## **Sharing Economy:**

# Collaborative Consumption in the World of Warehousing

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#### **Management summary**

The Internet makes it possible that a number of altogether new and different sharing business model concepts have merged, speeding up the "sharing economy" of collaborative consumption, where people offer and share underutilized resources in creative new ways (Botsman & Rogers, 2010). Much of the innovation so far has been about satisfying the needs of consumers. However, the sharing economy is entering the business space and offers opportunities to share resources with each other. Supply chain management, and more specific the world of warehousing, is one of the areas where the sharing economy is likely to be increasingly important (Mosskow, 2014). This thesis aims to answer the following research question: *Under what conditions could the sharing business model concept add value to the warehouse utilisation in The Netherlands and what are the critical success factors*?

This research aimed at both primary and secondary data sources, resulting in an extensive literature review followed by 10 semi-structured interviews. The collected data is analysed by using the template analysis technique (King, 2012) and data displays. A coding 'template' has been developed, which is applied to empirical data, revised and re-applied. The technique started with generating a theoretical initial template of a priori themes. Furthermore, several measurers have been taken to enhance reliability and validity during the research (e.g. recorded and literally transcribed interviews).

The literature review has resulted in 2 initial templates of a priori themes.

- 1. "Sharing business model concept in warehousing", which includes 13 themes divided over the categories: Conditions, Motivations, Risks & challenges and Critical success factors.
- 2. "Warehouse utilisation fluctuation factors", including 11 themes divided over the categories: Distribution network design, Supply uncertainty and Demand uncertainty.

After coding all the transcripts, new themes have been inserted next to the initial templates:

- 1. 17 new themes have been inserted to the "Sharing business model concept in warehousing", resulting in an intermediate template of 30 themes out of which 13 have passed the minimum contribution rate of 25% and consequently have been included in the final template.
- 2. 7 new themes have been inserted to the "Warehouse utilisation fluctuation factors", resulting in an intermediate template of 18 themes out of which 7 have passed the minimum contribution of 25% and have been included in the final template.

The relatively high amount of inserted themes is likely to be caused by a priori themes that have been based on consumer perspective instead of business perspective.

In conclusion, this research has resulted in a final template of 21 themes. It adds value to the existing literature by proposing a shared business model concept for the business-to-business environment in the world of warehousing. Because of the exploratory nature, the final templates are considered to be a guideline for academics / entrepreneurs, rather than a demonstrated and fully proven methodology.

### Preface

Passionately about the technology industry, and more specifically the developments around the shared economy and business models like Airbnb and Uber, I was wondering why such a shared business model concept could not be applied within the warehouse business. The complexity of this environment, the differences between consumer and business perspectives and the innovative character makes is truly an interesting field with a lot of opportunities. This thesis aims to provide insights into the conditions and critical success factors required to apply the sharing business model concept in warehouse space in The Netherlands. I trust this thesis adds value to those that read it and stimulates other to conduct further research on this topic.

I wanted to express my gratitude to the people within my personal network who put me in touch with the interview respondents, and all interviewees for their support to make this thesis happen. Furthermore, I want to thank my girlfriend and family for their patience and encouragement during the hours I was locked-up in the University library. Special thanks to my supervisor dr. Small for his time and effort to support me during this period.

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#### 1. Introduction

This chapter will introduce the topic of this research. The problem indication starts with describing a gap in existing shared business model concepts. Subsequently, an empirical opportunity is described that is linked with the gap in the theory, following by a problem statement. To formulate an answer to the problem statement, multiple research questions are formulated.

#### **1.1. Problem indication**

Sharing between people is a phenomenon as old as humankind (Belk, 2014). We may share a drill with our neighbours, a bench in the park or a bag of candy with our friends. In contrast, business-tobusiness (B2B) sharing traditionally is limited due to competition and a lack of trust or opportunism (Dyer & Singh, 1998). However, this view has changed and collaboration and sharing of (less) tangible assets between organisations has been widely discussed in a variety of disciplines, such as transaction cost economy (Williamson, 1975) and supply chain management (Lee, 2002). The benefits can include a reduction in transaction cost and an increase in resource sharing, learning and sharing knowledge in order to achieve competitive advantages (Wang & Archer, 2007). For example, intermediate or hybrid governance structures, such as joint ventures (e.g. Sony-Ericsson) and franchising (e.g. McDonald's), have proven their success in todays' business. Trust, collaboration, complementary resource endowment and resource interdependency are important characteristics of these intermediate governance structures (Dyer & Singh, 1998; Wang & Archer, 2007). Lee (2002) stated that supply chain efficiency can only be achieved through information sharing, tight collaboration and coordination between different organisations. For example, Vendor Managed Inventory (VMI) and collaborative planning, forecasting and replenishment (CPFR) are strategies that aims to enhance supply chain integration between different parties. The rise of the Internet has made it possible that information sharing and collaborative replenishments up and down the supply chain (Lee, 2002).

The Internet has made it possible that a number of altogether new and different sharing concept business models have merged. For example, Airbnb is a community marketplace for people to share homes around the world; Uber is a company that allows real-time, location based ride-sharing via an app. What their underlying business models have in common is that they operate in the "sharing economy" of collaborative consumption, where people offer and share underutilized resources in creative new ways (Botsman & Rogers, 2010). Many of the sharing and collaborative consumption organizations that currently exist benefitted from the economic recession of 2008, which made most everyone more price sensitive and to seek new ways to earn money or lower their expenditures (Belk, 2014). Furthermore, Cohen & Kietzmann (2014) argue that their success is also driven by a growing environmental consciousness combined with the ubiquity of internet and associated information and

communication technologies which make sharing possible at scale. Together, these developments have started to challenge traditional thinking about how resources can be offered and consumed. In 2015 gross revenue from collaborative platforms and providers across the EU was  $\in$ 28 billion (European Commission, 2016) and it is estimated to be worth \$335 billion globally by 2025 (PWC, 2014).

Much of the innovation in the "sharing economy" so far has been about satisfying the needs of consumers. However, the sharing economy also offers opportunities for businesses to share resources with each other. Supply chain management is another area where the sharing economy is likely to be increasingly important (Mosskow, 2014). For example, the Global Commerce Initiative (2008) defined in their report "The Future Supply Chain 2016" an innovation entitled as collaborative physical logistics. It involves the sharing of physical infrastructure such as warehouse storage and transport vehicles in order to simplify the overall physical footprint, and to consolidate flows to improve service and asset utilisation. In addition, Christopher & Holweg (2011) identifies "asset sharing", sharing physical assets such as factories, distribution centres or trucks with other companies, including competitors, as one of the key actions to achieve a supply chain that exhibits structural flexibility.

Warehouses are an essential component of any supply chain, their operations include the receiving, storage, order picking and shipping of goods (Gu et al., 2007). Since these functions are basically equivalent for every organization across different industries, a potential phenomenon of the sharing business models is faced. This phenomenon can be regarded as a special scenario of supply chain in which on-demand warehousing is possible by connecting organisations in need of additional warehouse space to organisations with extra warehouse space via an online platform. The application of the sharing economy in warehouse space could bring several benefits. Firstly, organizations can manage demand and inventory fluctuations more easily since capacity can be quickly adjusted. Secondly, it offers the possibility for organizations to quickly expand their geographic distribution network. Thirdly, organizations could reduce capital investment and operational cost. In contrast, organisations with too much warehouse space can monetize their underused assets. Fourthly, it would support popular sustainability programmes since the utilization rates of existing warehouses will be higher and less new warehouses need to be built. Given this, it can be concluded that supply chain management has emerged as one of the major areas for companies to gain competitive advantages (Lee, 2002)

Such a business model is not completely new. The service is already provided by Flexe.com, an organisation founded in 2013 and headquartered in Seattle (USA). This organisation provides an online marketplace for on-demand warehouse space. Their technology connects shippers who need

warehouse space with warehouses that have extra capacity. However, this business model has not yet been adopted in The Netherlands. This research seeks to assess the conditions and critical success factors of such a sharing business model to add value to the warehouse utilisation in The Netherlands. The Netherlands plays a key role in the global market because of its well-structured logistics. The Dutch government recognized "logistics and supply chain" as one of the top sectors in which The Netherlands internationally excels. They defined the ambition to be the international leader in 2020. The national government wants to further strengthen their international position by encouraging and investing in innovation (Rijksoverheid, 2011).

#### **1.2.** Problem statement

This thesis aims to provide theoretically and empirically supported insights that contribute to answering the research question:

Under what conditions could the sharing business model concept add value to the warehouse utilisation in The Netherlands and what are the critical success factors?

#### 1.3. Research questions

To answer the problem statement, 5 research questions are derived:

#### Theoretical research questions

- What is the sharing business model concept, its risks and challenges for adoption and acceptance?
- What factors have been identified in relation to the warehouse utilisation?
- Which business segments are most suitable for the shared model approach in warehousing?

#### Practical research questions

- To which business segments in The Netherlands can the shared model approach in warehousing be applied?
- What conditions need to be met to be successful in The Netherlands and how can success be measured?

#### 1.4. Thesis structure

The next chapter (chapter 2) contains the review of academic literature and some insights from business publications. This review ends with the initial template of a priori themes, which are suggested to be of great importance for the success of the sharing business model concept in warehousing. Chapter 3 describes the research methodology, including details of the data collection and data analysis phases. Chapter 4 reports the results of the empirical data and presents the

intermediate template. The final template is presented in chapter 5, including conclusions, discussion, limitations and recommendations for future research and business.

#### 2. Literature review

In this chapter, the theoretical research questions will be answered. To do so, first the sharing business model concept will discussed. Second, factors related to warehouse utilisation will be introduced and described. Lastly, an initial template of a priori themes are presented, which are suggested to have an influence on the success of the sharing business model concept in warehousing.

#### 2.1. The sharing business model concept

The internet, and especially the Web 2.0, has made it possible for a number of altogether new and different sharing concept business models to emerge (Belk, 2014; Cohen & Kietzmann, 2014; Kaplan & Haenlein, 2010). The term Web 2.0 is a term that was first used in 2004 to describe a platform whereby content and applications are no longer created and published by individuals. It has enabled the development of online platforms that promote user-generated content sharing and collaboration (Kaplan & Haenlein, 2010). For example, content sharing sites (e.g. YouTube), online encyclopaedias (e.g. Wikipedia) and crowdfunding services (e.g. Kickstarter).

The economic recession of 2008 made many people more price sensitive and seek new ways to earn money or lower their expenditures. Together with the growing environmental consciousness, this contributed to challenge traditional thinking about how resources can be offered and consumed (Belk, 2014; Cohen & Kietzmann, 2014). Evidence for the growth in disruptive sharing business models concepts can be found in examples such as Airbnb and Uber. What these business models have in common is that they operate in the sharing economy of collaborative consumption, where people offer and share underutilized resources in creative new ways (Botsman & Rogers, 2010). The terms "sharing economy" and "collaborative consumption" are often used synonymously (Sundarajan, 2013; Sacks, 2011). However, Botsman (2015) clarifies distinct differences. She states that the sharing economy is an economic system based on sharing underused assets or services, for free or for a fee, directly from individuals or organisations, whereas collaborative consumption is reinventing not just what we consume but how we consume. Consequently, platforms comparable to the online encyclopaedia Wikipedia would in this context not be labelled under the sharing economy phenomenon since these platforms are not based on sharing underused assets or services, but relies on user contribution for its content. Alternatively, Hamari et al. (2015) considered the sharing economy as an umbrella concept that encompasses several ICT developments and technologies which endorses sharing the consumption of goods and services through online platforms. This definition implies that online platforms that promote user-generated content sharing and collaboration (e.g. Wikipedia) fall under the concept of the sharing economy. According to Hamari et al. (2015), collaborative consumption is one of the categories which encompasses the sharing economy. For example, house

sharing for a certain amount of time and fee (e.g. Airbnb) illustrates the collaborative consumption phenomenon.

Concepts associated with the phenomenon collaborative consumption can be summarised as shown in Table 1.

Reference	Definition "collaborative consumption"
Felson & Speath (1978)	Events in which one or more persons consume economic goods or
	services in the process of engaging in joint activities with one or more
	others.
Botsman & Rogers (2010)	Systems of organized sharing, bartering, lending, trading, renting,
	gifting and swapping between groups of individuals.
Belk (2014)	People coordinating the acquisition and distribution of a resource for a
	fee or other compensation.
Hamari et al. (2015)	Peer-to-peer based activity of obtaining, giving, or sharing access to
	goods and services, coordinated through community-based online
	services.

Table 1. Definitions "collaborative consumption"

According to Felson and Speath's (1978) definition, if a group of people come together to watch a football game, this would be considered as collaborative consumption. But since these participants have no influence on whether the event will happen, nor have they coordinated its acquisition. The definitions provided by Botsman and Rogers (2010) and Belk (2014) differs. Botsman and Rogers (2010) emphasizes that a compensation is not necessary to participate in collaborative consumption. This definition includes sharing activities like those of Peerby, where you can borrow and share items with your neighbours. Furthermore, the definition provided by Hamari et al. (2015) contributes by including the coordination through community-based online services. This perspective seems to validate the view that the internet, and especially Web 2.0, has made it possible that a number of altogether new and different sharing concept business models have merged (Belk, 2014; Cohen & Kietzmann, 2014; Kaplan & Haenlein, 2010).

Considering the above alternatives, it can be inferred that the definition of the terms "sharing economy" and "collaborative consumption" remain ambiguous among researchers. In this research sharing economy will be considered as an umbrella concept that encompasses several ICT developments and technologies, among others collaborative consumption, which endorses sharing the consumption of goods and services through online platforms (Hamari et al, 2015).

With respect to Belk (2014) there are 2 commonalities in sharing and collaborative consumption practices: (1) their reliance on the Internet and (2) their use of temporary access non-ownership models of utilizing goods and services. Moreover, a mapping of 254 collaborative consumption platforms by Hamari et al. (2015) revealed that the ownership aspect may be separated into: (1) access over ownership and (2) transfer of ownership. Access with a change in ownership, such as renting or lending, is the most common mode of exchange. Whereas, transfer of ownership involves passes ownership from one user to another through swapping, donating and purchasing of primarily second-hand goods (Hamari et al., 2015).

According to Botsman and Rogers (2010) sharing can be divided into 3 types of systems. The first system includes product service systems, which enable companies to offer goods as a service rather than sell them as products. This also includes traditional concepts, such as car leasing. However, new sharing business models concepts arise where goods that are privately owned can be shared or rented (e.g. Peerby). The second system includes redistribution markets; used or preowned goods are moved from somewhere they are not needed to somewhere they are (e.g. Marktplaats). The third type is collaborative lifestyles, whereby people with similar needs or interests band together to share and exchange less-tangible assets such as time, skills and money (e.g. Wikipedia).

#### Conditions and motivations for adoption and acceptance

For adoption and acceptance, Botsman and Rogers (2010) contribute a set of conditions for the sharing economy and collaborative consumption to succeed. These set of guidelines represent the 'How' of using a shared business model. According to these authors, the 4 principles include: (1) trust between strangers, (2) idling capacity, (3) critical mass and (4) belief in the commons. Each principle is weighted evenly, but some may be more critical than others depending on what is being shared and who is participating in the sharing. For example, sharing your home (e.g. Airbnb) requires some level of trust between both parties; the host needs to trust that the guest will not destroy his home. The existing online platforms support these interactions by providing features such as verified identities, detailed profiles and confirmed reviews and rankings. These 4 principles count for all 3 types of systems; product service systems, redistribution markets and collaborative lifestyles (Botsman & Rogers, 2010).

Next to these 4 conditions, it is important to determine the motivations and attitudes towards using a sharing economy option that is concerned with collaborative consumption. These motivations represent the 'Why' of using a shared business model concept. Möhlmann (2015) developed a framework on the most commonly cited determinants in the literature on choosing a sharing option. Furthermore, Hamari et al. (2015) stated 4 characteristics of the sharing economy, and how these determine attitude and the behavioural intention to participate in collaborative consumption. In

Motivations		Möhlmann	Hamari et al.	Schor & Fitzmaurice
		(2015)	(2015)	(2015)
1.	Community belonging	Х		Х
2.	Economic benefits	Х	Х	Х
3.	Environmental impact	Х	Х	Х
4.	Familiarity	Х		
5.	Internet capability	Х		Х
6.	Service quality	Х		
7.	Smartphone capability	Х		
8.	Trend affinity	Х		
9.	Trust	Х		
10.	Utility	Х		
11.	Enjoyment		Х	
12.	Reputation		Х	

addition, Schor and Fitzmauce (2015) found 4 major motivations for participation in the sharing economy. An overview of the determinants can be seen in Table 2.

Table 2. Motivations for participation in collaborative consumption

Most researchers agree (Möhlmann, 2015; Hamari et al., 2015; Schor & Fitzmaurice; 2015) that the motivations for using a sharing option can be described by using the following dimensions: community belonging, economic benefits, environmental impact and internet capability.

#### Community belonging

The first motivation is community belonging, where members increase social connection and build social networks (Möhlmann, 2015; Schor & Fitzmaurice, 2015). Today's generation seeks to connect with like-minded people in online and offline communities. They aspire to be part of a group or community, in which they practice sharing or collaborative consumption activities (Möhlmann, 2015). However, a number of online platforms fail to deliver durable social ties (Schor & Fitzmaurice, 2015). Möhlmann (2015) argues that people make use of community gatherings to share knowledge and goods for both ideological and practical reasons.

#### Economic benefits

The second motivation is concerned with the economic benefits when practicing collaborative consumption (Möhlmann, 2015; Hamari et al., 2015; Schor & Fitzmaurice, 2015). Online platforms are able to re-distribute value across the supply chain. They both deliver more value to the demand

side and create new income opportunities the supply side (Schor & Fitzmaurice, 2015). According to Möhlmann (2015), the satisfaction of sharing would be influenced by cost savings, including the initial capital investment and operational costs of an owned asset. Furthermore, organisations can monetize their underused assets. However, online sharing platforms can also be highly disruptive of established businesses and interests (Schor & Fitzmaurice, 2015). For example, hotel demand can fall when Airbnb activity rises and official taxi drivers already revolted against services like Uber and Lyft.

#### Environmental impact

Participation in collaborative consumption is generally expected to have a positive impact on environmental issues (Möhlmann, 2015; Hamari et al., 2015; Schor & Fitzmaurice, 2015). Because the pooling of material goods leads to the increased intensity in the usage of none single product entity. By sharing material goods, an increased utilisation of one single product entity can be achieved (Möhlmann, 2015). For example, staying in existing homes reduces the demand for new hotels. Sharing space is less resource intensive then letting it sit empty. However, ecological impacts have been largely assumed and there are relatively few studies of how these new practices affect resource intensity and greenhouse gas emissions (Schor & Fitzmaurice, 2015). This motivation towards using a sharing economy option may be influenced by attitudes shaped by socio-economic concerns, such as preference for greener consumption. Hence, this motivation can be linked to ideology and norms (Hamari et al., 2015).

#### Internet capability

The fourth motivation for participation in collaborative consumption is internet capability (Möhlmann, 2015; Schor & Fitzmaurice, 2015). The use of the Internet, and especially Web 2.0, has empowered people to do things efficiently and easily (Schor & Fitzmaurice, 2015). In addition, Internet technology has reduced transaction costs and cut distances dramatically in the last couple of years. Currently, many sharing and collaborative consumption services are facilitated by internet platforms (Botsman & Rogers, 2010).

#### Risks and challenges for adoption and acceptance

Collaborative consumption and sharing are not without problems (Belk, 2014). Sharing platforms can also be highly disruptive of established businesses and interests (Schor & Fitzmaurice, 2015). For example, the music and film industries vigorously opposed online sharing of their products. Hotels are pressuring municipalities to enforce hotel or bed and breakfast regulations on those who would offer short-term rental services through the likes of Airbnb to rent their homes. Furthermore, legal liability, insurance and other regulations pose challenges to the system (Dillahunt & Malone, 2015). Another

study (Edelman & Luca, 2014) suggested that social platforms such as Airbnb make it easier to racially discriminate online because it requires hosts to provide photos.

Management teams have an important influence on the direction of firms through their strategic decisions (Child, 1972). The decision about whether to apply the sharing business model will be of strategic nature to the organisation, therefore these decisions need to be made by managers who are either responsible or are supporting the decision making process. An individual's age is expected to influence strategic decision-making perspectives and choices (Wiersema & Bantel, 1992). Research by Child (1974) suggested that older managers might avoid risky decisions, which could include major changes. On the other hand, younger managers are characterized to challenge the existing system and tend to be more risk oriented. This implies that management youth is probably an active influence on company change. Additionally, earlier research proved that collaborative consumption services are mainly used by a young aged group, mainly from teenagers to the age group of mid-thirties (Möhlmann, 2015; Owyang et al., 2014). Hence, it can be suggested that organisations with younger managers in the decision making process are more willing to cooperate with such a sharing business model than organisations with older managers.

#### 2.2. Warehouse utilisation fluctuation factors

Supply chain management has emerged as one of the major areas through which companies to gain a competitive edge (Lee, 2002). Supply chain management can be defined as a network of facilities that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and distribution of these products to customers (Ganeshan & Harrison, 1995). A basic supply chain consists of manufacturing plants, warehouses, retailers, customers and logistics service providers (LSPs) to provide logistics services (Tsiakis et al., 2001). De Koster et al. (2007) state that warehouses form an important part of a firm's supply chain. Their operations include the receiving, storage, order picking and shipping of goods (Gu et al., 2007). As already mentioned in Chapter 1, organisations are continuously searching for new sources of competitive advantages. New initiatives are designed in order to achieve supply chain efficiency through information sharing, tight collaboration and coordination between different organisations. For example, Vendor Managed Inventory (VMI) and collaborative planning, forecasting and replenishment (CPFR) are strategies that aims to enhance supply chain integration between different parties (Lee, 2002).

Furthermore, organisations are increasing their focus on looking for new ways to reduce costs and improve customer responsiveness. The goal of cost reduction provides motivation for centralization of inventories, while the goal of customer responsiveness provides motivation for having goods as near

to the final consumer as possible (Nozick & Turnquist, 2001). Ballou (1968) has identified 3 major decision areas that concern the physical distribution managers about the design of a distribution network: (1) location of warehouses, (2) transportation service choices and (3) inventory-level alternatives. Warehouse location is not overly constraining to physical distribution system design when warehouses are initially well placed, as long as demand and economic conditions remain relatively unchanged over time. However, if conditions change significantly and warehouse locations do not, the constraint of warehouse location may cause suboptimum profits (Ballou, 1968). Therefore, distribution network trade-offs need to be evaluated among the criteria supply chain costs and customer service (Chopra, 2003; Nozick & Turnquist, 2001). Chopra (2003) has identified various measures regarding evaluation criteria that are influenced by the structure of the distribution network (Figure 1).

Another major trend in the design of distribution network is called omni-channel retailing. In today's world, customers want to make purchases quickly and simple, no matter where they are. In addition, customers expect a wide range of shipping options. Beck and Rygl (2015) define this phenomenon as: "the set of activities involved in selling merchandise or services through all widespread channels, whereby the customer can trigger full channel interaction and/or the retailer controls full channel integration" (p. 174). The presence of multiple channels has important implications for customer demand and operational issues such as the distribution network (Bell et al., 2013). According to Hübner et al. (2015), inventory management, warehouse operations and capacity management have to be configured very differently depending on the decision on integrated or separated networks, while picking challenges are a reason to simplify structures and operate separate networks. Traditional retailers are increasingly facing the challenge of redesigning their warehouse and distribution processes and making them more flexible (Hübner et al., 2015).

#### Designing a distribution network



Figure 1. Designing a distribution network (Ballou, 1968; Chopra, 2003; Nozick & Turnquist, 2001)

#### **Demand & Supply Uncertainty**

Suppliers create inventory to meet the uncertain demand downstream the supply chain. Uncertain demands, combined with uncertain production and/or transit times largely determine the inventory at a given site (Ganeshan, 1999). The critical decisions to be made about inventory and capacity are not only about minimizing costs, but also about where in the chain to position inventory in order to hedge against uncertain demand (Lee, 2002). Fisher (1997) presented the matching of supply chain strategies to the right level of demand uncertainties of the product. Furthermore, Lee (2002) expanded this framework by adding supply uncertainties. As a result, 2 types of uncertainties are distinguished within a supply chain; supply uncertainty and demand uncertainty. Demand uncertainty is linked to the predictability of the demand for the product, while supply uncertainty is related to the reliability of the source of supply.

According to Fisher (1997) and Lee (2002) demand uncertainty can be further divided between functional products and innovative products. Functional products have long product life cycles and therefore stable demands, while innovative products have short life cycles with high innovation contents and therefore highly unpredictable demands (Fisher, 1997). Supply uncertainty can be

#### **Demand uncertainty**

Low (Functional Products)

Efficient supply chains

Grocery, basic apparel, food,

oil and gas

High (Innovative Products)

Supply uncertainty

Low (Stable Process)

High (Evolving Process)

Risk-hedging supply chains

Hydro-electric power, some food produce Responsive supply chains Fashion apparel, computers, pop music

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Telecom, high-end computers, semiconductor

Agile supply chains

characterised by stable supply and evolving supply. Stable supply is characterised by a mature manufacturing process and underlying technology, following by a supply base that is well established. In contrast, an evolving supply is where the manufacturing process and the technology are still under early development and are rapidly changing, following by a supply based that may be limited in both size and experience (Lee, 2002). Given these characteristics Lee (2002) defines 4 different supply chain strategies: (1) efficient supply chains, (2) risk-hedging supply chains, (3) responsive supply chains and (4) agile supply chains (see Figure 2). Many companies have tried to turn traditionally functional products into innovative products. But they have continued to focus on physical efficiency in the processes for supplying those products. This phenomenon can be found in industries such as automobiles, personal computers and consumer packaged goods (Fisher, 1997).

#### Figure 2. Supply chain strategies (Lee, 2002, p. 114)

#### Efficient supply chains

These are supply chains that utilize strategies aimed at creating the highest cost efficiencies in the supply chain. To achieve such efficiencies, non-valued-added activities can be eliminated through, for example, applying the LEAN methodology. In addition, scale of economies should be pursued, optimization techniques can be deployed to get the best capacity utilization and information linkages can be established to ensure the most cost-effective transmission of information across the supply chain (Lee, 2002).

#### Responsive supply chains

Lee (2002) states that these are supply chains that utilize strategies aimed at being responsive and flexible to the changing and diverse needs of the customers. An extensive characteristic is the mass customization as a means to meet specific customer requirements.

#### Risk-hedging supply chains

These are supply chains that utilize strategies aimed at pooling and sharing resources in supply chain, so that the risks in supply chain disruption can also be shared. For example, an organization may want to increase the safety stock of its key component to hedge against the risk of supply disruption. By sharing this safety stock with another company, the cost of maintaining this safety stock can be shared (Lee, 2002).

#### Agile supply chains

Lee (2002) defines agile supply chains as a strategy that is aimed at being responsive and flexible to customer needs, while the risk of supply shortages or disruptions are hedged by pooling inventory or other needed capacity resources. This strategy is characterised by the strengths combination of the

"hedged" and "responsive" strategies. The strategy is agile because it has the capability to be responsive to the uncertain demand, while minimizing the back-end risks of supply disruptions.

According to Johnson (2001) there are several categories related to risks associated with demand uncertainty, including: (1) seasonality, (2) volatility of fads, (3) new and innovative product adoptions and (4) short product life. For example, many challenges in the toy industry are characterised by the seasonal demand and short product life time. Toy sales and volumes grow exponentially the last few days before Christmas. Alternatively, manufactures and distributors of fashion skiwear (e.g. Sport Obermeyer) constantly faces the challenges and risks of demand uncertainty; stock outs during the selling season and leftover inventory at the end of the season (Fisher, 1997). The rewards from investments in improving supply chain responsiveness are usually much greater than the rewards from investments in improving the chain's efficiency (Fisher et al, 1994).

For companies that deal with products that are highly seasonal, it is essential to respond accurately (Fisher et al., 1994). For example, fashion apparel products (e.g. ski wear) are highly seasonal, have short selling periods and their demand is highly unpredictable (Lee, 2002). Companies often turn to third-party providers to help manage the huge seasonal volumes. In the case of toys, the key holiday selling season is so short that matching supply and demand is exceptionally complex (Johnson, 2001). Additionally, sales of volatile products (e.g. Furby in the 90's) tend to occur in a concentrated season, which means that a manufacturer would need an unjustifiably large capacity to be able to make goods in response to actual demand (Fisher et al., 1994). The uncertain market reaction to innovation (e.g. Apple watch) increases the risk of shortages or excess supplies. High profit margins and the importance of early sales in establishing market share for new products increase the cost of shortages (Fisher et al., 1994). For companies that deal with products that are new, a responsive approach is essential. Consequently, innovative products require inventory buffers to absorb uncertainty in demand (Fisher, 1997). Short product life cycles (e.g. fashion apparel) increase the risk of obsolescence and the cost of excess supplies, the response time is essential. Hence, market mediation costs predominate for these products (Fisher et al., 1994). Market mediation costs arise when supply exceeds demand and a product has to be marked down and sold at a loss or when a supply falls short of demand, resulting in lost sales opportunities and dissatisfied customers (Lee, 2002). The predictable demand of functional produces makes market mediation easy because a nearly perfect match between supply and demand can be achieved. As a result, these organisations can focus almost exclusively on minimizing costs.

The innovative product characteristics (Fisher, 1997; Lee, 2002) and the categories related to risks associated with demand uncertainty (Johnson, 2001) are a strongly related to each other. In particular, the "innovative products" term acts as an umbrella concept for the categories related to risks associated with demand uncertainty.

#### **Bullwhip effect**

Forrester (1961) illustrated another important phenomenon regarding demand variance among the supply chain is termed the bullwhip effect, where orders of the suppler tend to have larger variance than sales to the buyer and the distortion tends to increase as one moves upstream the supply chain. This effect is a result of the strategic interactions among rational supply chain members. Therefore, it could be suggested that problems according to inventory fluctuations, required capacity and warehouse utilisation can be found more upstream the supply chain. Lee et al. (1997) outlines 4 sources of the bullwhip effect: (1) demand signalling, (2) shortage game, (3) order batching and (4) fluctuating prices. Demand signalling is concerned with the situation where demand is unpredictable and one uses past demand information to update forecasts. Shortage game is commonly existing in the situation when demand exceeds supply. Under the shortage situation, the supplier would ration the supply of the product to the buyers. To secure more units the buyer orders a quantity that exceeds what the buyer would order if the supply of the product is unlimited. Order batching is characterised by a process where the buyers are constantly trying to gain economies of scale and transportation, which will increase order variability. Fluctuating prices are common in mature product phase of the product life-cycle when, for example, manufacturers are in a market share war and offers price discounts and quantity discounts to its customers (Lee et al, 1997).

#### 2.3. Initial templates of a priori themes

Table 3 provides 2 initial templates of a priori themes around the first 3 research questions of this research. Firstly, the conditions and motivations for applying the sharing business model concept, its risk and challenges for adoption and acceptance. Secondly, the factors that have been identified in relation to fluctuations in warehouse utilisation and the business segments that are most suitable for the shared model approach in warehousing. These theme in total are suggested to have an influence on the success of applying the sharing business model concept warehouse space. As explained in more detail in the next chapter (research methodology), these initial templates contain themes that are subject to revision during the analysis of the empirical data.

	Initial templates of a priori themes						
<i>T1</i> .	Sharing business model concept	T2. Warehouse utilisation fluctuation					
1.	Conditions ("How")	1.	Distribution network design				
	1.1. Trust between strangers		1.1. Supply chain costs				
	1.2. Idling capacity		1.2. Customer responsiveness				
	1.3. Critical mass		1.3. Omni-channel retail				
	1.4. Belief in the commons	2.	Supply uncertainty				

2.	Motivations ("Why")	3.	Demand uncertainty
	2.1. Community belonging		3.1. Seasonality
	2.2. Economic benefits		3.2. Volatility of fads
	2.3. Environmental impact		3.3. Innovative product adoptions
	2.4. Internet capability		3.4. Short product life
3.	Risk and challenges	4.	Bullwhip effect
	3.1. Disruptive of established businesses		4.1. Demand signalling
	and interests		4.2. Shortage game
	3.2. Legal liability		4.3. Order batching
	3.3. Insurance		4.4. Fluctuating prices
	3.4. Regulations		
	3.5. Participant's age		

Table 3. Initial template of a priori themes

#### 3. Research methodology

This chapter describes the research methodology used for data collection and analysis in order to provide theoretically and empirically supported insights to answer the problem statement of this research. Furthermore, it will be explained how the validity and reliability is optimised.

#### 3.1. Research design

According to Sekaran and Bougie (2013), the purpose of a study depends on the stage to which knowledge about the research topic has advanced. Since there is very limited academic literature available, specifically on applying a sharing business model concept in warehouse space, this research is exploratory in nature. Exploratory studies are undertaken to better comprehend the nature of the problem when very few studies have been conducted in that area. Extensive interviews might have to be undertaken to get a handle on the situation and understand the phenomena (Sekaran & Bougie, 2013). The data collection approach that is most appropriate for this study is a qualitative research. Qualitative research can be referred as information gathered in a narrative form through interviews and observations (Sekaran & Bougie, 2013).

To get a better understanding of which parties in the supply chain are most concerned with a sharing business model concept in their warehousing operations, all key parties of a basic supply chain are included. A basic supply chain consists of manufacturing plants, wholesalers, retailers, customers and logistics service providers (LSPs) to provide logistics services (Tsiakis et al., 2001). It is recognized that, given the relatively short time frame, this limits a deeper understanding of specific parts of the supply chain. However, in this stage of the phenomenon it is more important to get a better perception of the supply chain as a whole and to figure out where further research should focus.

#### 3.2. Data collection

For this research, both primary and secondary data sources are used. In order to explore the existing academic literature and business publications on the research topic, secondary data is collected through academic databases provided by Tilburg University. The theoretical review section ends with the initial template of a priori themes (see Table 3), which are suggested to have an influence on the success of applying the sharing business model concept within the warehouse space. Because there is very limited literature specifically on sharing business model concepts applied in warehouse space, the common sharing economy themes are considered in this framework.

Primary data is collected from interviews with managers of companies that are potential to make use of a sharing business model concept in their warehousing operations. The interviews are semi-structured to allow comparison across interviews as well as probing questions to stimulate richness of the answers. In a semi-structured interview, the researcher asks about a set of themes using some questions based upon Table 3, but varies the order in which the themes are covered and questions asked (Gillham, 2005). In this way a much deeper understanding of the phenomenon becomes possible. In order to access empirical data, the personal network of the author is used. Decisions about applying the sharing economy within a business are of strategic nature to the organization, therefore the interviews are held with managers who are either responsible for making these decisions or are supporting the decision making process.

#### 3.2.1. Sample design

Since the purpose of the research is to better comprehend the nature of the problem, a non-probability sampling technique was used to select the participants. Purposive sampling is the most frequently used form of non-probability sampling in qualitative research (Saunders, 2012). This technique allows the researcher to choose participants on the basis of his own judgement that are best enable to answer the research questions and meet the purpose of the research. Specifically, typical purposive sampling was applied. This technique provides an illustrative profile that is considered representative (Saunders, 2012).

The sample size for non-probability samples is often ambiguous, there being no hard and fast rules. Sekaran and Bougie (2013) state that qualitative studies use small samples, because of the intensive and in-depth nature of the study. Saunders (2012) specifies that when the population are heterogeneous, data saturation is likely to be reached having collected data between 12 and 30 participants. In contrast, for homogeneous populations data saturation is likely to be reached having collected data between 4 and 12 participants. Since the sample will represent a variety of

organizations from different industries and with different strategies, the population can be comprehended as heterogeneous. However, the basic warehouse functions (i.e. receiving, storage, order picking and shipping of goods) are basically equivalent, resulting in homogeneity (Gu et al., 2007). Therefore, a sample size between 10 and 14 is considered sufficient. As argued in the section research design all parties of a basic supply chain are involved. In this way, it is possible to get a better understanding of which parties of the supply chain are most concerned with a sharing business model concept in their warehousing operations. Furthermore, the sample had the ambition to include 3 different companies for each party. As a result, validity is enhanced.

In order to access these parties and companies, the personal network of the author is used. 23 companies were approached both by telephone and e-mail, resulting in 10 interview respondents. The remaining 13 did not result in participation because of either no responds to the request (11) or not being willing to participate (2).

The research is conducted in The Netherlands. Therefore, the interviews were conducted in Dutch, as this enabled the interviewees to better understand the questions and eventually give more elaborate answers. The 10 interviews took place between 8 November and 6 December 2016. 8 interviews were conducted face-to-face and 2 by telephone. As agreed before the interviews, the identity of the respondents and that of their company is kept confidential in the thesis and is only known to the supervisor. Table 4 presents the respondents in a chronological manner. Furthermore, it provides general information about the respondents; the function the company adopts within the supply chain, the industry they operate in and the individual position of the interviewee within the company.

Respondent	Supply chain party	Industry	Position
1	Retailer	Fashion	Assistant Supply Chain Manager
2	Logistics service provider	Supply chain	Director Transport and Forwarding
3	Manufacturer	Food	Category Purchasing Manager
4	Manufacturer	Food	Supply Chain Manager
5	Wholesaler / Retailer	Fashion	Supply Chain Manager
6	Manufacturer	Life and material sciences	Head Global Distribution Centre
7	Wholesaler	Food	Director Operational Logistics
8	Manufacturer	Construction services	Project Coordinator
9	Logistics service provider	Supply chain	Business Development Manager
10	Logistics service provider	Supply chain	Supply Chain Manager

Table 4. Interview participant characteristics

#### **3.2.2.** Interview design

Semi-structured interviews are used in this research. In a semi-structured interview, the researcher uses a set of questions, but varies the order in which the themes are covered and questions asked (Gillham, 2005). In this way, answers can be compared and where and when applicable, additional probing questions can be asked to clarify or elaborate on any topic. In this way a much deeper understanding of the phenomenon is possible. By adding some structure to the interview, it is ensured that all participants provide their view on all of the topics of interest.

The interview protocol used is presented in Appendix A, the open-ended questions represent the structured part of the interview, probing or clarifying questions are asked where applicable during the interview. The questions are based on the literature review, but to ensure objectivity it is also noted that the a priori themes derived from literature should not guide the data collection. Before proceeding with the actual data collection, the interview protocol was verified and approved by the supervisor. In order to increase reliability, the interviewee was asked for approval to record the interview. Subsequently, it was once again noted that everything that was discussed during the interview would be handled anonymously, confidential and for academic purposes only. The interview started with an introduction, including some general questions about the company and position of the interviewee. The following questions were dealt with the situation inside the participant's company. This provides insights into the market characteristics, warehouse operations and inventory fluctuations the company has to deal with. After this, the interviewee is asked to provide his or her definition of the sharing economy that is concerned with collaborative consumption. This is done to focus the mind of the participant and assess the familiarity of the participant with the topic. Then the conditions, motivations and critical success factors for applying a sharing business model concept in warehousing are investigated. At the end of the interview the interviewees were asked if they had additional remarks, questions or information that he or she wanted to share.

#### 3.3. Data analysis

The collected data is analysed through the use of the template analysis technique (King, 2012) and data displays. Template analysis provided the opportunity to translate the qualitative data into descriptive statistics, while data displays were made to structure the coded data.

The template analysis technique combines a deductive and an inductive approach to qualitative analyses (Saunders et al., 2012) and involves the development of a coding 'template', which is then applied to further data, revised and re-applied. The technique starts with generating an initial template of a priori themes, which are expected to be strongly relevant to the analysis. These a priori themes should correspond to key concepts or perspectives for the study (King, 2012). For this study, these a

priori themes were based on the insights from the theoretical review (see Table 3). The next step involves the analysis and coding of the first transcripts, resulting in an intermediate template. Following the intermediate template, the rest of the transcripts need to be analysed and coded, iteratively verifying, modifying and re-applying the template until the final template is constructed. Insertion of themes is not limited during the coding process. Every piece of text that specifically contributes to the topic but does not fit in an existing theme resulted in a new theme inserted in the template. The template is organized in a way which represents the relationships between themes, most commonly involving a hierarchical structure. Themes are considered feasible when the contribution rate is at least 25%, meaning that at least 4 out of 12 respondents mentioned the specific theme (Borgen & Amundson, 1984). To provide an insight on the steps taken during the template analysis, a detailed description is presented in Appendix B.

The template analysis technique does not come with strict prescriptions and procedures, unlike other approaches. The technique is very flexible regarding the style and format of the coding and template, which can be modified for the needs of the specific study. The discipline of producing the template forces the researcher to take a systematic and well-structured approach to handling the data (King, 2012). The technique is suitable for areas with limited theory, since the technique combines a deductive and an inductive approach to qualitative analysis in the sense that codes can be predetermined and then amended or added to as data are collected and analysed (Saunders et al., 2012). This provides flexibility of using an initial template of a priori themes based on the existing literature, and enriching or replacing it with empirical data, generates a final template to support answering the problem statement. This also helped to select key themes to explore and to identify issues that arise through the data collection process and analysis that have not covered during the theoretical review (King, 2012).

In order to structure the data, data displays were made for both the templates sharing business model concept and warehouse utilisation fluctuations and its related categories (see Appendix C). These data displays make it easier to analyse all the collected data and provides a comprehensive overview. Each table contains the relevant codes and pieces of text conducted from the interviews. These pieces of text correspond to the filled interview worksheets used for the template analysis.

#### 3.4. Reliability and validity

There can be no validity without reliability (Lincoln & Guba, 1985). The reliability of a measure indicates the extent to which it is without bias and hence is consistent (Sekaran & Bougie, 2013). Sekaran and Bougie (2013) state 2 types of validities; internal validity and external validity. Internal

validity refers to the degree of confidence that the data accurately reflect the phenomena under study. External validity refers to the extent of generalizability of the results to other contexts or settings.

#### 3.4.1. Reliability

As stated by Sekaran and Bougie (2013), reliability indicates the extent to which the measure is without bias and hence is consistent. Threats to reliability can be bias and errors (Saunders et al., 2012). By being aware of the possibility of these biases and errors, and taking measures to avoid them, the reliability can be enhanced. First of all, through logical reasoning and an in-depth description of the steps taken in this study, reliability is improved. In this way, it is possible for anyone to replicate the research to another contexts.

In order to ensure the reliability during data collection, the process of interviewing is documented in detail and all interviews are recorded and literally transcribed. This decreases the chance of misinterpretation and thus improves reliability. Furthermore, this provides the opportunity for a retest by an independent observer. In addition, the transcripts are sent to the respondent afterwards in order to ask for correcting and approval. To avoid interviewer bias during data collection, objectivity by the researcher has to be ensured. Responses are summarised during the interview to test the interpretation of the researcher. By making the interviewee feel comfortable and interested in the research topic, through showing credibility and the possible benefits for the organisation, trust of the interviewee is improved and thus interviewee bias is minimised.

To ensure the reliability during the analysis the coding process was checked by the supervisor. This is essential, since the "template analysis" technique is very flexible regarding the style and format of the coding and template (King, 2012). In this way, the reliability can be enhanced by an additional skilled researcher.

#### 3.4.2. Validity

As argued by Sekaran & Bougie (2013), validity refers to the extent to which the research results accurately represent the collected data (internal validity) and can be generalized or transferred to other contexts or settings (external validity).

To achieve a high level of internal validity, the entire process was monitored and assessed by the university supervisor. For data collection, the semi-structured interviews are constructed and conducted in a careful way to clarify questions, to probe meanings and to explore responses and themes from variety of angles to enhance its validity. Furthermore, one of the drawbacks of template analysis includes over-descriptiveness or losing individual respondent's voices while aggregating

themes (King, 2012). These are mitigated by providing concrete detail and rich descriptions of the given answers in the results reporting section.

Although this research is qualitative in nature, this does not automatically mean that the external validity is low. This research aims to contribute to existing literature around the sharing economy that is concerned with collaborative consumption, and more specifically within the warehousing area. Because of the very limited literature available, this study attempts to establish a new area for future research. Furthermore, multiple respondents were positively surprised when the heard about the idea and its innovative character and hence, started thinking about implementation into practice. In this way, the research may contribute to the practical start-up and, development and implementation of the concept.

#### 4. Data analysis and results

In this chapter, the practical research questions will be answered. To do so, first a short description of the respondents will be given. Second, the results regarding the sharing business model concept in warehousing will be discussed, resulting in the intermediate template. Lastly, the results and intermediate template of the factors that causes warehouse utilisation fluctuation will be presented.

#### 4.1. Sample description

This section provides a short introduction to the respondents. The descriptions are categorised by the role the company adopts within the supply chain based on the basic supply chain functions provided by Tsiakis et al. (2001). In total 10 participants have participated: 4 manufacturers, 2 wholesalers, 2 retailers and 3 logistics service providers.

#### 4.1.1. Manufacturers

Respondent 3 is a worldwide candy manufacturer, with more than 20 brands and active in more than 150 countries. The organisation exploits 40 operating companies, including 32 manufacturing facilities and more than 17.000 employees worldwide. The company is headquartered in The Netherlands and had net sales of more than  $\notin 2$  billion in 2015.

Respondent 4 is a worldwide consumer food manufacturer focused on branded nutritional food products. The organisation is active in 16 countries with more than 4.300 employees worldwide and exploits 16 different brands. Furthermore, the group had net sales of more than  $\in 1.1$  billion in 2015.

Respondent 6 is a Dutch science-based multinational and manufacturer active in the fields of health, nutrition and materials. The organisation employs more than 20.000 employees in 50 different countries. Furthermore, the company is still headquartered in The Netherlands and had net sales of more than  $\notin$ 7.7 billion in 2015.

Respondent 8 is a Dutch construction-services business by origin and active in 3 different countries. The company operates in property development, (non-)residential building, roads and civil engineering. The organisation employs a staff of more than 6.500 employees and had net sales of more than €1.9 billion in 2015.

#### 4.1.2. Wholesalers

Respondent 5 is a Dutch fashion brand for over more than 25 years, with more than 60 employees and active as wholesaler and online retailer. The brand label sells fashion products both online and offline, with more than 2.700 point of sales within the Benelux, Germany and France.

Respondent 7 is a Dutch organisation active in both foodservice as a wholesaler and food retail as a wholesaler and retailer. The group employs a staff of more than 5.500 employees at more than 200 operating companies in The Netherlands. Furthermore, the group had net sales of more than  $\notin 2.7$  billion in 2015.

#### 4.1.3. Retailers

Respondent 1 is a Dutch fashion chain by origin, with more than 80 retail stores and approximately 2.000 employees. The organisation is multi-branded and sells fashionable labels both online and offline in 4 different countries.

Respondent 5 is a Dutch fashion brand for over more than 25 years, with more than 60 employees and active as wholesaler and online retailer. The brand label sells fashion products both online and offline, with more than 2.700 point of sales within the Benelux, Germany and France.

#### 4.1.4. Logistics service providers

Respondent 2 is a Dutch logistics service provider by origin, with a maritime character for more than 30 years and active in more than 75 countries worldwide. The company applies multimodal transport concepts, specialised in overseas forwarding. Furthermore, the company employs a staff of more than 800 employees at various strategic location throughout Europe.

Respondent 9 is a global logistics service provider that provide their services in more than 60 countries. The organisation operates more than 110 locations and they manage more than 200 logistics facilities covering over 20 million square feet worldwide. The company is headquartered in Singapore and had net sales of more than  $\in 1.5$  billion in 2015.

Respondent 10 is a Dutch logistics service provider specialised in retail distribution solutions. The organisation employees more than 150 employees in The Netherlands. The company is part of a Dutch group, active in supply chain solutions and had net sales of more than  $\in 100$  billion in 2015.

In the next sections the intermediate template for both the "Sharing business model concept in warehousing" (T1) and the "Warehouse utilisation fluctuation factors" (T2) will be presented. During the interviews, participants were asked to elaborate on their views on how a sharing business model

concept could add value to warehousing in The Netherlands and what fluctuation factors they observe for their warehouse utilisation.

#### 4.2. The sharing business model concept in warehousing

The literature review did not report any specific sharing business model concepts in warehousing. However, several general sharing business model concepts are taken into account. In this section the intermediate template of the "Sharing business model concept in warehousing" and the related contribution rates are provided and presented in more detail by discussing the 4 categories: (1) Conditions, (2) Motivations, (3) Risks & challenges and (4) Critical success factors. Furthermore, the themes that passed the minimum participation rate of 25% are discussed in more detail using quotes that can specifically be attributed to this topic. After coding all the transcripts, 17 new themes have been inserted next to the existing a priori themes. However, not all these new themes passed the minimum contribution rate.

#### 4.2.1. Conditions

The set of conditions represent the 'How' of using a shared business model concept. After analysing all transcripts, 4 new conditions were added next to the a priori themes: "Neutrality of participants", "Predefined volumes and duration", "Evaluating system" and "Start on a small scale and simple products".

In addition, to capture a more precise description 1 condition was changed. The condition T111 changed from "Trust between strangers" to "Trust between partners", because all respondents speak about collaboration with "partners" instead of "strangers". An overview of the conditions can be seen in Figure 3.



## Sharing business model concept in warehousing Category "Conditions"

a priori ■ new themes Figure 3. Intermediate template of the sharing business model concept in warehousing - category "Conditions"

#### T117. Evaluation system (60%)

Respondents agree that an "Evaluation system" is of great importance for the sharing business model concept to succeed. At first, some feel that there should be an evaluation system during the start-up phase of the platform: "*The way how these partners are selected by the platform provider is of critical importance.* (...) *If everyone can enter the platform and list their space, we wouldn't use the platform*" (respondent 2). To facilitate this condition, parties should be selected carefully, based on pre-defined selection criteria. Consequently, potential companies are assessed before participation: "*We at company x want to operate exclusively with approved companies*" (respondent 8).

Secondly, respondents argue that, when they are in need of additional space and therefore make use of such a platform, they want to be able to react quickly and preferably engage with a company in the same business sector. Speed of response is seen as important factor, respondent 4 stated: *"if you are in need of additional warehouse space, you want to react quickly, so there should be a selection on advance"*. This is supported by respondent 5: *"I would definitely make a pre-selection. I would preferably choose a party that is in the same business sector as me"*. Because of the different types of goods, respondent 9 adds: *"The difference in product characteristics and regulations should be distinguished upfront in the platform. You can't match dangerous and / or chemical goods with food products"*. This is why it is important that a sharing business model concept platform for warehouse space should include a pre-selection and filtering for the characteristics and regulations of the specific organization and its business model (e.g. food stored in a conditioned environment). As a result, they want to partner with someone who is already familiar and capable with the type of business environment they are acting in.

#### T111. Trust between partners (50%)

When analysing the results related to "Trust between partners" it can be approached from several perspectives. Several respondents argue for partners that are financially strong and solvent. As explained by respondent 2: "You do not want to risk bankruptcy and as a result my goods are seized". On the other hand, respondent 7 has a more idealistic perspective: "I think that everyone is too much business case driven. Humans have to search for new and other economies. I mean a community in which trust is one of the greatest things. The belief to collaborate in another way. It's not only about money, but also about being together and helping each other". As a result, participating in a sharing business model concept can only be successful if partners build and maintain a relationship based on mutual trust.

#### T118. Start on a small scale and with relatively simple product characteristics (50%)

During analysis respondent 2 states: "You should start on a small scale and with selected companies. Not too big. You have to partner with companies that have an innovation strategy". Starting on a small scale allows opportunities to operate with a selected group of partners who trust each other. This is supported by several respondents, for example respondent 10: "I should definitely start on a small scale". To this respondent 9 adds: "When you use such a platform, you want to react quickly. So, I think that you should start with products that are not too complicated and don't have a lot of WMS requirements. For example, seasonal products. These have often limited Stock Keeping Units (SKU's), then a simpler solution would work". Therefore, the product characteristics and related warehousing requirements should be relatively simple. For example, temporary overflows, bulky goods and seasonal products are mentioned during the interviews.

#### T116. Predefined volumes and duration (40%)

This fourth condition includes the set-up of a framework with predefined storing volumes and storage duration. Many respondents state that installation costs will be too high when providing high volumes for just a couple of weeks. For example, respondent 2: "I think that you have to set a minimal rent duration with a minimum square meters. You will never provide 10.000 m<sup>2</sup> for a month, then the installation costs will be too high. (...) I should say between 1.000 - 5.000 m<sup>2</sup>, minimal 6 months rent. Everything less than 1.000 m<sup>2</sup> can be between 0 - 3 months". Respondent 6 emphasizes that the ratio of fixed versus variable costs highly influences this fourth condition: "Changing fixed costs into variable costs will positively influence your total costs. The timeframe is off course of great importance. (...) To spread my fixed costs". A variable cost structure favours agility and flexibility.

By maintaining a high proportion of variable costs, scaling up or down the capacity can often be costeffectively realised based on actual demand. However, respondent 4 contradicts this condition by underlining the purpose of using such a platform: *"It is intended for temporary storage. You should not set fix requirements for minimal duration. It should stay flexible"*. This respondent suggests that when you set too many requirements for the volumes and duration, flexibility becomes questionable.

#### 4.2.2. Motivations

The motivations represent the 'Why' of using a shared business model concept. After analysing all transcripts, 4 new motivations were added besides the a priori themes: "Must to survive", "Curious to test new things", "Transparency" and "Flexibility". The a priori theme descriptions did not change during the coding process. An overview of the motivations can be seen in Figure 4.



Sharing business model concept in warehousing Category "Motivations"

Figure 4. Intermediate template of the sharing business model concept in warehousing - category "Motivations"

#### T122. Economic benefits (80%)

When analysing the single key motivation "Economic benefits", it can be approached from different point of views. Companies that supply warehouse space are able to monetize their underused space, while on the other hand the demand side is able to lower the rent. This is supported by respondent 1: "From a financial point of view, I would like it. If you have too much space, then you can monetise your extra space. On the other hand, organisations are able to lower the rental costs". Furthermore, respondent 5 states that the organisation would consider such a platform when it offers an advanced WMS, built on existing knowledge and used by a greater community: "It is always helpful to use "the

best of breed" and available existing knowledge. Would it be possible to make use of a brilliant WMS, then it would cost me 2 cents per product versus 6 cents in case of an own build WMS". In this way, economies of scale can be realised. In conclusion, the analysis shows that "Economic benefits" are the most important motivation and is a key aspect. For example, respondent 8 states: "The only argument would be the financial aspect. (...). All aspects in terms of comfort and the distance to the project will result in lower costs".

#### 4.2.3. Risks & challenges

Within this category 5 new risks and challenges were added besides the a priori themes, including: "Distance", "Costs", "Visibility on own assets", "Unfamiliar" and "Communication between systems". All new themes passed the minimum contribution rate.

In addition, the a priori theme description "Regulations" changed slightly to "Regulations and storage characteristics". Participants argued that, although their products are not subjected to certain regulations, they still want to collaborate with parties who are active in the same business segment. An overview of the risks and challenges can be seen in Figure 5.



Sharing business model concept in warehousing Category "Risks & challenges"

Figure 5. Intermediate template of the sharing business model concept in warehousing - category "Risks & challenges"

#### T136. Distance (70%)

Several respondents claimed that the "Distance" of the potential warehouse should not be too great from their current location. When the distance is too great, it will be hard to transfer goods between both locations and hence, the transport costs will increase exponentially. For example, respondent 1 provides an example of a situation in which they rent an extra location for bulk storage which was, in the end, too far away: "A while ago, we operated an extra warehouse. (...) We had to deal with a lack of capacity, so we stored some inventory over there. However, the warehouse was in Loven, which was too far away". This is supported by respondent 2: "We currently have 3 partners to store our overflows. (...) These warehouses are not super modern, but are closely located. Which is of great importance for us". Furthermore, respondent 7 adds: "When in the end all possibilities are defined, you will look for the most efficient distance from your current location". This proves that the distance plays a key role and is seen as a risk and challenge for the success of a shared business model in warehouse space.

Moreover, respondent 3 states: "When operating with multiple warehouses, you have to deal with your safety stock and transport costs. (...) The distances are in The Netherlands feasible within 1 day". This suggests that decentralised warehousing will lead to higher transport costs, safety stocks and hence, working capital. As a result, the respondent claimed for a centralised warehouse location since the driving distances are feasible within a couple of hours in The Netherlands.

#### T137. Costs (70%)

When analysing the results related to "Costs" it can be inferred that respondents fear the risk for higher costs when using a shared business model for warehousing. For example, respondent 4 states: "Decentralized storage will not work in The Netherlands, because of the increase in work capital. (...) It is better to operate a centralized warehouse". This statement is supported by respondent 3: "In a centralized warehouse you have slightly more transport. But you have to keep less stock. When storing decentralized, you have to deal with multiple safety stocks. You have to coordinate more operations". Furthermore, respondent 10 adds: "When you offer great storage fares, but as a result the transport costs increase, the solution is ineffective" However, respondent 7 intends to participate: "If we decide to participate, we will make use of it, as long as the costs will not be higher than currently". In summary, participating in a sharing business model concept can only be successful if the all-in costs are equal or lower compared to the current costs. This finding corresponds to the most important motivation of using a shared business model concept, labelled as "Economic benefits".

#### T1310. Exchange of data between systems (70%)

The respondents fear the risk that the use of different systems and its data exchange can provide issues during the usage of a shared business model concept platform. According to respondent 6: "A risk is that the inventory levels are not equal in 3 ways. This includes the physical-, administrativeand WMS inventory. If your system is not well integrated, than can it be tough to synchronise". This implies that the technological system behind the platform should be able to integrate with any other system in a simplified manner (e.g. ERP and WMS). Correspondingly, the inventory levels should be monitored and synchronised on a real-time base. This is supported by respondent 5: "You should have a WMS which can communicate with every other WMS in a second". Respondent 2, who already rents warehouse space via a third party argued: "Often we have partners who use the same systems. (...) You will take that into account during the decision making process."

Another important aspect of the "exchange of data between systems" are the product characteristics. The complexity of the products can have a major influence on system requirements. Therefore, it is proposed by respondent 9 to operate with simple products during the start-up phase: "Such a platform has a start-up phase. You have to start with simple products on pallets, bulky goods and / or overflows. After a while you can deal with more complicated IT solutions".

Additionally, respondent 8 proposed to create an agreement between the platform and the company, instead of creating an agreement between every match. "Our policy is to minimize the numbers of suppliers. Furthermore, every supplier should be administrated in the system. In this way, you should create an agreement between us and the platform. If we need to administer every single match, then it becomes a difficult story" (respondent 8). By creating an agreement between the platform and the participating organisations, the number of suppliers in the system and its administrative workload can be minimized.

#### T134. Regulations and storage requirements (60%)

From analysis it can be obtained that most organisations are subjected to a lot of regulations and requirements to store their goods, especially the food and life and material sciences industries (respondents 3, 4, 6 and 7). Both industries have to deal with a lot of standards (e.g. HACCP-conditions) to manage and ensure human health and safety. Respondent 3 states: "We need to have full visibility on our own assets. Because we operate in food, we have to deal with a strong regulated environment". Respondent 4 supports this statement by providing an example: "(...) For example, you are not allowed to place food products next to petrochemical products. You have to separate". Because of the regulated environment and storage requirements, respondent 6 adds: "I want to collaborate with partners who knows the business and discipline. (...) Every industry is in today's work subjected to a wide range of regulations. So, you need partners who are specialists". In conclusion, it could be suggested that the food and material sciences industries do not seem directly suitable for the shared model approach in warehousing, since the wide range of regulations will cause difficulties in obtaining a perfect match between parties.

Furthermore, some respondents in the fashion industry prefer a third party who knows the business and disciplines. For example, respondent 5 states: "One of the risks is that we lose the value that is

added by our logistics operations. So, if you choose such an on-demand platform, you want to make use of parties in the same business segment. You do not want to store clothes at a warehouse who is specialised in the handling of tires". In summary, by matching partners who operate in the same industry, the goods are stored in a warehouse that meets the regulations and specific storage requirements. Additional benefit includes that industry proficient employees will handle the goods.

#### T138. Visibility on own assets (50%)

Instead of focusing on their core-business, multiple respondents fear for losing control and being dependent on third party distribution channels. Respondent 1 states: "We want everything in-house. By doing so, we are able manage and control everything. Otherwise you would be dependent on a third party". Respondent 5 emphasizes this statement: "We have the philosophy that if we manage the entire process, we are able to keep our deliveries close to the company's values. In this way, we can deliver "our flavour" to our customers". It should be noted that both respondents operate in the fashion industry.

Although respondent 3 and 4 have both outsourced their logistics activities, the organisations still fear to lose visibility on their own assets when using a shared business model concept. Their warehousing activities are currently centrally organised by a third party, specialised in food. Respondent 3 states: *"The risk is that you don't know where everything is stored and where you have to pick your orders. Subsequently, how will I manage my inbound and outbound flow?"*. In conclusion, respondents fear to lose visibility on their own assets for 2 reasons. Firstly, some organisations operate and manage their own warehouse activities and hence, are afraid for losing control. On the other hand, some organisations are afraid of losing visibility when storing their goods decentralised.

Respondent 2, who already outsource some temporary overflow, adds: "(...) We will never outsource 30% or 40%. We want to control the chain. If the overflow gets too big, we will build a new warehouse". However, this seems reasonable since the organisation is a logistics service provider and hence, warehousing is one of their core-business.

#### T139. Unfamiliar (40%)

Furthermore, "Unfamiliar" is the next risk and challenge that passed the minimum contribution rate during the analysis. Some respondents indicate that they have no experience in participating in the sharing economy, even not privately. Respondent 5 indicates: "*I think people don't know what to expect. It's a new concept and they can hardly visualize for themselves*". Because they have no former experience in the sharing economy in general, they even do not know what to expect from a sharing business model concept in warehousing. With respect to this unfamiliarity, participating in such a shared model will even be harder since the businesses involves their working capital.

Moreover, respondent 5 emphasizes that logistics is one of their core activities: "We have to be responsive to our customers. Using a concept that is in the start-up phase is a major risk for us. We don't know what to expect". Concluding, some respondents fear to use an unfamiliar and unproven concept for activities that includes their working capital and are of essential importance for their business continuity.

#### T133. Insurance (30%)

Some respondents are curious about certain insurance related conditions: "For example, fire safety and temperature conditions can be an issue" (respondent 4). In addition, other respondents raise questions about specific circumstances and how insurance companies will deal with these: "What about insurance and liability, if you place your goods at someone's place you don't know? What if they unload the truck and everything drops on the ground, who will be liable?" (respondent 8). Regarding this curiosity, respondent 9 states: "You have the standard logistics conditions in The Netherlands, named the FENEX conditions". These conditions includes a standard agreement within the Dutch logistics industry, in terms of the legal relationship between an agent and its principals. However, it needs to be verified if the FENEX conditions cover the shared business model concept in warehousing.

#### 4.2.4. Critical success factors

Although the initial template of a priori themes (see Table 3) stated no specific critical success factors, the problem statement (see chapter 1) includes these factors. The respondents who showed interests in participation during the interview, were asked about this critical success factor. In total 5 respondents showed interest. After analysing all transcripts, 4 themes were added: "On-time delivery", "Responsiveness", "Reputation" and "Lower costs". An overview of the critical success factors can be seen in Figure 6.



## Sharing business model concept in warehousing Category "Critical success factors"

Figure 6. Intermediate template of the sharing business model concept in warehousing - category "Critical success factors"

#### T144. Lower costs (40%)

This financial aspect seems to be of great importance to the interested respondents. Respondent 4 states: *"The only critical success factor would be lower costs compared to the current system"*. This is supported by respondent 8: *"The only argument would be the financial aspect. (...) All aspects in terms of comfort and the distance to the project, will in the end lead to lower costs"*. When analysing the critical success factors related to "Lower costs" it can be inferred that this corresponds to the most important motivation for using a shared business model concept in warehousing, labelled as "Economic benefits".

#### 4.3. Warehouse utilisation fluctuation factors

The literature review reported several factors that are related to the fluctuation of warehouse utilisation. In this section the intermediate template of the "Warehouse utilisation fluctuation factors" and the related contribution rates are provided and presented in more detail by discussing the 4 categories: (1) Distribution network design, (2) Supply uncertainty, (3) Demand uncertainty and (4) Bullwhip effect. Furthermore, the themes that passed the minimum participation rate of 25% are discussed in more detail using quotes that can specifically be attributed to this topic. After coding all the transcript, 7 new themes have been inserted next to the existing a priori themes. However, not all these new themes passed the minimum contribution rate.

#### 4.3.1. Distribution network design

Respondents were asked for the supply chain strategy of the corresponding company. When no clear answer was given, the response was not included in this analysis. After analysing all transcripts no new themes were added. An overview of the distribution network design themes can be seen in Figure 7.

Warehouse utilisation fluctuation factors



Figure 7. Intermediate template of the warehouse utilisation fluctuation factors - category "Distribution network design"

#### T212. Customer responsiveness (30%)

The supply chain strategy "Customer responsiveness" is the only strategy that passed the minimum contribution rate. When analysing the results, the respondents indicated that the related organisations purposively focus on customer service and the availability of the goods. More specifically respondent 3 states: "Our product should always be feasible in the shelves. Hence, visibility and availability are the most important aspects for us". In this way, the respondent is to compete with low-budget products. Furthermore, respondent 5 adds: "Our strategy is customer focused for sure. Off course we will also take costs into account, but when it adds value to the performance of the company it doesn't matter". In summary, the respondents conclude that performance of the company and the happiness of the customer will always be up front.

#### 4.3.2. Supply uncertainty

After analysing all transcripts 3 themes were added to the supply uncertainty category: "Number of suppliers (risk spreading)", "Supplier - buyer relationship" and "Lead-time". An overview of the supply uncertainty themes can be seen in Figure 8.



## Warehouse utilisation fluctuation factors Category "Supply uncertainty"

Figure 8. Intermediate template of the warehouse utilisation fluctuation factors - category "Supply uncertainty"

#### T223. Lead-time (40%)

Analysis shows that "Lead-time" is the most important supply uncertainty factor that causes warehouse utilisation fluctuations. 4 respondents stated that they have to deal with relatively long lead-times regarding their supply flow of goods. To deal with this, respondents argue for different solutions, whether on behalf of the supplier or themselves. For example, respondent 6: "*In terms of short supply and inventories, we currently make use of airfreight. Which is really expensive*". To this, respondent 1 adds: "*Sometimes delivery is via airfreight. But that's because of an agreement with the supplier, which he can't meet because of a manufacturing defect. He has to ensure that the product is delivered on-time. Hence, that is a cost consideration the supplier has to decide. Another possibility is that he delivers overdue and provides a discount*".

Additionally, the analysis also shows some contradicting findings within the fashion industry. On the one hand, respondent 5 argues: "Our response to customer demand is very bad. The delivery terms in fashion are always long. (...) The current lead-time is 4 months". On the other hand, respondent 1 states: "I think the lead-time is 4 weeks. But that is about just the purchasing process, then the design already exists". These stated lead-time differs greatly, 4 months (respondent 5) versus 4 weeks (respondent 1), while both respondents purchase in the same geographical region.

#### <u>T222. Supplier – buyer relationship (30%)</u>

The relationship between both parties is of great importance for the supply flow of goods. Following examples show what causes fluctuations in needed storage capacity because of this relationship.

Firstly, respondent 8, operating in constructive services, states: "Sometimes we have additional inventory, because of insufficient agreements with our suppliers. (...) If there is a delay in the construction project and the supplier is not able to store the purchased goods at their own warehouse for a short period of time, they will just ship the goods to the construction site. Consequently, we have to figure out ourselves how we deal with the inventory". It is reasonable to argue that this occurs because of no tight relationship between both parties. As a result, the construction services organisation has to deal with unforeseen inventory at the construction site. Secondly, fluctuations can also occur due to unreliable suppliers. For example, respondent 5 states: "They always deliver too late. When we placed an order and it is approved, we will never cancel". Furthermore, it can occur that suppliers deliver less or more than agreed, although they are not allowed to. As a result, the respondent adds: "In terms of reliability, there are a lot of opportunities". Lastly, respondent 1 argued not be too dependent on 1 main supplier: "In the past we had 1 big supplier and some smaller ones. I think 90% of the purchased volume was from that 1 supplier. Nowadays, we have around 25 suppliers. In this way, they are able to spread the risk for unforeseen circumstances. In conclusion, 3 sources for supply uncertainty are identified: (1) no tight relationship and alignment, (2) unreliable suppliers and (3) dependency on suppliers.

#### 4.3.3. Demand uncertainty

Within this category 4 new themes were added next to the a priori themes, including: "Supplier – buyer relationship", "Promotions", "Own performance" and "Tender procedure". An overview of the risks and challenges can be seen in Figure 9.



## Warehouse utilisation fluctuation factors Category "Demand uncertainty"

Figure 9. Intermediate template of the warehouse utilisation fluctuation factors - category "Demand uncertainty"

#### T231. Seasonality (90%)

Analysis shows that seasonality is the highest rated theme and hence, the most important factor that causes fluctuations in inventory and warehouse utilisation. A difference in industry can be distinguished. Firstly, the respondents operating in the fashion industry (respondent 1 and respondent 5) recognize 2 clear sales seasons, during the spring-summer and fall-winter collections. To this, respondent 5 states: "For spring-summer collection, January and February are high sales peaks. (...) For fall-winter collection the sales peak will be around July, August and September. (...) Hence, you have 2 waves". This implies that the warehouse inventory peaks couple of weeks before. This finding is supported by respondent 10, a logistics service provider who operates a customer active in fashion: "When spring arrives, summer footwear enters the warehouse. On the other hand, when autumn arrives, winter footwear enters. You note those fluctuations also with clothes". Additionally, the weather has a major impact on the duration of the seasons. For example, when summer will last till October, the demand for t-shirts is still available during September. Furthermore, there is a difference between these seasons related to required warehouse space. According to respondent 1: "The summer collection includes a lot of different articles, so a lot of locations within the warehouse. (...) However, the fall-winter season products are more bulky and hence, require more storage volume. Then we are in trouble". Although respondent 5 was not directly interested in participation, he suggests that the fashion industry meets the characteristics that are needed for the implementation of such a shared business platform. "The fashion industry is characterised with the need of a lot of warehouse space. Furthermore, there are clear peaks during the year" (respondent 5). In conclusion, this implies that the warehouse utilisation is not optimal throughout the year.

Secondly, the respondents in the food industry (respondent 4 and respondent 7) also recognize seasonal peaks within their industry. Respondent 4 adds that this applies to specific products: "You see a peak in the summer with Soda. Afterwards you get a valley, because the weather is worse". This is supported by respondent 7: "We also note some peaks on article base. For example, the Unox Sausages peaks during winter". In addition, respondent 7 argues for extra warehouse space because of additional activities: "We also produce Christmas boxes, 1 million each year. (...) We need extra space that period of the year". Currently, the organisation already rent extra space at a third party to solve this problem.

When analysing the results, the period around Christmas is also stated by respondent 2: "One of our customers produces toys. They make 80% of their revenue during the last 3 months of the year. They have a huge peak in September, October and November". This statement about the toys industry corresponds to the theory provided by Johnson (2001), which is discussed in the literature review (see chapter 2).

#### 5. Supplier – buyer relationship (30%)

The respondents operating in the food industry (respondent 3 and respondent 4) both agree that the bargaining power of the retail sector is a challenge. Respondent 3 argues: "*The power of the supermarkets is incredible. (...) They want to compete among each other and therefore lower the prices*". This is supported by respondent 4: "*Retail has all the power. Within the out-of-home segment we have some more bargaining power, because their assortment is much bigger and diffused*". As a result, manufacturers have no voice during negotiation with supermarkets and hence, have to perform in line with their demand.

Furthermore, respondent 8 (operating in construction services) discussed a disagreement with their customers: "We have currently 5 big projects with a delay, because of disagreements with our customers". As a result, the corresponding projects are temporarily on hold, which affected the purchasing and hence, supply uncertainty is recognised (see Section 4.3.2.).

#### 4.3.4. Bullwhip effect

The bullwhip effect has been extensively researched in academic literature. Consequently, no new themes were considered to be of any value added. An overview of results within the bullwhip category can be seen in Figure 10.



## Warehouse utilisation flucatuation factors Category "Bullwhip effect"

Figure 10. Intermediate template of the warehouse utilisation fluctuation factors - category "bullwhip effect"

#### T241. Demand signalling (50%)

When analysing the results related to demand signalling it can be concluded that this process is complicated in several industries. Firstly, the fashion industry (respondent 1 and 5) both state difficulties. Respondent 1 states: "Our forecast is primarily based on experience and knowledge. Keep an eye on the vogue, and try to act on it". On this, respondent 5 adds: "Our never-out-of-stock assortment fluctuates heavily and that is mostly because of our own incapability. Hence, the stock availability is bad and the demand is unpredictable". In concluding, these organisations practice complications with levelling their inventory to meet actual demand because of their own incapability. This implicates that the fashion industry is not very advanced in their planning and forecasting activities.

Secondly, the food manufacturers have to deal with demand signalling difficulties. Respondent 3 states: *"You arranged a certain volume with your customers. (...) If the consumer sales are disappointed, your inventory will arise"*. Consumer market is characterized by volatile and independent demand. This implies that, next to the tremendous power of the retail companies (e.g. supermarkets), the food manufacturers are heavily subjected to these unpredictable consumer demand.

These results are supported by respondent 10 (logistics service provider): "It is a forecast and we remark significant deviations with reality. That is because of the unpredictable consumer purchasing behaviour". In summary, most organisations that have to deal with unpredictable consumer behaviour practice complications in their actual demand signalling.

#### T244. Fluctuating prices (40%)

Respondents also argue that "Fluctuating prices" stimulate fluctuations in inventory and warehouse utilization. On the one hand, respondents (respondent 1 and respondent 7) benefit and extend their purchases when prices decline at the supply side (purchasing costs or transportation costs): "Sometimes the supplier has excess capacity, then they start producing for next season and will offer lower prices. However, the supplier can't keep storing those products in their plant and then they will send it to us earlier. In this way, these articles will stay for a longer time in our warehouse" (respondent 1). Respondent 7 adds: "A couple of years ago the sea freight market built boats with huge capacities, but demand doesn't show up. As a result, the boats are half empty and hence, the prices decrease". On the other hand, respondents (respondent 3 and respondent 7) are arguing for too much power at the demand side, resulting in lower selling prices: "The power of the supermarkets is incredible. (...) They want to compete among each other and therefore lower the prices" (respondent 3). These findings are in line with the findings around the "Supplier – buyer relationship" theme (T235) and the related bargaining power of retail parties (e.g. supermarkets).

#### 5. Conclusions and recommendations

This thesis sets out to investigate: "Under what conditions could the sharing business model concept add value to the warehouse utilisation in The Netherlands and what are the critical success factors?". Based on the literature review 2 initial templates of a priori themes have been determined (see Table 3). The first initial template includes the conditions and motivations for applying a sharing business model concept, its risk and challenges for adoption and acceptance. The second template includes, the factors that have been identified in relation to fluctuations in warehouse utilisation and the business segments that are most suitable for the shared model approach in warehousing.

Empirical data was collected through semi-structured interviews with managers of companies, who are considered as potential participants of a sharing business model concept in warehousing. Subsequently, the initial templates were verified, modified and re-applied during the analysis of the empirical data until the intermediate templates have been constructed. The last step included revision of the intermediate templates, resulting in the final templates. As a result, the final templates have revealed 21 themes that contribute to a better understanding of the conditions and critical success factors required to apply the sharing business model concept in the world of warehousing space in The Netherlands. Additionally, it provides better insights into business segments that are considered to be most applicable for the shared model approach in warehousing.

#### 5.1. Conclusions

In this section the conclusions around the final template of the "Sharing business model concept in warehousing" and "Warehouse utilisation fluctuation factors" will be discussed separately.

#### Sharing business model concept in warehousing

In conclusion, 13 themes have passed the minimum participation rate of 25% and hence, are included in the final template of the "Sharing business model concept in warehousing" (see Table 5). Because insertion of new themes was not limited during the coding process, 9 of these 13 are a result of the empirical data analysis.

Final template							
"Sharing business model concept in warehousing"							
1. Conditions ("How")	<b>Contribution rate</b>	A priori	New				
1.1. Trust between partners	50%	Х					
1.6. Predefined volumes and duration	40%		Х				
1.7. Evaluation system	60%		Х				
1.8. Start on a small scale and simple products	50%		Х				
2. Motivations ("Why")							
2.2. Economic benefits	80%	Х					
3. Risks and challenges							
3.3. Insurance	30%	Х					
3.4. Regulations and storage requirements	60%	Х					
3.6. Distance	70%		Х				
3.7. Costs	70%		Х				
3.8. Visibility on own assets	50%		Х				
3.9. Unfamiliar	40%		Х				
3.10. Exchange of data between systems	70%		Х				
4. Critical success factors							
4.4. Lower costs	40%		Х				

Table 5. Final template of the shared business model concept in warehousing

#### 1. Conditions

For a successful implementation of the sharing business model concept in warehousing, participants should be selected and approved before participation, based on predefined selection criteria (e.g. financial solvency). As a result, the platform should include an "Evaluation system". In this way, the next condition "Trust between partners" can be enhanced. According to the results, the platform can only be successful if partners build relationships and trust each other. In addition, the implementation should "start on a small scale with few partners and with relatively simple products". By starting with a selected group, trust can be built. Furthermore, a framework should be made in which "predefined volumes and the corresponding duration" are defined. In this way, profitability and interest to participate can be ensured for both the supply and demand side.

#### 2. Motivations

It can be concluded that the "Economic benefits" is the single key motivation for parties to participate in a shared business model. As a result, organisations can monetize their underused space, while organisation in need for extra space are able to lower the rent. In addition, by providing an advanced Warehouse Management System, economies of scale can be realised.

#### 3. Risks and challenges

Several risks and challenges are expected during implementation. The 3 most important risks and challenges will be discussed in more detail. The first main risk and challenge expected during implementation is the "Distance" between the current warehouse location and the additional shared warehouse space. When the distance is too great, it will be hard to transfer goods between both locations and hence, the transport costs will increase exponentially. Secondly, the "Costs" related to a shared business model seems to be an important risk and challenge. Implementation can only be successful if the all-in costs are equal or lower compared to current costs. The third risk and challenge includes the "Exchange of data between systems". The use of different systems (e.g. ERP and WMS) and its data exchange can provide issues during the usage the platform. The system behind the platform should be able to integrate with any other system in a simplified manner, including real-time visibility of corresponding inventory levels. In addition, the complexity of the products can have a major influence on system requirements.

#### 4. Critical success factors

The single critical success factor for the platform includes "Lower costs". The financial consequences seem to be of great importance for the interested respondents. This is supported by the main motivation "Economic benefits" and the risk and challenge theme "Costs".

#### Warehouse utilisation fluctuation factors

In conclusion, 7 themes are included in the final template of the "Warehouse utilisation fluctuation factors" (see Table 6). 3 of these 7 themes have been inserted after analysis and hence, next to the existing a priori themes.

Final template "Warehouse utilisation fluctuation factors"							
1. Distribution network designContribution rateA priori							
1.2. Customer responsiveness	30%	Х					
2. Supply uncertainty							
2.2. Supplier - buyer relationship	30%		Х				
2.3. Lead-time	40%		Х				
3. Demand uncertainty							
3.1. Seasonality	90%	Х					
3.5. Supplier - buyer relationship	30%		Х				
4. Bullwhip effect							
4.1. Demand signalling	50%	Х					
4.4. Fluctuating prices	40%	Х					

Table 6. Final template of the warehouse utilisation fluctuation factors

The main business segments to focus on during implementation of a shared business model in warehousing encompasses organisations that have to deal with "Seasonality". This causes high (non)-predictive fluctuations in both inventory and warehouse utilisation throughout the year and is hence, most suitable warehouse sharing. Furthermore, the analysis showed differences in the industry dealing with seasonality's (e.g. fashion and food industry).

In addition, the "Relationship between supplier and buyer" can cause fluctuations in both the supply and demand side of an organisation. With respect to supply uncertainty, 3 causes have emerged: (1) no tight relationship and alignment with suppliers, (2) unreliable suppliers and (3) dependency on suppliers. Regarding demand uncertainty, 2 causes have emerged: (1) the bargaining power of the retail sector (e.g. supermarkets) against its suppliers (e.g. manufacturers) and (2) because of disagreements, projects have been temporarily put on hold, which in turn affected the purchasing process.

#### 5.2. Discussion

When reviewing the final template of the "Shared business model concept in warehousing" it can be concluded that, out of the 13 themes within the final template, 9 themes have been inserted after analysis. This implicates that the suggested general sharing business models themes are not altogether suitable for a shared business model in warehousing. As clarified in the introduction (see chapter 1), much of the innovation in the "sharing economy" so far has been about satisfying the needs of customers. Because there is no academic literature available specifically on sharing business models typically focused on consumers. Hence, the initial templates of a priori themes are based on consumer perspective instead of business perspective. It is reasonable to argue that the difference between consumer behaviour and business behaviour causes the relative large amount of inserted themes that passed the minimum contribution rate of 25%. However, the highest rated theme "Economic benefits" is derived from the theoretical review. This theme is recognised by all researchers (Möhlmann, 2015; Hamari et al., 2015; Schor & Fitzmaurice; 2015) as motivation for using a sharing option (see Table 2).

Out of the 7 themes in the final template of the "Warehouse utilisation fluctuation factors", 3 themes have been inserted next to the initial template of a priori themes. Although the literature review indicated supply uncertainty as one of the causes for fluctuations in inventory and warehouse utilisation, it did not mention clear hierarchical themes. The empirical data filled this gap by adding the themes "Supplier - buyer relationship" and "Lead-times". Since the bullwhip effect has been

extensively researched in academic literature, no new themes were considered to be of any value added.

#### 5.3. Limitations

Several limitations exist regarding this research. First of all, although the minimum sample size of 10 has been achieved, a higher number of respondents might have contributed to this research. In addition, it is argued to include 3 different companies for each party of a basic supply chain within the sample design (see Chapter 3). However, for both the retailers and wholesalers, the actual sample size were 2 respondents. This could influence the validity of the results of these parties. Furthermore, all respondents were geographically located in the south of The Netherlands. This makes it complicated to generalise the findings to The Netherlands as a whole. However, this region is recognised as the Dutch logistics epicentre. Although, it would be a great to validate the findings in other parts of the country.

#### 5.4. Recommendations

Most studies around the sharing economy that are concerned with collaborative consumption emphasize the general sharing business models, typically focused on consumers (e.g. Airbnb). This research adds value to the existing literature by proposing a shared business model concept for the business-to-business environment, and more specifically the world of warehousing. Regarding theoretical implications, the results of this research provides a number of recommendations for further research. Firstly, it would be a great attribution to test the findings in another region of The Netherlands. In this way, generalisability of the findings to the country as a whole can be enhanced. Secondly, it would be interesting to understand how the final template relate to other industries. For example, the toy- and garden furniture industry are mentioned during the interviews. Lastly, a deeper (quantitative) testing of the proposed final template would contribute to the validity of this research.

Since this research is exploratory in nature, the final templates are considered to be a guideline for academics / entrepreneurs, rather than a demonstrated and fully proven methodology. The results offer a structure along which a feasibility study in the area of shared business models in warehousing can be evaluated. However, it is recommended to anybody who wants to start a sharing business model concept in warehousing to execute a front-end-loading study during the start-up phase to confirm whether the final templates are applicable in the corresponding business environment.

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## Appendices

## **Appendix A: Interview protocol**

### Introduction

The research method for me thesis prescribes that I record the interviews. The results shall be treated strictly confidential and for academic purposes only.

- 1. Can you introduce yourself briefly?
  - 1.1. What is your role within the organisation and for what tasks are you responsible and or accountable?
  - 1.2. With which other department(s) do you collaborate the most?
  - 1.3. How long do you occupy this function?
- 2. Can you introduce the company briefly?
  - 2.1. What is the company's mission and vision?
  - 2.2. What products / services does the company offer?
  - 2.3. What is the company's supply chain strategy?
    - 2.3.1.Customer responsiveness or reducing supply chain costs?
  - 2.4. What keeps you awake at night in relationship to your company?

#### Inventory fluctuations and warehouse operations

First, I would like to understand the market characteristics your company have to deal with, and more specifically the supply chain management / logistics department.

#### Demand uncertainty

- 3. Who are your customers?
  - 3.1. Can you give some examples of your customers?
- 4. Can you characterize the market?
  - 4.1. Does the demand peak in a specific season?
  - 4.2. How volatile is the market?
  - 4.3. How innovative is the market?
  - 4.4. What is the product life cycle of a specific product?
- 5. How predictable and stable is the demand pattern?
- 6. What is the demand on a monthly base?
- 7. How quickly can you respond to customer demand?
- 8. Can you describe the type and strength of the relationship with your customers?

#### Supply uncertainty

- 9. Who are your suppliers?
  - 9.1. Can you give some examples of your suppliers?
- 10. Can you characterize the purchasing market?
  - 10.1. Do you have specific purchasing season?
  - 10.2. How volatile is the purchasing market?
  - 10.3. How innovative is the purchasing market?
- 11. Can you describe the type and strength of the relationship with your suppliers?
- 12. How is the supply process organised?
- 13. How reliable are your suppliers?
- 14. How quickly can your supplier respond to your demand?

#### Distribution network design

- 15. Does the company operate their own warehouse activities or is it outsourced to a LSP? Why?
- 16. Do you operate centralized or decentralized warehouse operations?
  - 16.1. How many warehouses do you operate?
- 17. Where are the warehouses located?
- 18. How much warehouse capacity do you roughly have?
- 19. How do you currently cope with a lack of warehouse capacity?
  - 19.1. How often does this happen and how much capacity is needed?
- 20. How do you currently cope with excess warehouse capacity?
  - 20.1. How often does this happen and how much capacity is in excess?

#### Sharing business model concept

I would like to understand your general perspective on sharing business model concepts / the sharing economy, besides the specific context of your company.

- 21. What do you think about when we speak of the sharing economy?
- 22. Have you ever participated in the sharing economy, business wise or private?
  - 22.1. What were your motivations using a sharing economy option?
  - 22.2. How satisfied were you? Why?
  - 22.3. Would you use such an option again?

#### Conditions, motivations and critical success factors

Imagine, you are in a situation when you are in need of extra warehouse capacity.

- 23. What would you do in the current situation? Why?
- 24. What would be the optimal solution?

Now, imagine there is a platform that offers on-demand warehousing.

- 25. What conditions should be met for considering on-demand warehousing? Why?
- 26. What factors would motivate you towards using such a sharing business model concept? Why?
- 27. On a scale of 1 to 10, how would ... motivate you:
  - 27.1. Community belonging
  - 27.2. Economic benefits
  - 27.3. Environmental impact
  - 27.4. Internet Capability
- 28. What would be the critical success factors?

#### Complications

- 29. What would retain you using a shared business model concept? Why?
- 30. What risks do you expect to encounter when using a sharing option for your warehouse activities?
- 31. To what extent would these risks determine whether to use a sharing option for your warehouse activities?

#### Other

32. Do you have any other remarks, questions or additional information that you would like to share?

#### **Appendix B: Template analysis**

For the template analysis it is decided to use common spreadsheet software. A template worksheet was filled with the a priori themes priori themes, which were based on the insights from the theoretical review (see Table 3). Subsequently, all themes received an unique numeric (sub)code. Furthermore, additional worksheets were inserted (1 per interview). These interview worksheets were filled with pieces of text from the interview transcripts. In addition, coding was done referring to the unique (sub)codes as given to the themes in the template worksheet. Insertion of themes was not limited during the coding process. Every piece of text that specifically contributed to the topic but did not fit in an existing theme resulted in a new theme inserted in the template. The template worksheet was enriched with a column per interview and formulas to retrieve the codes from the interview worksheets. Moreover, the total amount of times a certain code was assigned (sum), in how many interviews a code was assigned (count) and the contribution rate were calculated. The contribution rate was calculated by the ratio of the count and the total interviews taken. In this way, the results can be summarised in 1 sheet. Themes were considered feasible at a minimum contribution rate of 25%, meaning that at least 25% of the participants mentioned the specific theme (Borgen & Amundson, 1984). To provide an insight on how this template analysis is set up, a partial example of the template worksheet (Figure 11) and the interview worksheet (Figure 12) are presented.

	Α	В	C	D	E	L	M	N	0	Р
								1		Participation
1			Interview	1	2	9	10	Count	Sum	rate
2			Code							
3		T1. Sharing business model concept	T1							
4		1. Conditions ("How")	T11							
5		1.1. Trust between partners	T111	2	2	0	0	5	8	50%
6		1.2. Idling capacity	T112	0	0	0	0	2	3	20%
7		1.3. Critical mass	T113	0	0	0	0	2	2	20%
8		1.4. Belief in the commons	T114	0	1	0	0	2	2	20%
9		1.5. Neutrality of participants	T115	0	1	0	0	1	1	10%
10		1.6. Predefined volumes and duration	T116	0	2	0	0	3	4	30%
11		1.7. Evaluation system	T117	0	5	4	0	5	13	50%
12		1.8. Start on a small scale and simple products	T118	0	1	5	0	4	9	40%
13										
14		2. Motivations ("Why")	T12							
15		2.1. Community belonging	T121	0	0	0	0	2	3	20%
16		2.2. Economic benefits	T122	2	0	2	0	7	14	70%

Figure 11. Example of template sheet

	A	В	C	D	E	F	G
1	Transcript line #	Quote	Level 1 💌	Level 2	Level 3	Level 4 🔻	Code 🔻
		Wij werken met onafhankelijke vraag. Niet afhankelijke vraag. Zit er altijd een foutenmarge in de					
		vraagvoorspelling. Dus de twee invloeden, enerzijds geen 100% garantie hebt vanuit de productie en					
		ook geen 100% feilloze vraagvoorspellingen kan je dus in situaties terecht komen waar dat vraag en					
2	92 - 98	aanbod niet op elkaar aansluiten.	T2		4	L	T241
		Luchtvracht wordt gebruikt in het kader van het oplossen van de lead-times in geval van short supply.					
3	140 - 141	Dus van lage voorraden.	T2		2 3	3	T223
		Ik zou zeggen een duidelijke transparantie in het kostenmodel. Als je gaat voor een model waar in					
		infrastructuur, diensten, mensen over diverse partijen geshared worden dan denk ik dat het belangrijk					
		is welk kostenmodel wordt daar gebruikt om de diverse aspecten van de service en de infrastructuur					
		die je daar gebruikt hoe die aan jou worden doorgerekend. Dat het duidelijk is van welke prijs krijg ik					
4	186 - 190	voor welke service.	T1		2	1	T127
		Ik denk een andere voorwaarde is dat de rollen en verantwoordelijkheden heel duidelijk bepaald zijn.					
		Ook dat de processen op een goede manier met elkaar aansluiten. Dat kan systemen zijn. Vermijden					
5	192 - 193	dat zaken verscheidene keren opnieuw moeten worden ingebracht.	T1		3 10	)	T1310

Figure 12. Example of interview sheet (interview 6)

Figure 13 shows the template sheet including all themes and hence, before deleting any theme that did not pass the minimum contribution rate of 25%. Furthermore, an overview of themes that have been added, deleted or changed during the entire analysis is provided in Figure 14.