ministry of Defence, the urgency for Big Data Analytics grows due to the increasing importance of cyberspace. The interdependence between the physical and virtual world grows. In the recent years, the MoD faced an increasing amount of available data. This includes staff information on goods flows or increasing information flows in mission areas. Most of the data is included in (semi) structured databases like SAP ERP (Maas, Fenema, P.C, & J.K., 2014) . But where in the past databases had a magnitude of some gigabytes, we now speak about terabytes (1 terabyte is 1000 gigabytes) and Peta bytes (1 PETA byte is 1000 terabyte). The database of the 'Provinciaal Reconstructie Team in Uruzgan' existed on departure from Afghanistan in 2010 over 125,000

documents (van Fenema, Kalden, Rientjes, & van der Sluis, 2015). The volume of data is the most prominent of the three characteristics of Big Data.

In addition to the data size, Big Data has two other main characteristics: velocity and variety. As for the speed, in the past is was common that many databases were filled in periodic batches. Nowadays, the trend is focussed on the real-time availability of mission and business information (van Fenema, Kalden, Rientjes, & van der Sluis, 2015). For example, a commander wants to have direct insight into the employability of its equipment. This is possible due to the effective use of BDA within the MoD.

The use of BDA at the MoD

The analysis of Big Data is not only used for operational matters such as thread analysis or mission information. The MoD uses data gathered from the Supply Chain to map processes and detect defects in order to implement improvements. The data needed for the so called ‘process mining’ originates from transaction data within the SAP ERP working environment (Nooijen, van Dongen, & Fahland, sd). Patterns of defects can be learned from and will hopefully be prevented on time. During long-term operations, strategic transportation can be optimized. Different routes can be analysed in order to reduce lead-times and supply chain risks.

Within the network of the supply chain, a feasible demand and delivery plan is established. This plan has a focus on keeping inventory levels low and service levels high. In order to establish a feasible demand for articles and services, the understanding of demand must be as accurate as possible and requires real-time demand-analytics with

demand prediction techniques. Also, in the supply chain, the highest level of flexibility must be built in to simultaneously respond to demand as the delivery priorities. Also for this, a responsive management is needed on real-time analytics. Within the supply chain, an integrated logistic planning is needed in order to regulate the most efficient and sustainable transport and Warehouse management processes as possible (van der Sluis, 2014). The usage of BDA enables the MoD to make better decisions and to maintain a better alignment between different parts of the organization and suppliers leading to more effective and efficient operation and cost reduction throughout the entire process (van Fenema, Data Driven Defensie, 2016). This also strengthens the position of MoD against suppliers and is part of the Smart Buyer/vendor management role (Morgan, et al., 2017).

In the standard operations, BDA is among other things responsible for providing strategic insight, control and stability. Political questions such as: How many resources are available; Are units available and when can we be operational in a certain area? Can be answered quicker and backed up by reliable information. Within the different parts of the organization, the match between tasks, resources, needs and availability can be optimized. This is important for the short-term, while starting a new mission, as for the long-term when we talk about life cycle management for instance (Beeres, Fenema, Bollen, & Dado, 2014) (de Gooijer, 2017). BDA provides the tools to be in control at all levels.

The future

Within the private sector, companies invest in analytics and big data to gain insights into the relationship with customers and suppliers. At the moment, we find ourselves in the transition from Analytics 2.0 to 3.0 (Beeres, Fenema, Bollen, & Dado, 2014). In the past, data was often externally 'sourced' and very large and/or unstructured. The fast flow of data meant that it had to be stored and processed quickly, often with solid parallel servers running on hardware. The overall speed of analysis was much greater. Visual Analytics often supplanted predictive and prescribing techniques.

Nowadays we use a different approach. Prescribing analytics to help us not only learn from previously taken decisions, but also predict emerging issues and plans. By combining structured and unstructured data into a hybrid dataset, smart Data technology allows you to create a total image of an issue. And, in theory, the best possible decision to take is determined on the basis of this dataset. and prescribing analytics uses Multi-structured (hybrid) datasets to predict the future (van der Sluis, 2014).

The implementation of SAP at the ministry started back in 2002 and was named the ‘SPEER-project’. This project has become the most expensive the most expensive ICT-project at the ministry and has a projected cost of 950 million euros (Dijkhuizen & Beerens, 2015). According to supply chain expert Walther Ploos van Amstel (ICT-slagveld bij Defensie, 2014) the project was too ambitious for its time. At the time ministry was the first in the world to attempt to implement an ERP system across all parts of a nations armed forces. Van Amstel states that at the time the planning phase of the

SPEER-project was too ambitious. This needs to be taken into account during future projects.

The ministry of defence invests in new BDA projects in order to be in control of all data. According to a vison document of the Defensie Materieel Organisatie (DMO) (van der Sluis, 2014), the ministry does not only research Big Data possibilities in the military sector. Every use of big data when used in the supply chain management will be followed closely. The department aims to learn form best practices across industries in order to achieve better performance.

Conclusion

The Ministry of Defence relies in its operations on the information is retrieved from several databases, mostly SAP. This information crucial for the ministry to check if KPI's are met, and if not where do problems (defects) occur during the process. The ministry invests in its future with Big Data Analytics and by doing this, the ministry and the military is able to fulfil their duties. Keeping the Kingdom of the Netherlands and its citizens safe and to preserve worldwide open trade routes.

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Big Data and Supply Chain Management

Team 5

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Abstract

This paper contains a brief overview of the role big data has in business society, accompanied with its theoretical and practical implications. At the end, a short looking at social networks and its data, which give the food industry a good competitive advantage is performed, to have a more practice-oriented overlook on the situation.

Keywords

Big Data, SCM, Social Networks, Competitive Advantage & Information

Big Data and Supply Chain Management

The word Big Data was historically referred as the overflow of an immense amount of data in a range of numbers unthinkable to a human brain and now extended itself representing a process of obtaining, storing, visualizing and interpreting the data (Zhong, Newman, Huang, & Lan, 2016). The concept of big data computing is first mentioned in an article of a digital library in 1997 (Zhong et al., 2016). Nowadays, more and more firms invest their money into the development of an intelligent system, which could enhance the overall company's effectiveness and efficiency, eventually having an extraordinary impact on the bottom line (Zhong et al., 2016). Moreover, Big Data industry is forecasted to be one of the ten most important market trends in the upcoming century. Experts forecast a value of around 120 billion dollars by 2022 with an average growth of 26% in the years from 2014 to 2022 (Zhong et al., 2016). According to KPMG (2017), companies exploiting big data are potentially more competitive and more profitable. Data analytics helps companies creating a more responsive and agile supply chains, because of their better understanding of the market around them. An analysis is usually done by combining sales, social media, market, demographics and direct data inputs. All this can bring companies' the possibility of a proper planning of its supply chain, as well as being proactive rather than reactive to supply chain risks (KPMG, 2017).

The key question within such framework is how to get the most out of the massive amount of data present. This logic applies to any industry and could take part in

any of the industry's sectors. The difficult part is finding a proper balance between placing too much or too little time harvesting the data. Both "extremes" are not beneficial because they can both have undesired effects. In the first case, the data obtained can be meaningless, while on the other hand, placing too little time harvesting the data can result in a loss of opportunity, ending up in unexpected supply chain disruptions and dissatisfying customers. Hereby, it is necessary to work smarter, not longer (Schoenherr & Speier-Pero, 2015).

The authors will take a fast look at the major theories regarding the big data world in SCM, and later apply the theory to a case study, to have a practical overview of the situation.

Literature Review

The literature was obtained from peer and non-peer reviewed journal articles and some useful insights gotten from website based articles. The written works describe today's role of big data with its implications on SCM. They try to give some theoretical and practical basics and applications to understand the role of a proper data management in supply chains. Finally, by using relevant findings, the paper is concluded with a case study describing data analysis performed in the beef industry and its implications to all connected industries.

Theory about Big Data in SCM

Big data is a relatively new field, so its applications to SCM are not yet well theoretically defined. However, big data is usually defined encompassing the 5V's (Volume, Velocity, Variety, Verification, and Value), which define the basis of understanding big data (Waller & Fawcett, 2013).

In many circumstances, reviewers find works atheoretical, for their lack of theoretical basis (Waller & Fawcett, 2013). In a good portion of the cases, the papers are rather more outcome-based (industry based results) than theoretically based findings. This is happening, because, big data is relatively new and most of the research is based on the findings carried out by companies trying to get the most out of data (Waller & Fawcett, 2013). The academic world likes proven theoretical foundations, which are still lagging in this world, but authors think that the early stages are now over and upon those empirical findings (which lack of supporting theory) a theoretical basis can be developed. There are some cases where companies' findings have outperformed those with a theoretical basis. Google outperformed a Medical center (and its deeper understanding of the field) for predicting the flu outbreak. Wall Mart found interesting data about items sold before a hurricane. The theory would suggest people buying necessity items, but the findings (carried out using the correlation analysis) rather suggested that popcorn was one of the most sold items. Thus, such data reduces costs related to the inventory and gives management better implications on how to serve the devastated areas after the hurricane, by providing water and popcorn (Waller & Fawcett, 2013; Schlegel, 2015).

Applications in SCM

The applications in the SCM world are multiple as help companies become more precise in allocating resources, enabling to make more strategic and informed decisions (Addo-Tenkorang & Helo, 2016). Big data helps companies enhancing end pipeline visibility, real-time demand adjustments (dynamic pricing) and so offering better products. For KPMG (2017), big data can be applied to 6 major phases of the supply chain, namely: Delivery, Inventory Planning, Distribution, Demand Forecasting, Warehousing, and Scheduling. Big data not only makes all these steps more functionally efficient but rather links all these together as a single entity, by bringing together supply and demand increasing efficiency and market responsiveness.

According to Singh, Jain, Metha, Mitra J. and Agrawal (2017), the direct benefits of the adoption are multiple. Some of them are: reduced delivery time (big data links companies' and customers' systems enabling a faster prediction (even before the customer takes any decision) with the planning eventually made in advance); reduced inventory costs (better prediction patterns eventually lead to a lower need for safety stock); lower operational costs (this variable is seen as multiple, comprehending different types of sub variables inside, like: (electricity, direct labor, transportation, etc.), which can be easily mutually analyzed and eventually lowered with a proper big data analysis. The last and probably most important benefit is the improved customer service. This variable is certainly the most important now, when customers are always put at the first place, since it enables companies to carry out customer-specific products and services,

giving them advice before, during and after the sale. According to Newman (2017), data analytics allows companies getting much more personal than ever before. However, only if used correctly, without being abused, this can get benefits (Arunachalam, Kumar, & Kawalek, 2017).

The role of social networks in the age of Big Data.

Data retrieved from Statista (2017), about the number of social media users worldwide 2010-2021 shows, that almost 2.5 billion people use social networks worldwide, making it a very powerful tool. Companies understood the potential coming out of these social hubs some years ago and started invested in heavily (Fronetics Marketing the Supply Chain, 2014). Nowadays, popular or less popular brands use social networks to enhance the brand name. Every time a person opens its social account eventually sees any brand's post, advertising itself using a language basically identical to the one used by other users of the same social network. Two studies conducted by Fronetics Marketing the Supply Chain and Fronetics Strategic Advisors (2014) regarding the benefits of social networks among supply chain firms show, that the first two positions are taken by increased visibility (95%) and better brand image (90%). Moreover, these surveys/reports indicated that in 68% of the cases, companies had perceived tangible benefits exploiting social networks. Namely, the research study showed, that those companies had increased business and market intelligence as well as their engagement with customers. At that time firms still didn't completely find social

media involvement as a tool for shortening sales cycles. Now, almost all big firms are present on social networks to exploit the data pool and share the knowledge. Knowing in advance a person's individual behavior (via interactions such as likes, comments, sharing, posting) helps to have a complete knowledge of the customer, thus giving the possibility of making special (tailor made) offerings. Those special offers are in fact already known and so the planning is done much faster and with less inventory needed. Basically, this is a demand management process which is not just managing the demand but eventually creating it (Davis, 2016).

Case study (Big Data and SCM in the Food Industry)

Food's supply chain is more difficult to manage because of its nature (Singh, Shukla, & Mishra, 2017). The products sold are perishable by nature. Thus, a different approach must be taken to ensure their proper delivery. The core object stays on customers, i.e., a customer-centric supply chain.

A study case conducted by Singh et al. (2017), linked the use of Twitter and its tweets regarding beef to create a basis for the customer-centric supply chain. Basically, the method consists of first obtaining data relative to the hashtags (#beef and #steak), categorizing them as positive or negative depending on the (smiling or sad) tweets' emoticon. Moreover, the second stage correlates other "sentiments" with those two words. The analysis shows, that the clusters can be farther classified into tweets associated with episodic and product opinions. The authors say that the first cluster can

be exploited by (for example) retailers in making marketing campaigns by knowing the factors which had the most association and influence. The second cluster instead, identifies the positive or negative sentiments, which can be used to improve the quality of the offer, with a positive impact on the revenues. The final research looked at the reasons for dissatisfaction. Knowing the reasons early can prevent further customers' dissatisfaction. Those known reasons (from the tweets) are then quickly investigated (using the 5W's analysis) and failures removed. An interesting example regarding the methodology used is given by the way customers cook their products (beef in this case). Customers perceive certain meat (from different body parts) as less tasty, however, a different type of cooking (slow-cooking) can considerably improve taste even for that previously unwanted sort of meat. The misperception of quality can be later prevented by adopting good marketing techniques raising awareness of less desired sorts of meat, preventing waste and unsold (perishable) inventory. Thus, the implementation of the data analysis does have a huge impact on the supply chain. In this short overview, it was possible to see how can a proper usage of the amount of data encompassing the business and non-business environment have great impacts also in the beef industry (Ji & Tan, 2017).

Conclusion

This seminar paper provided an overview of how big data impacts the decision making. Big data is one of the major trends, leading to further and further discovering in

that field. However, because of its young age, big data and big data in SCM don't have a proper theoretical foundation in comparison with other fields. Thus, it will eventually be the topic of future research. Its applications in SCM can help companies understanding buying patterns (behaviors) and with this, enhancing competitivity by ameliorating the overall performance in all the supply chain parts. In doing so, social networks' role is certainly central, giving companies the possibility of getting and discovering an (until now) unexpected amount of useful information. Big Data is certainly a new field where diving into, however, its success is in everyone' eyes, meaning that further and further development with many other firms embracing this method.

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The impact of Cross Chain Control Centre on supply chains

Group 12

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Abstract

Cross Chain Control Centers (4C) are becoming more and more important. To successfully operate a 4C tower, cooperation in the chain is required. By making the current supply chain more end-to-end visible and resilient the companies are able to adapt to the changing world of supply chain management.

Keywords

Cross-chain control center; cross-chain collaboration center; cross-chain control tower; supply chain control tower; supply chain integration

The impact of Cross Chain Control Centre on supply chains

After the invention of the steam engine, electricity and the internet, the next step in the transformation in supply chain is about to happen. Technologies which have arisen from the internet are making the change: big data, cloud computing and mobility. Supply chains are getting under more and more pressure, and the combination of these technologies are able to transform the supply chain concept towards cross chain control centers (4C) (Bentz, 2014).

Especially for the Dutch market, which is traditionally a big player in logistics, adaptation of 4C should keep or regain Dutch competitive advantage in logistics by transforming the Netherlands from a mere distribution country to a supply chain orchestration country (Ploos van Amstel). This transformation is important because supply chains are exposed to bigger risks, caused by increasing pressure from many fronts. A lot of pressure comes from the end consumer, who demands a wide range of choices and a high level of service. Companies are therefore struggling to reduce manufacturing and lead-times (Ploos van Amstel). Another source of pressure comes from the CFO's and the company's shareholders who demand faster and higher returns on their investments (Bentz, 2014).

Management of the risks involved with these pressures through control towers is one of the top ten emerging trends which are shaping supply chain operations worldwide (Trzuskawska-Grzesińska, 2017). Control towers can also contribute to real demand

realization, omnichannel retailing challenges, demand swing alignment, sustainability challenges and collaboration vs. competition.

4C Explained

Although the development of 4C is gaining more attention in supply chain management, the definition of 4C remains ambiguous. Not only the definition of 4C, but also the used appellation differs. Cross-chain control center, cross-chain collaboration center, cross-chain control tower and supply chain control tower are terms which share more or less the same definition (Biederman, 2013).

Dinalog, for example, defines 4C as: *"A 4C is an orchestrating entity that coordinates flows of physical goods, information, and cash across multiple supply chains"*(Buijs, 2014). The Aberdeen Group, an American technology and service provider, defines a supply chain control tower as *"a solution having a centralized view with the ability drill down to the root cause of a problem and resolve the problem from that point of view"* (Ploos van Amstel).

The use of the word control tower implicates a threatening situation, as a suggestion seems to be made in which the authority about the supply chain is transferred from cooperating partners to some kind of independent legal entity. De Kok (de Kok, van Dalen, & van Hillegersberg, 2015) decided to change the definition to *"a 4C legal entity performs supply chain management (SCM) activities and supply chain execution (SCE) activities, granted this responsibility by more than one legally independent partner in one or more supply chains, in the sense that the emphasis of a 4C is on performing the*

management (control) and execution activities, assigned by supply chain actors, in one or more supply chains".

The aim of 4C's is bringing together the capabilities which are required to manage complex supply chains from end-to-end (Bentz, 2014). The term "control tower" is a metaphor for the place where these capabilities come together. With these capabilities, organizations are assisted to deal with rising volatility, uncertainty and complexity. Climate change, tsunamis, hurricanes, and droughts are likely to occur more serious supply chain disruptions in the future. But 4C is not only a solution for reliability. By facilitating supply chain collaboration, 4C facilitates economies of scale and scope and thus cost reductions (Buijs, 2014).

A big advantage of the internet technologies and connectivity, is that businesses have the opportunity to keep SKU-levels visible across the entire supply chain, from the last tier supplier to the store or warehouse shelves (Bentz, 2014). Because companies have a better view of the entire inventory in the pipeline, decisions about the alteration of the suppliers or modes of transportation can be made before problems occur. Supply chain reliability and predictability is improved, leading to smaller safety stock and thus costs. Because 4C integrates functions which were usually isolated in their own supply chain, coordination and collaboration are enhanced. But technology is not the only driver of 4C, it is only an enabler. 4C is also built based on people's skills and competencies and unique business processes and the collaborations with supply chain partners.

4C operates on several areas in SCM (Bentz, 2014).

1. Inventory management. From every single part to finished goods, 4C provides a view on SKU-level where everything is, where it should go and what problems may occur.
2. Supplier management. 4C can create an extensive map with all suppliers and their key-suppliers, with information about contracts, reliability, pricing and quality.
3. Transportation. With which mode, price, route and where goods are delivered is visible down to local levels.
4. Data. SCM managers are able to make decisions based on reliable data provided by 4C.
5. Demand. 4C links operations to demand forecasts, supporting decisions of which and how much products to make for each separate market.
6. Talent. 4C helps optimizing scare talent resources and create opportunities for the best supply chain professionals.

By using 4C, SCM managers are able to reach better inventory control, cost reductions, higher quality, improved customer service and optimal asset utilization. For supply chain risk managers, a control tower allows them to change their way of working from reactive to anticipative (Trzuskawska-Grzesińska, 2017).

Supply Chain Visibility

Supply Chain Visibility is one of the leading aspects and goals of the 4C control towers and can be defined as: "*the awareness of, and control over, specific information*

related to product orders and physical shipments, including transport and logistics activities, and the status of events and milestones that occur prior to, and in, transit" (Heaney, 2014).

Visibility is critical for companies to reduce costs and improve their operational performances in the increasingly complex and multi-level supply and demand networks (Pearson, 2014). Responsiveness and supply chain intelligence depend on the synchronization of supply and demand in the whole supply chain and visibility is one of the prerequisites to reach this. Before costs can be reduced, it needs to be visible where money is lost. Technology can be used to find where these costs are and with the tools available.

Supply chain Resiliency

Increasing the resiliency of supply chain is another step companies need to take in this fast-changing environment where traditional supply chain models begin to break down. Lean, Just-in-Time and other practices create highly efficient supply chains. However, these supply chains are not very resilient. They are brittle and have high risks, disruptions (ranging from natural disaster up to traffic jams) both small and severe influence the chain. In order to minimalize the impact of disruptions, a new approach is the fast, lean and resilient supply chain by Andrew Zolli. He refers to two definings: *"The ability to maintain a core purpose , or the ability to restore core purpose in the face of a disruption"* (Heaney, 2014).

It will go further than just restoring and maintaining the business but also anticipates, rapidly adjusts, and even capitalizes on unanticipated supply chain events or disruptions (Harrington, 2014). Together visibility and resiliency are core principals of effective cross chain control centers which would not be possible without the proper technological instruments. Control towers minimize the effect of disruptions by rapidly responding.

Downsides

4C literature does not discuss the influence of Lean and Six Sigma principles on cross-chain collaboration in supply chains. It may be difficult to keep up Lean and Six Sigma standards while creating a visible and resilient supply chain. Companies who want to integrate their supply chains must make a thorough consideration of the effects of supply chain integration on Lean principles and vice versa. (Goldsby & Griffis, 2006).

To integrate the supply chain within 4C, a considerable initial investment of capital and time needs to be made which may take a long time to payoff (Beheshti, Oghazi, Hultman, & Rana, 2014). This may lead to hesitation along potential companies.

Another downside of 4C can be trust between the cooperating companies. To overcome uncertainty of future demand, processing and analyzing of data is necessary beyond the reach and capabilities of the individual firms. The improvement of the forecasts can lead to increased trust between companies. If this trust will not grow for

whatever reason, economies of scope will not be reached, and failure of an expensive project is likely (de Kok, van Dalen, & van Hillegersberg, 2015).

Business Case

An example of a 4C is the cooperation between Heinz, FrieslandCmapina, SCA, Hero Benelux and Nabuurs (Nabuurs, 2012). Nabuurs, a logistics service provider, took over the transportation of goods towards the retail and foodservice channels of the other four parties. Especially for this project, Nabuurs built a new warehouse with extensive crossdocking facilities and special areas for delicate food products. The combination of the four flows of goods realizes a reduction of CO2 emissions and a more responsive delivery to the customers.

For a more extensive insight in the environmental and financial gains which can be created by implementing 4C, the research from TNO and TU Delft in construction logistics is interesting. In an investigation at two construction sites, the research focused on possible improvements in the logistical processes with experimental logistical concepts based on 4C (van Merriënboer & Ludema, 2016). Some results were a decrease of transport time with 81 minutes, a 70% saving on transport costs, 70% less CO2 emission and a 32% increase in labor productivity.

Conclusion

The cross chain control center uses technologies which have arisen from the internet. Because supply chains are under more pressure, 4C manages the risks involved in these pressures. The goal of 4C's is bringing together the capabilities which are

required to manage complex supply chains from end-to-end, and deal with volatility, uncertainty, and complexity. Companies are able to anticipate to disruptions because the supply chain is visible from end-to-end and they are resilient to withstand any disruption. Trust between companies is the base of a successful 4C supply chain and this requires clear and transparent agreements. If companies commit themselves to 4C initial investments can be huge but in the end will pay off and create a better supply chain for the companies involved and in the case of Nabuurs even reduces CO2 emission and overall costs.

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Effects of Customs and Trade Compliance on Supply Chains

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Abstract

Nowadays supply chains are trying to achieve growth and increase in supply chain surplus by taking advantage of the globalization of the world. Supply chains are trying to gain new market share in previously unknown markets and by relocating parts of supply chain processes to take advantage of physical or/and human resources in different countries across the world. One of the ways of helping supply chains to achieve their goals is by having a trade compliance which is described as the terms and conditions for all trade between two or more countries.

Keywords

Global Supply Chain; Trade policies and agreements, Taxes, Customs; Standards; CETA


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Effects of Customs and Trade Compliance on Supply Chains

Nowadays supply chains are trying to achieve their goal to increase supply chain surplus by taking advantage of globalization of the world, by trying to gain new market shares in previously unknown markets and by relocating parts of supply chain processes to take advantage of physical or/and human resources in different countries across the world (Nicita, Ognivtsev, & Shirotori, 2013). The topic of the paper is important because for a supply chain to achieve previously stated objectives there need to be a customs and trade compliance so the terms and conditions for all trade between two or more countries or/and unions are described and agreed upon. It can be managed by using trade policies and agreements to help domestic supply chains by guarding domestic market and by making access to foreign markets easier. It is important because without customs and trade compliance supply chains cannot take advantage of the globalization of world, because the domestic trade agreements and policies are putting the domestic supply chains in disadvantage compared to their global competitors. The idea is that customs should not disrupt trade but enforce it. The aim of the research is to assess the customs and trade compliance effects on supply chains and to understand what are the barriers for customs and trade compliance and how to manage them. The tasks are: to analyze existent other authors work and governmental reports and to analyze their observations and conclusions to gain a full understanding of this subject. Also, already existent trade deals will be analyzed to conclude their effects on supply chains.

Customs and trade compliance in external literature

Reports have shown that supply chains are increasingly organizing the production of goods and services through global supply chains. Products are processed, and value is added in many different countries (World Economic Forum et al., 2013). For these processes to happen more effectively without any interruptions, the domestic government should work together with their domestic companies and with foreign governments to create policies and trade agreements with the goal to help supply chains to achieve their goals. Trade agreement is when two or more nations agree on the terms of trade between them (Flash Global, 2017). In the processes of creating the trade agreements - the product standards, tariffs, and duties that countries impose on import and exports will be agreed upon. So, customs and trade compliance describes the terms and conditions for all trade between two or more countries or/and unions (Amadeo, 2017). Customs should be made in a way, so it does not disrupt the trade. Because the biggest obstacles for a supply chain is customs that may create a market access barrier and/or border administration barrier that will not allow supply chains to gain new market share in previously unknown markets and/or to take advantage of physical or/and human resources in different countries across the world (Nicita, Ognivtsev, & Shirotori, 2013). This is the reason customs and trade compliance are important for a supply chain to achieve their goal and increase the overall supply chain surplus (Jackson, 2014).

Market barriers explained

The main results of the considered creation of trade policies and agreements across countries and unions are the reduction of market access and border administration barriers that overall makes supply chains more reliable and allows them to decrease costs (World Economic Forum et al., 2013). An example is shown in Figure 1.

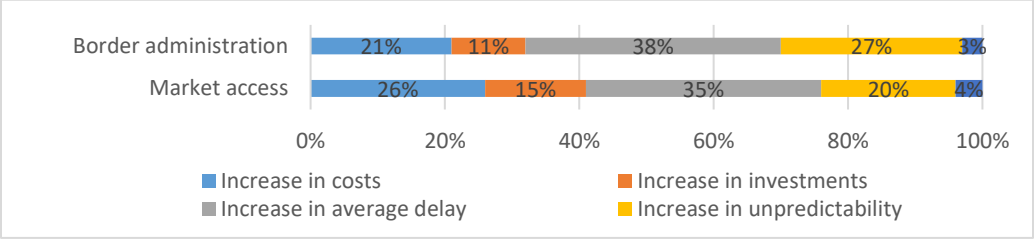

Figure 1. Trade barriers and their effect on supply chains. Shown as a percentage of total occurrence (World Economic Forum et al., 2013).

The increase in costs and investment are mostly customs duties which on average in global trade are 4,3% on final products, 2,2% on intermediate products and investment which is described as guarantee money and other money tied up in different customs processes. Delays are characterized as time spent for customs and customs related processes to pass them. For example, double certification because importing country does not acknowledge testing done in a foreign country and time spent to pass through customs processes for foreign imported goods (Nicita, Ognivtsev, & Shirotori, 2013).

The trade and customs compliance positive effects could be easily seen. Trade agreement makes everything standardized and all process "how-to" are agreed upon so that

companies from partner countries do not experience any kind of barriers that could put them in a disadvantage to the domestic supply chain (Robinson, 2017).

The scope of trade agreement and policies

Trade agreements and policies main goals are to create conditions that allow domestic supply chain to take advantage of new opportunities to help them to increase their supply chain surplus. For the trade and customs compliance to always have a positive effect on domestic supply chains the trade agreement and policies should be well thought-out and implemented at the right time and in the right way. It can only be done when in the creation process of new trade policies and agreement governments are working together with domestic companies to make trade policies and agreement truly help their supply chains. Furthermore, for trade and customs compliance to always have a good effect on domestic supply chains, governments should be working on educating domestic companies on how to take advantage of opportunities provided by trade agreements and policies. Governments should stimulate it by providing domestic companies risk guarantees when they export their products to new markets.

Case description

Usually, complicated manufacturing processes involve sourcing components from all over the world. "A Volkswagen might have an engine made in Germany; a wiring harness from Mexico, and an exhaust filter system from Canada" Because of the differences in standards and testing – Canadian norms are not accepted in Europe and vice versa (Hoekman, 2015). A trade agreement can help to make source; make; deliver

processes easier for supply chains. Trade agreement like FTA, an agreement between South Korea and the European Union, have helped for European companies to increase their exports by 55 % and saving 3,1 billion since introduction (European Commission, 2017). For example, CETA is a trade agreement between the European Union and Canada and it is one of the biggest trade agreements ever made. Canada is the second biggest trading partner to EU. The scope of trade agreements includes: (a) trade in goods and services, (b) public procurement, (c) investment, (d) intellectual property, (e) sustainable development and small companies. From this, it could be understood the importance and scope of this trade deal (European Commission, 2017). Total of 98% of Canadian customs will be abolished, saving European Union business 590 million each year. More interestingly, the agreement will benefit all type of supply chains, from small to big because total 70`700 companies are exporting to Canada and 79% of them are considered small firms.

CETA is also protecting supply chains that are not yet ready for a bigger competition. That is why the poultry and egg market will not be open to Canada and beef, pork, sweetcorn will be limited with tariff-free quotas (European Commission, 2017). A good example of trade policies helping the domestic supply chains is that recently, the European Union increased tax for imported steel products from China for 26% to 55 % to defend local companies from China attempt to destroy Europe steel industry (Petroff, 2017). The reduction of tariffs gives companies the benefit of saving time spent in customs procedures while also allowing to save money on customs fees, tariffs, and other

related costs. For example, previously mentioned Volkswagen will be able to benefit from the deal in at least two ways: There will be reduction in tariffs of vehicles and vehicles parts from 9,5% to 0% plus, because of the trade deal, Canada will be accepting 143 different types of product certification standards which means that Volkswagen will have tested their product with one of the certificates in Germany, meaning there will be no need for double testing (European Commission, 2017). Also, CETA will affect small businesses like Graffeo Cravatte who manufactures handmade silk ties will benefit from the reduction of tariffs for textile from 16% to 0%. Moreover, European Union provides aid to small companies to start exporting their goods to Canada. A great example of helping local companies to take advantage of CETA agreement can be found in Latvia, where government agency "LIAA" offer lectures to teach companies how to export their product to Canada and even offers the risk of export guarantee up to 1 million euros (European Commission, 2017). Overall it was concluded that good practices in compliance with trade and customs may have a positive effect on supply chains. So, the conclusion is if the trade policies and agreement are created out of need and well thought then only the positive impacts on supply chains should be seen, starting with cost savings and ending with reduction of customs process lead times (IRPP, 2015).

Conclusion

In this paper customs and trade compliance effects on supply chain were analyzed. An analysis of existent other author work and governmental reports was performed to analyze their observations and conclusions to gain the full understanding of

this subject. Also, existent trade agreements and policies were analyzed to conclude their effects on supply chains. It was concluded that customs and trade compliance have a positive effect on supply chains. The idea is that customs should not disrupt trade between nations but enforce it by removing trade barriers like border administration and market access barrier. On the governmental level, these barriers can be dismantled by creating trade policies and agreements. Trade agreement and policies can enforce trade and cooperation between nations because everything is standardized and all process "how-to" are agreed upon, meaning that domestic supply chains do not have the competitive advantage over their foreign competitors. Allowing the supply chains to enter new markets and take advantage of foreign resources without any disruptions. It was concluded that good trade policies and agreements are created out of the need by working together with all interested parties. Well, thought agreement and policies have only the positive impacts on supply chains, starting with cost savings and ending with reduction of customs process lead times.

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Effects of the Transatlantic Trade and Investment Partnership on developing countries

Group: 19

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Abstract

Since July 2013, the EU and US have been negotiating a trade agreement, the Transatlantic Trade and Investment Partnership. Many reports written by ministries and reports written by researchers have been used. The report mainly contains the discussion on whether the trade agreement is beneficial for developing countries. This report focuses on the negative effects of the TTIP on developing countries and takes the positive effects on supply chains into account. Throughout the report, the US's stand on the TTIP since Trump has been president are highlighted.

Keywords

Trade compliance; Tariffs; Supply chains; TTIP; Low-income countries; Trump

Effects of the Transatlantic Trade and Investment Partnership on developing countries

The objective of this paper is to give insight on the effects that trade compliances have in developing countries. The cases discussed will be the Transatlantic Trade and Investment Partnership (TTIP) between the United States and the European Union. The negotiations were launched in July 2013 and they are still accompanied by opinions that are skeptical about the agreement. The TTIP would increase the exports and investment flows that fuel the economies and support high-quality jobs on both sides of the Atlantic (European, 2017). The TTIP would form the worlds largest free market and it will impact the developing countries, as well as the world trade system, significantly. The fear is that the TTIP will cause severe disruptions in the labor markets and world economy (Schmieg, 2015).

The new president of the United States, Donald Trump, has made statements that he is planning to withdraw the United States from the negotiations (O'Grady, 2017). This paper will discuss the case of the TTIP in developing countries despite this uncertainty.

Case description

In this chapter, the subject that has been chosen will be described. The chapter will be put into two paragraphs, one about what position USA has taken on TTIP since Trump has been president and the second about the affects TTIP will have on developing countries.

TTIP through Trump's eyes

The TTIP has been described in the introduction. It is hoped that the TTIP will result in increased trade and prosperity for those on both sides of the Atlantic. TTIP will mean lower barriers to trade, this will mean that more trade will take place, and besides that, the ensuing competition should result in better and cheaper goods and services, making all sides better off. (Quick, 2015). So it will result in increase trade and investment through market access, increase employment and competitiveness and create a harmonised approach to global trade. To harmonise global trade (Naim, 2017). But Trump has been critical on this agreement several times. Trump does not like the deals because he thinks the American workers will be hurt and that it will undercut US companies (Bradshaw, 2016). Also, there is an increasing hesitation from decision-makers to continue the TTIP negotiations (Dominguez, 2017). Besides that, Trump has stepped out of more agreements, for instance, the Trans-Pacific Partnership (TPP), in which he said that it would undermine the US economy and it will undermine US independence. The US has also stepped out of the Paris Climate Agreement (Vitali, 2017). This was because he also thought that the agreement was negotiated poorly and was too costly for the American people with few tangible gains.

Effects of TTIP on developing countries

If a comparison is to be made between the US and the EU it will become clear that the TTIP will be more beneficial for the EU than the US. This because of the fact that the US tariffs (customs) are slightly higher than the EU tariffs. The TTIP is aimed to

increase the trade between the US and the EU. It is predicted that this will lead to less trade (import and export) to non-TTIP countries. So a negative effect that the TTIP could have in developing countries is that companies in the EU and US will be able to trade more easily. Barriers will be cut down. Companies in the EU or US that have exported many goods to the EU or US will benefit from this. For instance Volkswagen. The standard tariff for importing cars to the U.S. is 2.5 percent of their value. Individual European countries don't charge import duties, but the European Union charges a flat rate of 10 percent on imported automobiles. In simple terms, tariffs are taxes. They're paid to governments by the businesses that import and export products and are factored into the prices we pay. Virtually every country in the world charges tariffs to some degree. With the proposed TTIP in place, the tariffs on cars and about a billion other products exchanged across the Atlantic would almost definitely disappear. So this could mean for customers in the US and EU that selling prices of cars could go down, very positive for customers in these countries. But this would mean that countries outside the TTIP would still have to pay these tariffs. So the companies won't be able to lower their price and because of it, developing countries will be negatively affected by this. This could be in all sorts of sectors. (Berkowitz, 2013)

Another negative effect that TTIP could have for developing, is concerning the quality regulations that the EU and US differ in. To keep in mind the automotive industry, regulations mainly concern safety and environmental issues. The U.S. crash-tests our cars according to guidelines from NHTSA. Europe follows the European New

Car Assessment Programme (NCAP). Our vehicles must meet the EPA's emissions rules plus California's stricter standards. European-market cars must be Euro 5 compliant. Before TTIP will be introduced, it would be helpful to come to an agreement about what quality standards there should be for both countries, not each country having their own standards. So when these standards will be the same on both sides, in this case, the automotive industry in these countries would be able to produce the same cars and export them to both sides of the Atlantic. This would save huge costs, which could result in a higher trade rate between the two countries and will leave the developing countries out (Berkowitz, 2013). So for Volkswagen, it would probably have a positive effect on their supply chain.

Another negative effect that TTIP could have in developing countries is concerning the increased job outsourcing that TTIP will have. An effect that it could have is that for instance, the US could decide to place a production plant in something like the Czech Republic cause it will be cheaper than before the agreement. But when placing a production plant in Europe, it could cause a company to leave a developing country where they are currently producing their product. That is exactly what Trump currently doesn't like and that's why maybe the agreement won't go through. (Amadeo, 2017)

Discussion

The following chapter will include a discussion containing negative possible effects that the TTIP will have on countries with a low income. Some of the previously mentioned effects are further explained as well as the relevant objections.

Positive versus negative effects of TTIP

Scientists argue that the TTIP could boost the economy of the world by more than US$3000 billion, and create millions of jobs. (Egger, Francois, Manchin, & Nelson, 2015)

But it is not possible to draw a conclusion on whether the TTIP will be beneficial for low-income countries based solely on this prediction. The EU and the US are in most cases on the top ten export list of most low-income countries. The removal of the MFN tariffs between the US en the EU may lead to a serious decrease in the market share of the low-income countries to the TTIP countries. Especially large non-oil goods trade low-income countries such as Bangladesh, Pakistan and Cambodia could feel this effect significantly because their top 20 exports are to the EU and the US (Rollo, et al., 2013).

An important factor to take into account is that there are no to limited policy options open for low-income countries that are at risk due to the TTIP because they are not at the negotiation table. One may argue that a trade agreement between two of the biggest economies in the world what could have negative effects on other countries, including low-income countries, should be discussed with more parties.

The possible positive impact on low-income countries can be that the liberations of trade between the EU and the USA would generate additional economic activity and growth, which might have positive effects. For this impact to become a reality it is necessary that the EU and the US wield rather liberal rules of origin. If this is not the case, the effect of the TTIP on the low-income countries will be the one where there will be a higher barrier for the low-income countries to trade with the EU and the US. (Manrique & Lerch, 2015)

The focus on reducing costs of trade between the EU and US will allow countries, and companies, to explore and develop better logistical and supply chain implementations along the production chains. The elimination of barriers is a mutual interest of both parties due to the intense supply chain trade between the two. (Altenberg & Grünewald, 2013)

This already intense supply chain will continue to develop and intensify as the barriers fall. This is the basis for a trusted supply chain. (Trade complaince: The basis for a trusted supply chain, 2014) The supply chain will have the opportunity to continue to harmonize and simplify government processes and procedures. Nowadays it has become critical for companies to invest in sourcing and manufacturing offshore in order to stay competitive. This allows companies to grow while keeping the costs as low as possible. Trade compliances, such as the TTIP, simplifies the development of such supply chains. Global supply chains also bring challenges that need to be managed. Challenges such as information technology and improved visibility and the integration of global supply chains are a couple of examples. (Johnson, 2008)

Conclusion

Trade compliances focus on taking down barriers that obstruct trade between countries. In the case of TTIP, it involves two of the biggest economies in the world, namely the economy of the European Union and the United States of America. Taking down barriers between these two giant economies will include lower or no tariffs and a simplified governance of customs processes. This will make trade easier and cheaper between the two parties.

While this can be prosperous for the parties included in the trade compliance, it may lead to negative effects on countries outside the trade compliance; especially low-income countries. This is due to the fact that a lower barrier between such big economies will lead to a more mutual trade, and this, in turn, leads to higher barriers for low-income countries to maintain their footprint in these economies. This short-term effect is opposed by a long-term positive effect as a result of the increased trade between the EU and the US. This increased trade may lead to a global increase in trade that may also benefit the low-income countries.

With regards to supply chains, the TTIP will have as a result that companies will be able to intensify their export and import without high barriers. This will ensure their competitiveness and result in a more harmonized and simplified supply chain between the EU and the US.

Although the TTIP will result in positive effects for the parties involved, it requires a clear governance and regulations to ensure that the success of the trade compliance does not equal a downfall for countries not involved, especially low-income countries.

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The sustainable and circular supply chain of Zara

Group 18

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Abstract

This paper will make clear what the terms ‘sustainability’ and ‘circular’ mean. Three key elements exist when it comes to sustainability and these elements are being linked to the supply chain of Zara, which is the purpose of this paper. These three key elements consist of environmental, economy and social. Zara scores sufficient on the economic aspect, but some improvements can be made on the social and environmental aspects. Zara is responsible for a lot of pollution, by replenishing every store twice a week, which is a lot. And Zara purchases products from manufacturers in China and India, where the working conditions are not very well. The research has been done by doing deskresearch. The database of the Hogeschool Rotterdam and Google Scholar have been used to find the right information for this paper.

Keywords

Sustainability; Circular; Supply chain; Zara; Environment; Social; Economy

The sustainable and circular supply chain

Over the past few decades, individual and corporate entities have become increasingly aware of the greater role they need to play in preserving natural resources. It has also been established that economic and production systems cannot be separated from the environment. The growing concern with the environment, in particular the possibility of climate change through global warming, has led to a focus on how human and economic activity has the potential to adversely impact the long-term sustainability of the planet (Nasir, 2017). First, the terms ‘sustainability and ‘circular’ will be described and the principles of the sustainably supply chain will be illustrated. Secondly, the theory about sustainability will be given. Thirdly, the supply chain of Zara will be discussed in a short way, this is the case description. Fourthly, the connection between the case of Zara and the theory will be descriped, so it will be clear in which way Zara is sustainable or not. Lastly, the conclusion about the findings will be given.

Subject description

The definition of sustainability that is used is ‘’*Meeting the needs of the present without compromising the ability of future generations to meet their own needs’’* (Brundtland, 1987).

The impact of business decisions can be divided in three key areas (Elkinton, 2004); environment, for example pollution and climate change. Second area is economy, for example the profitabilaty of the business and the last area is social, for example the working conditions.

These three elements, the 3Ps of People, Profit and Planet, are also called the "Triple Bottom Line" (TBL) of sustainability. These TBL's are inevitably intertwined and they serve to remind us that for a business to be truly sustainable, it must pay regard to the wider impact of the activities it undertakes if it seeks to remain viable and profitable.

A regular supply chain contains the conversion from a raw material into a manufactured good. Then the product undergoes transportation and could eventually be delivered at the customer. In some cases, products will not be sold. These products become excess products, which means the products will become unsellable after a certain period. In terms of sustainability it is important to be able to reverse a supply chain, due to the scarcity of raw materials. The term circular supply chain is used to refer to this process. Aims of this process could be to re-use, recycle, remanufacture or repair a certain product (Acquaye, Figueroa, Genovese, & Koh, 2017).

Principles of a sustainable supply chain

Supply chain sustainability provides that companies will continue to meet their needs in the future, in economic, social, ethical and environmental terms. It ensures compliance with laws and regulations as well as adherence to and support of international principles for sustainable business conduct. In addition, companies are increasingly taking actions that result in better social, economic and environmental impacts because society expects this and because there are business benefits in doing so (Global Compact,

2015).

Environmental sustainability. TBL indicates that social capital (such as employee treatment and fair trade) and environmental capital (such as conserving natural resources and preserving ecological environments) are important to the traditional financial capital theory. This requires corporations to change their performance objectives from the single maximization of economic profit to the overall maximization of the three profit areas defined by TBL (Seuring, 2008). (Etayeb, 2011) proved that environmental management systems are necessary in SSCM which can be seen as a standard that could adopt for better performance. Hence, a good environmental management means forming a policy to promote combination amongst environmental dimension products, operation, and organisational strategies. (Lim, 2017).

Economic sustainability. Through globalization and rapid technological alterations, the average tenure of companies will only become shorter (Foster, 2012). To achieve long-term growth, companies have to be highly sensitive and responsive to market forces, because as one retailer develops a new and successful strategy, the others have to react and develop me-too or differentiation strategies (Porter, 1985). In other words, the creation of a strategic market advent achieved through quality, cost or time, is soon minimised in a never-ending competitive cycle where there would appear to be little or no sustainable competitive advantage over the long term. The harsh reality is that the marketplace is a very contested space with limited room to differentiate. To address this, (De Geus, 1988), proposed “The ability to learn faster than our competitors may be the

only sustainable comtetive advantage". De Geus makes a strong case for a learning organisation which is based upon ecological principles.

Changes in the economic environment and changes in the natural environment would appear to be combining to encourage or even force organisations to learn and alter their strategies. Pedler defined a learning company as, "An organisation that facilitates the learning of all its members and continuously transforms itself" (Pedler, 1996).

Social sustainability. The third area of the 3 Ps is the social sustainability. Customers are also increasingly concerned with ethical and environmental issues which affect their purchasing decisions (Trudel, 2009). A definition of social sustainability begins is ''design of human and industrial systems to ensure that humankind's use of natural resources and cycles do not lead to diminished quality of life due either to losses in future economic opportunities or to adverse impacts on social conditions, human health and the environment'' (Vallance, 2011).

Case description

Zara is a fashion and clothing retailer, with its headquarters based in Spain. They are well-known for being very agile in serving their customer demand (SCM Globe, 2016).

The logic behind Zara's ability to serve the demand of the customer at rapid pace is twofold. First, it all starts with Zara's DC, called 'the cube'. This DC is 464.500 square meters and is very automated. The Zara collection is up to date, new items are being

designed rapidly and are brought to the stores between every four and six weeks. Items which already exist travel much faster, because those items are modified in maximum two weeks (SCM Globe, 2016).

Second, Zara makes a lot of shipments, because they transport small batch sizes every time they deliver (Stevenson, 2012). All transports that are being made from their DC, with a destination in Europe, will be delivered by truck. Destinations outside Europe are getting transported by airplane (SCM Globe, 2016).

Discussion

In the next three paragraphs, the connections between the theory and Zara are being described.

Environmental sustainability. Nowadays Zara has 1900 stores worldwide. Store managers make orders twice a week and from the DC in Arteixo, shipments to all stores are getting done within the period of two weeks as well. This is possible, because the DC is known as a place where nothing should be stored, therefore everything has to be in motion. All stores in Europe are getting stored by truck delivery, this happens within a maximum of 36 hours after the order has been received. The stores outside Europe are getting their products by ship or aviation transport. The time of this delivery will take a maximum of 48 hours. Relatively many shipments are made by truck, 75%. So 25% of the shipments are made by ship or airplane (Oliviera, 2014). Regarding these facts, it becomes clear that there are a lot of shipments per week. Having a look at the theory, pollution is an important aspect of environmental sustainability. Zara is not doing very

well in terms of pollution, because there are approximately 3800 shipments every week, which is a lot. Besides, a lot of shipments are getting done by airplane, to ensure the fast deliveries to the stores worldwide. Airplanes are not environmental, so the pollution rate caused by Zara will also rise because of the use of airplanes (Schlenker & Reed Walker, 2014).

Economical sustainability. Economical sustainability, according to the theory of Pedler, is regarded as being more efficient than your competitor due to the high levels of competitiveness among the fashion retailers. Therefore there is a culture where companies feel the urge to improve continuously, while leaving the status quo behind (Pedler, 1996).

In the case of shortages in the supply chain, Zara's managers know they get replenished according to the historical sales data of that store. In this way, there are rarely stocks. And when there are no shortages, all stocks are also very small, because production is limited. So by being very efficient, the stock levels are low and the result is that there are almost no waste products. Therefore Zara is doing well in terms of economical sustainability. Zara could be this efficient due to its high turnover rate. They invest much money in the transports being made, because they are depending heavily on these transports. However, they earn this money back by having almost no waste products and by little investment in the sales department (Oliviera, 2014)**.**

Social sustainability. The theory of social sustainability is about customers who increasingly think more about ethics and environmental issues when it comes to buying a

product (Trudel, 2009). Zara should be aware of their ethical codes in order to perform well in terms of social sustainability. Zara purchases materials that are being produced in China, the working conditions are bad over here (Chapman, 2017). This might harm the reputation of Zara in terms of ethic performance. As a consequence people could have doubts about buying at Zara.

On the one hand, Zara is considered to be one of the most transparent companies in the fashion industry. On the other hand, however, they source from three polluted companies in China and they also source from one polluted company in India (Markets, 2017).

Nevertheless, Zara is doing a great job regarding animal welfare. Specifically, Zara only uses animals for production which have been treated well in their life and in an ethical way. Despite Zara's goodwill, some developing countries don't have any policy when it comes to animal welfare. So it is very questionable whether Zara is really executing their statement, because in some countries there is no regulation or law on animal welfare (Li, 2017).

Conclusion

In short, supply chain sustainability provides companies will continue to meet their needs in the future, in economic, social, ethical and environmental terms. It means for the environmental sustainability that the company forms a policy to promote combinate combination amongst environmental dimension products, operation, and organisational strategies (Lim, 2017). The economic sustainability is the ability to learn

faster than competitors, (De Geus, 1988). The third area is the social sustainability which focus on the ‘‘design of human and industrial systems to ensure that humankind’s use of natural resources and cycles do not lead to diminished quality of life due either to losses in future economic opportunities or to adverse impacts on social conditions, human health and the environment (Vallance, 2011). The circular supply chain is about a possible reverse logistics, Zara should not have problems with this, because they have rarely stocks. The sustainability of Zara has been measured by three elements; environmental, economical and social. Zara’s performances are medium, whereby the environmental aspect might be insufficient.

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HOGESCHOOL
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Managing first, second and third tier suppliers

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Abstract

In light of the minor Supply Chain Management provided by Hogeschool Rotterdam in Rotterdam an assignment regarding research of managing first, second and third tier suppliers had to be done. To start off, the different supplier tiers will be explained followed by how to manage those by identifying and covering five risks involved while handling these. Companies have to minimize these risks by mapping their total supply chain and by carrying out supplier risk management. By doing this the company will

have a clearer view of their supply chain, the risks of their supply chain and will be able to manage their first, second and third tier suppliers.

Keywords

Original equipment manufacturer (OEM), supplier tiers, supply chain risks

Managing first, second and third tier suppliers

The paper will start off by explaining what supplier tiers actually are. There are four different aspects which will be covered. Starting with the OEM"s which are all related to first, second and third tier suppliers. These will all be explained and further in the report the management part will be covered starting with the possible risks and later how to manage these.

Supplier tiers explained

Before talking about managing first, second and third tier suppliers, it is important to explain what they are and how they are different from each other. This will be covered in the section below. The term 'tier supplier ' is related to the distance between the manufacturer and supplier looking at their relationship. The automotive industry in an example of an industry with several tier suppliers as the manufacturing of cars requires multiple products which all have different specifications and are therefore produced by different companies. Multiple tier suppliers are not bound by industry (apart from the automotive industry it is also often found in the electronics industry) but require a production process. It is important to mention that a company can be involved in several

supply chains at once, a company can be supplying an OEM (tier one) while at the same time delivering to a tier one (as a tier two) ofcourse this depends on the product.

Orginal equipment manufacturer (OEM)

The original equipment manufacturer is the organization which eventually assembles the components to a final product. However this does not automaticly mean they are also responsible for selling the finished product because it can be marketed by a reseller or another manufacturer. Looking at the automotive industry, car retailers are selling the product directly to the customer while they are not always owned by a same owner as the OEM. However, some OEM's are selling their products (also) directly to the customer. Some companies within the computer/electronics industry are an example, people who want to upgrade their computer system have a choice to buy their upgrade either from a retailer or directy from the OEM.

OEM's often have several tier suppliers due to the complexity of their products. Ford, Volvo, Mercedes are examples of OEM's within the automotive industry. The different tiers explained below are all related to the OEM as they are all part of the production process. There are multiple reasons why the supply chain exists.

First tier suppliers

A first tier supplier can be described as

Company that provides parts and materials directly to an OEM. They are the key supplier to an OEM to assembly the parts into its final stage where it can be sold either by the OEM or another party. Looking at the global OEM automotive sales in 2012, Robert

Bosch GmbH was rank one (Crain Communications, 2013). They offer various innovative mobility solutions for the automotive industry. Furthermore, first tier suppliers often work with several OEM's and buy thei products from second tier suppliers. First tier suppliers are sometimes called contract manufacturers, this means that a company produces goods under the label of another firm based on their specifications. Looking at supplier management it is very important that the relation with a first tier supplier is managed correctly as it will result in better collaboration between both parties. This will lead to benefits like improved quality, performance and product development (Mangan, 2008).

Second tier suppliers

Second tier suppliers can be described as companies who deliver their products to tier one suppliers. They do not directly supply to the OEM but indirectly because they supply to tier one companies. The quality of the products the OEM's manufacture depends on second tier suppliers heavily because they are the key supplier to the tier one supplier.

Third tier suppliers

Third tier suppliers are in their turn companies who deliver to the second tier suppliers. Depending on the industry third tier suppliers usually provide the second tier suppliers with raw materials, an example would be plastic or metal.

Managing first, second and third tier suppliers

From the previous chapters it is clear there is a difference between the different tier of suppliers, but how does a OEM manage these different suppliers and what are the risks with the different suppliers? This will be discussed during this chapter.

Risks regarding the first, second and third tier suppliers

To manage the suppliers it is important for a OEM to analyze the risks of their suppliers. By doing this they will know how to handle these risks and therefore how to manage their suppliers. To be able to recognize potential risks a OEM should check different aspects of their company (PWC, 2017). These risks will be singly discussed. Strategic risks: These risks are about the kind of supplier a OEM wants. Do they want to build a long-term partnership or will the relationship be very leveled, where there is almost no collaboration? Do they want to have a multinational as their supplier, or is a local supplier sufficient? Choosing a certain strategic supplier means co-operating on a high level and thus means allowing a supplier to have a lot of knowledge of the company. Therefore this is a high risk for a company. Social, ethical & environmental risks: These risks are about the social, ethical and environmental risks of your suppliers. Does the supplier make, in any degree, use of child labour, do they take the environment into account, is there a lot of waste within the company and are the working conditions for their employees sufficient? If any of these aspects is not taken into account it could mean reputational damage for a company.

Financial risks: This risk is about the financial aspects of working together with suppliers in a certain market. These markets bring all kind of risks with them, for example the risk of increasing raw material prices, working together with suppliers who have a different currency, increasing labour costs or increasing energy prices. All these risk could have a big impact on a company, therefore it is important to check them and map them.

Operational risks: These risks can occur if the suppliers are not able to deliver as agreed. This can be risk regarding the quality of the delivered products, the delivery performance, the physical distribution from the suppliers to the OEM and the lead time of the products. If a supplier is not able to manage these risks well it could have a bad impact on the operations of the OEM. Therefore it is important to check whether a supplier is able to manage these different kind of risks.

Continuity risks: This risk is about all the aspects that could interfere with the continuity of the OEM. Mostly this are risk which could have a big impact on a OEM, but can't be controlled very well by the OEM. This are risks like natural hazards, financial failures at the supplier, poor management by the suppliers and being very dependent on certain suppliers. Although these risks are very hard to control, they could have a great impact on the continuity of a company and therefore on the company as a whole.

Managing risks regarding the first, second and third tier supplier.

It is clear what the risks are, regarding the different tier suppliers. Now it is important to know how to minimalize the chances of these risks. By doing this the OEM will become better at managing their suppliers.

Implement supplier risk management

Supplier risk management is a systematic approach to identify, assess and mitigate risk in a supply chain environment. Supplier risk management is used by companies to reduce vulnerability and ensure continuity (Leung, 2017) A typical supplier risk management process consists of four phases (Grubbström, 2004), namely: Risk identification, risk assessment, decision and implementation of risk management actions and risk monitoring.

Risk identification

Risk identification is about identifying the risks, by doing this a company becomes more aware about events that can cause uncertainty. The main focus of risk identification is to

recognize future uncertainties and to be able to manage these scenarios proactively. In a networked environment, with more than 1 tier suppliers, the risk identification should be about dependencies on other organizations.

Risk assessment

Risk assessment is about assessing the risks that are identified in the risk identification part. By doing this the company can decide whether the risk is a real treat for the company or whether the risk is just a risk on paper, but not a real threat. The risk

assessment part can be divided into three parts. The first part is about defining the impact of a risk. Basically the company has to determine the impact of a risk, if it would become a reality. The second part is defining the probability of a risk. In this part the company has to determine whether it is likely that a risk would become reality. The last part is about constructing a risk diagram. The risk diagram puts the output of the first two steps into a diagram. By doing this it becomes clear for a company which risks are critica and which are low-leveled and therefore can prioritize their risks.

Decision and implementation of supplier risk management actions

When a company has assessed their risks, it has to decide what to do with these risks. There are five generally used strategies for coping with risks.

- Transfer the risk, try to transfer the risk out of your supply chain,
- Take the risk, accept the fact that a risk is existing and deal with it as good as possible.
- Risk elimination, eliminate the risk by doing investments, trainings and such.
- Risk reduction, if total elimination of a risk is not possible reduce it as much as possible.
- Further analysis of the risk, analyze and come up with better solutions for the risk.

Risk monitoring

After the company has decided what to do with their risks and what actions they are going to take, they have to monitor these actions. Are the risks eliminated? What are the results? Are these results satisfactory? Why, or why not? When this part is finished the company can start all over again with the supplier risk management, because there is always the threat of new risks.

Conclusion

Supplier risk analysis is very important five different risks for a company have been discussed namely: strategic, social, ethical & environmental risks, financial risks, operational risks and continuity risks. The company has to minimize these risks by carrying out supplier risk management. By doing this the company will have a clearer view of their supply chain, the risks of their supply chain and will be able to manage their first, second and third tier suppliers.

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Impact of Cross Chain Control Center on Supply Chains

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Abstract

This paper aims to describe the concept of Cross Chain Control Center (4C) and its impacts on supply chains. It was conducted based on research to discuss the theoretical concept of 4C, and analyze a case study with the focus on understanding the influence of the concept on companies. Findings were made on how 4C can make improvements on supply chains in today's world to cope with globalization, as well as the difficulties of building a 4C. The value of this paper is to provide a prospect to redesign and manage the supply chain effectively by using the concept of 4C, with important insights into the changing business environment.

Keywords

Cross Chain Control Center (4C), Globalization, Complexity, Collaboration, Pooling, Bundling, Synchromodality

Impact of Cross Chain Control Centers on Supply Chains

In today's world, globalization is more and more intensifying its influence on business, which consequently resulting in higher uncertainty in the business environment and making flows of goods, money, and information become 'global' and more complex (De Kok, Van Dalen, & Van Hillegersberg, 2015). Therefore, competition between companies has been converted to competition among supply chains, or rather supply networks. This change has increased the need for collaboration not only between partners in the supply chain, but also between different supply chains in a supply network, in order to raise the common competitiveness and deal with complexity more effectively (De Kok, Van Dalen, & Van Hillegersberg, 2015).

Therefore, the concept of Cross Chain Control Center (4C) was established to help supply chain manager solve this problem. The goal of this paper is to give understandings of the 4C concept, and how it can make improvements and influence supply chains in today's world. The content of this paper can be divided into two main sections. In the first section, the theory of 4C will be explained. After that, in the second section, a case study will be given along with a discussion of the case based on theory.

Concept of Cross Chain Control Center (4C)

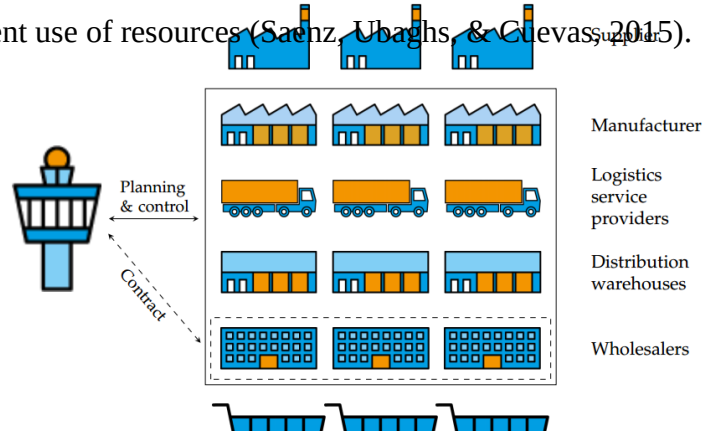
The concept of 4C, which stands for Cross Chain Control Center, was first introduced by Van Laarhoven (2008). He emphasized the increasing importance of control towers in managing or controlling multiple supply chains in today's world. Later, Professor De Kok, the director of the eSCF, has changed this concept to the Cross Chain

Collaboration Center, when cross-chain collaboration is more likely to extend beyond control activities (De Kok, 2010).

Cross Chain Collaboration Center is a control center within which different supply chains are connected and coordinated together; this is done with the help of latest technology, advanced software tools, and supply chain professionals. In addition to the control over goods flow, 4C also covers the management of information and financial flows. These three elements are very important for a supply chain manger to be able to design an excellent cross supply chain plan (Kant & Buijsse, 2008).

Impact of 4C on Supply Chains

The evolvement of competition from business to supply chain has led to the development of new concepts such as Vendor Managed Inventory (VMI) or Collaborative Planning, Forecasting, and Replenishment (CPFR) which focuses on supply chain vertical collaboration. Meanwhile, the idea of 4C is not just about vertical collaboration across a particular supply chain, but rather about the horizontal collaboration between different companies in a supply network (Figure 1). Vertical collaboration is the cooperation between parties along the supply chain to enhance effectiveness and increase service level, while horizontal collaboration happens when different companies which are usually in the same industry work together to share costs and achieve efficient use of resources (Saenz, Ubaghs, & Cuevas, 2015).



The key idea behind the concept of 4C is to establish a control center to coordinate a network consisting of multiple supply chains, and create economies of scale and scop

Figure 1: Supply network collaboration (Kok, Dalen, & Hillegersberg, 2015)

ing resources linked between different companies and different supply chains, to achieve cost efficiencies. Additionally, this concept also aims at building trust and relationship between involved parties, which subsequently helps to foster the growth of alliances to reduce costs of supply chain execution and enhance responsiveness (Zavala, 2010).

In term of horizontal collaboration, 4C helps to exploit economies of scales and increase the flexibility of supply chain by cooperating with comparable chains. In the other words, it aims at achieving maximal utilization degree to reduce cost, traffic, and emissions by bundling of materials, shipment, and flows of goods. This concept also opens an opportunity for having access to new channels when collaborates with other supply chains. In short, 4C enables a dynamic optimization of different nodes from multiple supply chains through synchromodality (Piest, 2015).

Furthermore, 4C provides an Information Communication Technology (ICT) system between the involved parties. The system enables data sharing and safeguarding as well as ensures confidential and competitive information could not be exposed to competing companies. This is one of the most important concerns for building a Cross Chain Control Center (Woolthuis, Nooteboom, & De Jong, 2013).

As 4C is built upon a network of several supply chains, it requires an advanced ICT infrastructure and software tools to control information and data, along with highly skilled supply chain professionals that being capable to manage a high level of complexity of the network (Piest, 2015). This may lead to a huge capital investment and larger costs of coordination. Therefore, building a 4C is usually costly and has to face up to many challenges, such as difficult data integration due to lack of standardization and different IT maturity between network partners. Additionally, as 4C requires sharing data between multiple supply chains, so trust is the most important element and also the biggest challenge to successfully establish a cross chains collaboration (Piest, 2015).

Case Study

Case Description

An example of 4C is the collaboration between Hero, a beverage producer, and SCA, a hygiene products supplier, with their logistics provider Nabuurs & Bakker in term of combining volumes with other companies. The bundling of goods flows will be carried out from a warehouse of Nabuurs in Wijchen, where is connected to the package of HJ Heinz. In the other words, as a cross chain control center, Narbuurs will take care of transportation and distribution planning, control and execution for their customers including Hero, SCA, and HJ Heinz. Their customers' products will be pooled and delivered together under the coordination of Nabuurs. With this expansion, Hero and SCA expect to be able to make their goods flows more sustainably and, in the long run, to offer more flexibility to their customers. The transportation of the goods has been utilized

and minimized to only one delivery per day (in this case by Nabuurs) because several companies (SCA, Hero, and Heinz) come to deliver their products together. Additionally, this concept has resulted in a reduction of 19% CO2 emissions (Martin, 2012).

This cross chains collaboration started in 2012 and was based on a shared user concept for consumer goods consolidation, in which companies who have the same customer bring their goods together and bundle these flows for delivery. However, the cooperation between SCA and Hero with regard to bundling of volumes has actually been around since 2007. Later, the participation of HJ Heinz has extended the collaboration network and resulted in better cost sharing (Martin, 2012).

Discussion

The 4C concept has been used in this case study in term of distribution collaboration. Overall, the objective is to improve their supply chains by collaborating and combining their distributions of goods flows, under the coordination of a logistics provider. This idea helps the companies to manage their flows of goods more efficiently and sustainably when bundling shipment with other suppliers instead of making transportation separately and incurring higher costs. In this case, Narbuurs plays as a cross chain control center to coordinate the transportation and distribution planning, control and execution for their customers including Hero, SCA, and HJ Heinz. With shared data, everything is synchronized so that all parties are able to monitor and track information: when the goods are loaded, when the shipments are arriving or where they are on the way. Besides, products of Hero and SCA are stored in the warehouse of

Nabuurs, which also helps them to reduce warehousing costs. The transportation of the goods (in this case by Nabuurs) can be optimized with only one delivery to the same wholesalers or retailers. Loading and unloading costs are also minimized. Moreover, in the long run, they can be able to offer more flexibility to their customers due to future opportunities to access to new channels from different companies. Additionally, it is clear to see the sustainable effect of the collaboration, when it helps reduce CO2 emission to the environment.

Besides, as mentioned in the theory, a Cross Chain Control Center is usually costly and difficult to build as it requires an advanced IT system and professional personnel to manage a complex network of different supply chains. Therefore, the 4C concept is likely to be more appropriate with logistics providers, when they have been providing services for several companies, so it could be easier for them to combine and control a supply network. This idea can explain the reason why SCA and Hero chose to cooperate with their same carrier, Nabuurs, instead of building their own network.

Conclusion

The concept of Cross-chain Control Center (4C) was described in the paper, along with the discussion of the case study about the cross-chain collaboration between SCA, Hero and HJ Heinz under the control of Nabuurs. In addition to the impacts of 4C on supply chains, the key challenges of building a cross chains collaboration were also determined. It was concluded that implementing the 4C concept in the supply chain is very cost intensive and is in need of a high-end ICT system. The exchange of data

between different logistic chains in a 4C makes it possible to organize transports in a chain-transcending manner. Within a 4C, information flows are cleverly linked to flow of goods. 'The most successful 4C initiatives are those in which shippers jointly transfer control over transport to a professional logistics service provider,' states professor Fransoo (2014, p.1), member of the Topteam / Strategic Logistics Platform

One of the key elements of 4C is ensuring that critical information will not be exposed to competitors. Therefore, creating trust between involved parties is the platform and the biggest challenge for building a cross chain control center. The 4C concept aims to achieve maximal utilization to reduce costs, traffic and emissions by bundling of materials, shipment, and flow of goods. It also opens an opportunity for having access to new channels when collaborating with other supply chains.

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The sustainable and circular supply chains

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Abstract

The management of a sustainable supply chain has become an uprising subject during the past two decades and it is more imperative every time that companies adopt this way of thinking in order to stay in the competitive market. This paper intends to provide an insight on sustainable supply chains and the three factors that make a supply chain sustainable: people, planet, and profit. It also addresses the more complex idea of a circular economy that looks beyond the current "take, make and dispose" industrial model which companies like Dell have adopted as it is studied in the presented case study.

Keywords

Sustainability, Sustainable, Supply Chain, Circular Supply Chain, Environment, Triple Bottom Line, People, Planet, Profit.

The sustainable and circular supply chains

This is a paper on sustainability and the triple bottom line in particular. The paper is structured as follows. First, different definitions of sustainability are given followed by an explanation of the triple bottom line. Also, the circular supply chain of Dell is described in the form of a case study to show how this company does business in a very sustainable way. Finally, a conclusion is given which tells how companies can become more sustainable.

Sustainability is a term that has been researched for more than 20 years now. When people think of sustainability, they think of the environment. Environmental related issues are in the news almost every day: prices of oil, increasing transparency in how companies manufacture their products, consumer awareness of where and under what types of working conditions products are manufactured (Carter & Rogers, 2008). Having a sustainable supply chain is of great importance for companies and supply chain managers in particular, because many different stakeholders – customers, regulatory bodies, non-governmental organizations – are increasingly demanding that these companies address and manage the environmental and social issues which are impacted by the companies' operations (Easton, 2011). But when is a supply chain sustainable and which factors make a supply chain sustainable? Which company already adjusted their supply chain to be more sustainable?

Sustainability

According to the Brundtland Report, the definition of sustainability is the "development that meets the needs of the present without compromising the ability of

future generations to meet their own needs" (Brundtland, 1987, p. 41). This definition indicates that not only companies but also people should care for the environment in order to preserve the world's resources for the future generations. However, sustainability has many different faces, as Todd Reubold mentions in one of his articles (Reubold, 2014). This will make it harder to work towards a more sustainable future. Matthew C. Nisbet suggests that it might be better to break sustainability issues into smaller, more manageable sectors (Nisbet, 2013). Some examples of sectors are transport, manufacturing and return logistics. This paper will focus more on the end and beginning of the supply chain: making the supply chain circular. In other words: finding ways to use waste or trash as resources again.

A normal, or linear, supply chain usually has a few standard stages: take, make and dispose (Shah, 2016). As mentioned before, the world's resources are limited. The needs of the present should be met without compromising the ability of future generations to meet their own needs. A very sustainable way of doing business is to set up a circular supply chain instead of a linear supply chain. A circular supply chain includes the entire reverse logistics process, like focusing on the recovery of resources, recycling and reusing used units (Kumar & Putnam, 2008).

People, planet, profit

Sustainability knows three performance dimensions and these are a part of the accounting framework 'Triple Bottom Line', introduced by John Elkington (Slaper & Hall, 2011). The 'Triple Bottom Line' dimensions are often called the three P's: people (social),

planet (environment) and profit (economic). These three dimensions should be combined and balanced properly within an organization in order to set up a sustainable supply chain.

People. The social bottom line is about human capital (people) within companies (Chamberlain, 2013). Fair and beneficial labor practices for employees will result in higher employee satisfaction hence a more sustainable company. If an employee feels safe, works in a clean and appropriate environment and is rewarded accordingly for his work, he will work better (Hutchins & Sutherland, 2008). Many satisfied employees will, in the end, result in a company that has a happy, healthy workforce that can keep working more efficiently and in a more sustainable way.

Planet. Planet is related to the environmental issues, like mentioned before. The environment is the first thing people will think about when talking about sustainability. Many supply chains have a negative impact on the planet: CO_2 emission, water pollution, dumping of waste. One of the main goals of a company is to generate revenue. The planet often is not that important. Every year 44 million acres of forest are destroyed, 8 billion tonnes of CO_2 are emitted and 160 billion tons of water is used more than is being replenished (Fisk, 2010). These resources are not infinite and eventually, the planet will run out of these resources. Luckily more and more companies are focusing more on CO_2 emissions (LOWCvp, 2017) and more environmentally friendly ways of gathering resources (Boynton, 2012). Another environmental issue is the dumping of waste in linear supply chains. Because the planet's resources are not infinite, re-using, repairing and recycling of products that have reached the end of the product lifecycle should be done

more often by companies. Great examples of companies that already have circular supply chains are Dell and Timberland (Hower, 2016).

Profit. Profit is the financial category. It includes everything that pertains to the financial health of the company (Shnayder, Hekkert, & Van Rijnsoever, 2015). By implementing new creative ideas aligned with sustainability, adapting advanced technologies for product development and managing products throughout their life cycles, businesses can gain competitive advantages, reduce costs and increase their profit (Pandey, 2015). Activities such as reducing packaging, improving working conditions in warehouses, using more fuel-efficient transportation, and requiring suppliers to undertake environmental and social programs, as just a few examples among many, can reduce costs while also improving corporate reputation (Carter & Rogers, 2008).

Case Description

Dell is a privately held information and technology company established in 1984 by its founder and current CEO Michael Dell. The company firmly believes that technology is a key enabler in the drive to create an economy that keeps products, materials, and components at their highest value and utility at all times (Dell, 2016b). Dell has been a member of the Circular Economy 100 (CE100) program at the Ellen MacArthur Foundation since 2015 after being awarded the Accenture Award for Circular Economy Pioneers during the World Economic Forum.

Dell follows ISO 14001 standards that refer to environmental management and focusses on life cycle analysis through their product design methodology with the complete

life cycle in mind. Design for the environment is a systematic way of considering the entire life cycle of a product up front and during design (Dell, 2016). Dell's sustainable product lifecycle consists of a closed loop of design, build, ship, use and recycle emphasizing reuse, repair and recyclability bringing the company closer to a more circular approach.

Dell's approach to the circular economy also tackles the triple bottom line of people, planet, and profit. An example of what the company has done regarding the planet portion of the TBL, between 2007 and 2015 Dell recovered 1.4 billion pounds of used electronics, positioning the company as the No. 1 recycler of e-waste and the first in the industry to use recycled plastics in the manufacture of new PCs and displays (Dell, 2016c).

The people segment, Dell has settled some goals for the upcoming future that looks to build a unified and inclusive corporate culture. An example of this goals is to be recognized as best-in-class Employer of Choice by 2021. Dell shares seven leadership principles, these are relationships, drive, judgment, vision, optimism, humility, and selflessness (Dell, 2017). Dell looks that its employees feel as a part of a community that’s why it encourages team members to enroll in flexible work programs.

Dell has developed ways to prevent some of the plastics it uses deteriorating, so it can continue to recycle these materials. This saves Dell money, reduces carbon emission by 11% compared to creating the same products with new plastics, and appeals to the increasing number of customers who want environmentally friendly products that are high quality while not more expensive (Tse, Esposito, & Soufani, 2016).

A challenge which Dell has been facing in this conversion to a circular supply chain is the establishment of a reliable closed-loop supply chain. Dell needs a security of supply, which can be difficult to attain with fluctuating numbers of products collected through takeback. Dell needs to continue to drive increasing participation in its programs, while at the same time exploring other means of acquiring recycled-content materials (Koch & Roberts, 2017).

Conclusion

As described in this paper the Triple Bottom Line describes three performance dimensions of sustainability: people, planet, and profit. With the passing of time, sustainable supply chains have become more and more relevant as the society is more interested and aware now of the impact the products they are consuming have in the environmental and social sectors. It is important for companies to find more sustainable ways of doing business to not only save the environment but also to maintain their customer base. Dell is a company that focusses on doing business in a sustainable way. They are the No. 1 when it comes to recycling e-waste and is really contributing to creating a more sustainable world with their sustainable product lifecycles. Dell is a great example for other companies when it comes to creating a circular supply chain.

Generating revenue is, of course, the main goal of many companies. Many companies do not realize that striving for high revenue and neglecting the planet can result in high damages in the future, for example, damage due to floods and storms making places inhabitable or companies go bankrupt. Companies should focus more on creating

sustainable and circular supply chains, like Dell, in order to contribute to a more sustainable world. Otherwise, the world will quickly run out of resources and then there will be no revenue to generate at all. Focusing on sustainability will cost money but will also guarantee a better future for the people and companies.

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Blockchain technology in the supply chain

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Abstract

Blockchain technology is a core, underlying technology with promising application prospects for a supply chain. Currently, the technology is used for cryptocurrency, with the most famous one, Bitcoin. But different companies are already considering its uses for their supply chain. It seems promising. Blockchain technology would offer supply chains from all over the world transparency which no technology so far, has been able to give. Supply chain transparency is becoming more and more important, not only for the players in a supply chain, but also for the end-customer. This paper focusses on the technology itself and what this technology could do for supply chains all over the world.

Keywords

Blockchain technology; Supply chain; New technologies; supply chain transparency

Introduction

Supply chain visibility is becoming increasingly more important. Not only for the parties in the supply chain, but also for the end-customer. With that, the volume of data is skyrocketing, as more and more different systems are used, and the analyses of the data is becoming a daily task (Padmos, 2016). Companies are trying to capture and store everything, to find out where the bottlenecks in their processes are. Therefore, the introduction of blockchain technology in 2008 was something that many companies where interested in. Blockchain technology offers a way to store the data, and give a level of supply chain visibility that is never seen before.

Blockchain technology

This paper will focus on blockchain technology for a supply chain, but to see or it could work in the supply chain, it is important to first understand the technology itself. To this end, first the technology and its history will be discussed, so in the next chapter can be looked at its application in supply chains.

What is blockchain technology?

With the arising technological changes and transaction based technologies globally used, trust becomes increasingly more important. To ensure the reliability and safety of digital data without it being changed or removed, in between or after the transaction is done, blockchain technology steps in. A blockchain is nothing more than a secure, digital ledger of data, organized in blocks that are linked together sequentially (Haughwout, 2017). A blockchain not only records cryptocurrency, like bitcoin, but also

provides a home for documents of all sorts (Nakamoto, 2008-2013). Bitcoin is a peer-to-peer electronic cash system that enables online payments to be transferred without an intermediary. Blockchain is the technology and software that enables the specific cryptocurrency, to securely transfer their tokens (Nakamoto, 2008-2013). More detailed information about blockchain technology and how a transaction is handled can be found in appendix I.

How does blockchain work?

A blockchain is a data structure that makes it possible to create a digital ledger of data and share it among a network of independent parties. According to the Harvard Business Review, (Nakamoto Satoshi, 2017) there are five basic principles underlying the blockchain technology. Firstly, is the distributed database, which means that each party within the blockchain has access to the entire database and its complete history. So not a single party controls the information or data but a large group of so-called minors who are the blockchain users. Every party can directly verify the record of their transaction partners without an intermediary. Secondly, peer-to-peer transmission, which means that there is no interference from a central node but instead communication occurs directly between peers. Each node stores information and forwards that information to all other nodes within the blockchain. The third principle is that of transparency without pseudonymity, which means that anyone with access to the blockchain system can view every transaction and its associated value. Every user (or node) has its unique thirty-plus alphanumeric address that identifies that users can choose to remain anonymous or

provide proof of their identity to other users or nodes within the blockchain. So, the transactions always occur between blockchain addresses and it is possible that a transaction is done by one anonymous party and none anonymous party. The fourth principle behind blockchains is the one of irreversibility of records. This means that when the transactions are entered in the database, and the accounts are updated, the records cannot be altered anymore because they are now linked to every transaction record that came before them. That is why it is a called a block "chain''. To ensure the recordings on the database is permanent, chronologically ordered and available to others within the network, various computer algorithms and approaches are deployed. Finally, the last principle is that of computational logic. The digital nature of the ledger (database) means that blockchain transactions can be tied to computational logic and programmed. This means that users can set up rules and certain type of algorithms that automatically trigger transactions between nodes (M. Iansiti, 2017).

Blockchain technology in the supply chain

Blockchain technology is a very new, innovative approach for applications in the supply chain. The first mentioning of blockchain is only eight years ago (Mattila, 2016). Most companies who work with, or research this technology, are mainly focused on the cryptocurrencies that works with blockchain, like bitcoin and Ethereum. In this chapter, the goal is to gain insight in what the blockchain technology can do for a supply chain. First, the advantages and disadvantages for this technology will be discussed and then the

current use cases are reviewed. This chapter ends with a discussion about applying the technology in the supply chain.

Advantages and disadvantages of applying blockchain technology in the supply chain

In the last few years a lot is written about blockchain technology and companies are starting to adapt it. In this paragraph the advantages and disadvantages of the technology will be discussed.

Advantages of blockchain technology in the supply chain

There are a lot of advantages for using blockchain technology for the supply chain. The most important advantages are:

- Transparency: blockchain offers a way to have more transparency in the supply chain. By using this technology, the buyer can see where the product comes from. This entails that you can see every step in the chain that the product has taken, real-time (Atul Kumar Verma, 2017). Supply chain transparency is a hot topic right now, not only for the advantages in the supply chain, but also for the transparency to the end-customer. There have been situations in the last few years that with the use of blockchain would not happen. For instance, the Nike child labor scandal of 1996, where underage children were working in factories based in Asia (Tim, 2001). Or the Foxconn, an Apple manufacturer, suicide scandal in 2010, where the work conditions where to hard (Moore, 2012).

- Smart contracts: The idea of smart contracts is that with blockchain, protocols can be made. If the conditions from this protocol are met (payment, orders delivered,

proof received), an action is performed. The advantage of this is that there is less human involvement, so with this the costs are less while raising the assurance of execution and enforcement process (Saveen A. Abeyratne, 2016).

- Inventory management: The visibility as discussed before can be a great improvement for the supply chain when it comes to inventory management (Swan, 2015). Knowing exactly where your products are and when they were shipped gives a better insight in when the product arrives. So therefore, inventory management can have less safety stock because the risk of not having the products on the time that is expected.

- IT system: the blockchain technology can be used to link the different IT systems of different companies with each other (Nakasumi, 2017). Now it's is common that when a supply chain wants to work together they use the same systems. This gives the insurance that the communication between the companies are good and that measurements, are taken the same way, so they can be compared with each other. By using blockchain, this all can be done without having the same system, they can be linked by using blockchain. Blockchain functions as a layer under the already existing layers of technology to combine and store the data. (Koot, 2017)

Disadvantages of the blockchain technology

While there are many advantages, there are also people who are less trilled about this new technology. In this subparagraph these disadvantages will be discussed to see or the advantages way up against the disadvantages of blockchain technology. Some of the most prominent disadvantages are:

- Capacity: The technology does not seem ready for the data going on in a supply chain (Patel, 2016). The technology is not ready for big data exchanges. The gap between the capacity that supply chains will need and what blockchain can offer is enormous (Knut Alicke, 2016).

- Security issues: blockchain itself can be made highly secure, but that does not mean that by using blockchain, the companies itself are secure. For instance, in 2016, 72 million dollars' worth of bitcoin where stolen, but couldn't be traced to a fault in blockchain (Baldwin, 2016).

- Other information technologies can offer supply chain visibility. For instance, Efficient consumer response (ECR). However, ECR does not offer the same amount of transparency as blockchain does. It is mostly used between two bigger parties in a supply chain, and is not by the entire chain.

- "In exchange for having much more accurate and useful data in a shared blockchain, we will accept that our competitors know who we buy from and what some of the flows in our supply chain look like." (Padmos, 2016)

Blockchain use cases

Currently, the only companies who are using it are the cryptocurrencies. But a lot of different sectors and companies are seeing the potential that blockchain can offer them. The most officious sector, is the banking sector. Bitcoin is something which wasn't welcomed when it launched, there were no rules for and it seemed like a bubble that would soon burst. But now, the banking sector itself is looking at it to see what it could

do. For the use of blockchain in supply chains, some very big companies are seeing its potential. For instance, IBM already introduced smart contracts that are based on the blockchain technology and is researching how blockchain could offer more transparency in the fresh food supply chain. R3, a blockchain start-up is offering blockchain as a service (BaaS), with members as Barclays, Royal bank of Scotland, Wells Fargo and many others (Kurt Fanning, 2016). Currently Exact is testing blockchain technology for supply chain finance. But, at this moment they are still learning and testing, so they can't give a new insight on the technology for supply chains yet, but are planning to test and use the technology in the upcoming years (Koot, 2017).

Discussion: How great is blockchain really for a supply chain?

Since the introduction of blockchain in 2008, the world is buzzing. It is said that it could be the greatest thing since the introduction of internet in its current form. For the supply chain, this could mean big things. More transparence, visibility, more data and a better way to arrange this. But there are downsides, there are security issues, the current form of blockchain doesn't seem ready for a big supply chain and there are other system that can also offer supply chain visibility. Especially the last disadvantage is a point to notice, what is the difference between systems as ECR and Vendor managed inventory, and blockchain when it comes to supply chain visibility and supply chain transparence? The difference right now seems to be that blockchain, has the ability to include the whole supply chain, while ECR and VMI are mainly used by the bigger players in the Supply chain. But with that, the question rises, is that really an advantage? When adapting a

technology as big as blockchain, it will only add value if the whole supply chain, so every single player, adapts it. In almost every supply chain there are also little players, for instance, the supplier of the cardboard boxes in which the products are delivered, will never be a big player in that supply chain and therefor will have other customers outside of that supply chain. When only one of its customers wants to adapt blockchain, it will be hard for him. This raises not only the question who will pay for it, but also, will it add value for that party, when its only used for one customer? So, is it much like the internet, that it only will really add value when every company, working in a supply chain, will use it? These questions can't be answered yet because there are no supply chains who are using it, so only time will tell.

Blockchain technology could be the next great thing, but before companies are adapting it, more research is needed, where the focus is not only on the Supply chain, but also on every player in that supply chain, will it add value for them? But, when this research has been done, Blockchain technology could change the way supply chains work all over the world.

Conclusion

Blockchain technology is a very new, innovative approach for handling the supply chain. The first mention of blockchain is only eight years ago (Mattila, 2016). Most companies who work with, or research this technology, are mainly focused on the cryptocurrencies that works with blockchain, like bitcoin and Ethereum. In this report

research was done for the blockchain technology and how it can advance supply chains all over the world.

First, research was done after the blockchain technology. With the arising technological changes and transaction based technologies globally used, trust becomes more and more important. To ensure the reliability and safety of digital data blockchain technology steps in. A blockchain is nothing more than a secure, digital ledger of data, organized in blocks that are linked together sequentially (Haughwout, 2017).

Since its appearance in 2008, not only cryptocurrencies are interested in this technology. Other companies and sectors are interested as well. Firstly, of course, the banking industry. There are also already companies looking at the blockchain technology to optimize their supply chains. For example, IBM had been researching blockchain technology for their fresh food supply chain.

When adapting blockchain technology in the supply chain there are things to consider. Blockchain technology can offer a level of transparency and visibility that no other technology has been able to do. This is because the technology is for the whole supply chain, every partner. But with that there are also concerns, how can the smaller partners pay for the technology, and does is really add value for them?

Because blockchain technology is still very new, only eight years old, there are not many use cases available. At least, not ones that can offer a real inside in how it would work. But with good research and testing, blockchain technology could be a

wonderful thing for supply chains all over the world.

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