

Sustainable business models in road transportation – Experience from Swedish and Australian long-haulage trucking industry. Social network perspective



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The increased focus of today's businesses is to operate in a more sustainable way in order to create value for numerous stakeholders. This is also valid in the transportation industry due to the multiple negative environmental impacts of this industry, and of road transportation in particular. Within the road transport industry, trucks remain to be the main mode of transportation for long-haulage deliveries, including the countries such as Sweden and Australia. Therefore, with the current focus of high-end truck manufacturers to provide sustainable transport solutions, the question arises: what is a sustainable business model in road transport supply chains? The empirical base is a multiple case study focused on high-end truck manufacturers and their downstream networks in Sweden and Australia. The results show that the high-end heavy-vehicle manufacturers who are to offer sustainable transport solutions do not only talk about recent technologies and green production processes, but are also focusing on the propositions of sustainable business solutions. The expected results are to show and advise various stakeholders of long-haulage transport supply chains about sustainable business models and its components in the industry.

Key words: sustainable solution, business model, long haulage trucks, road transport

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1 Introduction

Businesses nowadays are under increasing pressure to operate in a more sustainable way and consider not only economic, but also environmental and social issues underpinning their business practices for the purpose of value creation for all stakeholders. This has led to the development of sustainable business models, which tend to focus on environmental, social and economic issues, and these, in turn, drive sustainability throughout the whole supply chain, though, still posing some intriguing questions for businesses and researchers, in an inquiry that requires further exploration (Bocken & Short, 2015; Hogevoold et al, 2015; Dentchev et al, 2015).

Unsurprisingly, the focus on sustainable business models in the transportation industry is also increasing (McKinnon and Piecyk, 2010). This reflect the multiple negative environmental impacts of this industry, and of road transportation in particular (Jaegler & Condran, 2014). Within the road transport industry, trucks continue to provide the main mode of transportation for long-haulage deliveries, including the countries such as Sweden and Australia (trafikverket report and BITRE). Therefore, sustainability is clearly one of the focuses when exploring the ways to address the increasing environmental and social demands from governments and society at large while having economic profits.

As part of this focus, it is argued that companies should consider addressing the emerging sustainability challenges by combining different business actors and stakeholders in joint value-adding offerings (Seuring et al, 2013). But, as the current literature does not offer a general conceptual definition of what a sustainable business model should look like and how it should be operationalized (Boons & Ludeke-Freund, 2013), this makes it harder for organizations to understand what should be included in a sustainable business model. Whereas the general definition brings in the triple bottom line approach and considers a wide range of stakeholder interests (Bocken et al, 2014), the focus on overall profitability through product- service system is bringing challenges to the organizations (Coley & Lemon, 2009). It is not yet well understood how innovative sustainable business models function and are applicable in real world (Denchev et al, 2015).

This paper addresses the questions: What are the main components and principles of the business model that can be called sustainable? What is a sustainable solution in long-haulage road transport supply chains? The answers to these questions are informed through the multiple case study (Eisenhardt & Graebner, 2007; Yin, 2009) by the collection of primary and secondary data (Myers, 2009). The analytical model draws on social network theory, sustainable business model and sustainable road transport supply chain literature (Fig. 1) (similar approach as in Matos and Silvestre, 2013) in order to identify key components and principles of sustainable business model in long-haulage transport networks. With the case study approach the aim is to explore the extent to which sustainability is incorporated into the business models of a number of firms that are engaged in the long-haulage trucking industry, with a particular focus on truck manufacturers and transport companies. The multiple case study is focused on high-end truck manufacturers and their downstream networks in Sweden and Australia. The highly relevant research in this industry due to its environmental burden was also influenced by the current claims from high-end heavy-vehicle manufacturers that their vehicles provide increasingly sustainable operations and that their business strategy is to

provide sustainable transport solutions. The main respondents: two truck manufacturers in Sweden and their customers (as well as dealers) and two truck manufacturers in Australia (with its downstream supply chain).

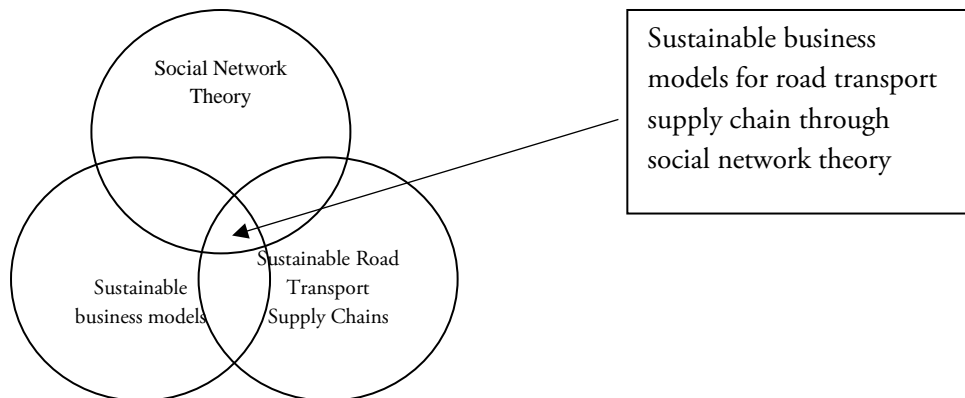


Figure 1. Analytical framework (partly adopted from Matos & Silvestre (2013))

This paper consists of five parts. Theoretical discussion on sustainable business models with the focus on the principles and components is laid out as follows. Sustainable supply chains in the road transport industry are discussed next. The rationale underpinning the chosen theoretical lens of social network theory is presented then. This is followed by a methods section which includes a description of the study performed, after which an overview of the data is obtained from the interviews with the heavy-vehicle manufacturers, dealers and transport customers (following the structure of the selected framework). This is followed by an analysis of this data which leads to a number of conclusions leading to a presentation of the model for sustainable business model in long-haulage transport industry. The final section summarises the managerial and theoretical contributions and directions for future research.

2 Theoretical overview – towards more sustainable business models

The theoretical discussion on business models in general includes the concepts of values, functions, profits, relations (systems) and resources (Chesbrough, 2010; Achtenhagen, et al, 2013; Zott et al, 2011). However, pressures from resource scarcity and stakeholder desires for improved sustainability support the development of new business models that include all three dimension of sustainability (economic, environmental and social). Examples of such sustainable business models in research and practice include closed-loop supply chain management, product-service systems, life-cycle models, strategies for sustainable products, solution business and others (Boons & Lüdeke-Freund, 2013; Pagell & Wu, 2009, Storbacka et al, 2013)

2.1 Sustainable Business Models

The starting point for any discussion of business models that focus on improved sustainability is a discussion on the concept of a business model itself (Schaltegger, Hansen & Lüdeke-Freund, 2015; Bocken & Short, 2015). As noted by Zott, Amit & Massa (2011) the literature surrounding the concept of a business model is still developing, but the main theme is that of a business model as a unit of analysis. Chesbrough (2010) describes the business model as a system serving several functions for the enterprise and articulating value propositions through identification of a market segment and revenue generation mechanism; the value chain, the firm's position in it as well as complementary assets for offering creation, revenue mechanisms and cost structures; and formulating a competitive strategy. In summarizing recent research, Roome and Louche (2015) argue that there are four emerging characteristics of business

models: value propositions (value embedded in the product/service offerings), value networks (relationships within supply chain), value capture (costs and revenue streams), and value creation and delivery (key activities, resources, channels, technology, value creation patterns and value (re)distribution). However, Achtenhagen et al (2013) argue that business model change and development is still poorly understood, and that the process through which business models evolve toward fundamental contributions to sustainable development is under researched (Roome and Louche, 2015)

Whilst research on sustainability in terms of sustainable initiatives and actions industrial companies may pursue (together with empirical examples) is extensive, there is a limited understanding of sustainable business models in such industrial systems and this has resulted in a lack of understanding of how firms should approach embedding sustainability in their business models. Moreover, the current literature does not offer a general conceptual definition of a sustainable business model (Boons and Ludeke-Freund, 2013), although Bocken, Short, Rana & Evans (2014) argue that sustainable business models (SBM) are the ones that incorporate a triple bottom line approach and consider a broad range of stakeholder interests, including environment and society (Bocken et al, 2014) or those where the company is both sufficiently profitable and is reducing environmental and socioeconomic burdens through the delivery of socially relevant products and services (Wells, 2015). When defining strongly sustainable business models, Upward & Jones (2015) underline the importance of positive environmental, social and economic outcomes through its value network. The strategic focus on sustainable business models means organizations should treat sustainability not as an add-on, but rather as a business strategy in itself while drawing on economic, social and environmental aspects in defining the aims of the organizations. Furthermore, they suggest that the SBM uses a triple bottom line approach in measuring performance, gives the priority to all stakeholders rather than only one shareholder's expectations, promotes environmental stewardship and promotes visionary CEOs so that sustainability gets embedded into organizational culture and structure (Stubbs and Cocklin, 2008).

According to Teece (2010), value creation together with its delivery and capture mechanism are the important facets of business model design. However, when value exchange is being measured only in monetary units, it is limiting the extension of the business model to other definitions of value. Upward and Jones (2015) go on to argue that a strongly sustainable business model must provide a base for guiding the co-creation of value with all organization's stakeholders, whilst, in a similar way, the existence of supplier-customer interactions and customer value fulfilment empowers value co-creation (Gronroos & Ravaldi, 2011). Few diverse business models that can help improve sustainability are discussed within both practice and research: closed-loop production/supply systems with cradle to cradle approach (Winkler 2011; Dekker et al, 2012; Kumar and Putnam, 2008) or sustainable supply chains (Carter and Easton, 2001), product service system with a focus on servitization as well as eco-innovations with life-cycle approaches (Bocken et al, 2014; Schmidt, 2001). Moving from a flow economy (with high amounts of useless waste) to a circular one where used products or other waste are reused or recycled for material efficiency and profitability is also currently an area under consideration within this literature (Winkler, 2011).

In Wells (2015), the metrics by which business models for sustainability might be measured are more diverse and more difficult to quantify and given the breadth and scope of sustainability issues, it is hard to find any business model capturing all the elements. These metrics, however, will help to analyze the case study presented in this paper.

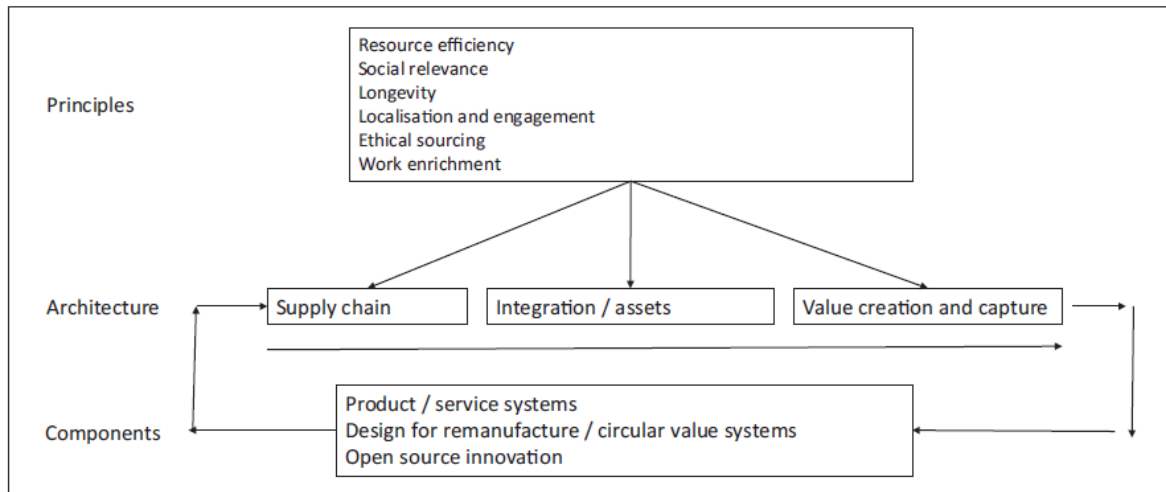


Figure 2. Principles, architecture and components of business model for sustainability (Wells, 2015)

In the above Figure, the principles refer to sustainability characteristics from wider business sustainability literature and from interaction within supply chains. Wells (2015) main conceptual contribution is through the discussion on the model of sustainable business. The concept of ‘Architecture’ refers to the business structure and, in doing so, captures the mainstream discussion in the literature on business models. Components refer to the operational means for achievement of competitiveness and sustainability targets. The principles include resource efficiency, whereas resource constraints in the future might be resolved by industrial symbiosis, circular value creation and capture systems, product/service systems, and remanufacturing strategies. The second principle is social relevance, where any product or service should serve social needs. Product and business longevity principle is referring to the efficiency and second life of product (together with recycling activities) as well as long-term businesses (family business) approach, where the emphasis is on viable business rather than short term profit maximization. Localization and engagement principle refers to be a part of the wider sustainability agenda for localized production and wealth generation locally. Ethical sourcing includes working with your supplier with sustainability requirements while work enrichment referring to the wider and more responsible working tasks. The architecture of the sustainable business model reflects the supply chain view (or network approach), where upstream and downstream actors function efficiently in long-term relationships in order to co-create value with the higher integration in mind. The components of sustainable business model are product/service systems, circular value systems and open source innovation (e.g. crowdsourcing and collective commons).

2.2 Sustainable business models (sustainable supply chains) in Road Transportation

While effectiveness and cost reduction have always formed the main focus within logistics and transportation, awareness of demands on sustainability in this sector is highly emerging (Pieters et al, 2009). Road freight transport operations are increasingly raising concerns over the environmental and social impact (Piecyk and McKinnon, 2010; Mattila and Antikainen, 2011). The strategy for product-service systems is quite broadly discussed in logistics and transportation (automotive) industries as a step towards more sustainable business model (e.g. Wells, 2004). Schmidt (2001) was exemplifying the best results achieved (with the least

investments) through drivers training and following decrease in fuel consumption. One of the archetypes by Bocken et al (2014) is also based on delivering functionality rather than ownership and is based on Product Service Systems and Servitisation (Bocken et al, 2014) and can be referred to as integrated solution. The integrated solution in the industrial context can represent the sustainable system of products and services addressing the customer needs and sustainability issues and even more, being both profitable for companies and beneficial for society. While designing more sustainable integrated solution, there are several commonalities identified: the customer need is the starting point of the offer, the provider is involved throughout the life-cycle of the product and guarantee a certain level of performance; there is a focus on creating added value. In the logistics (transportation industry) the maintenance of vehicles is also a major environmental problem thus proper maintenance programs help maintain vehicles in safe and efficient working conditions (Coley and Lemon, 2009).

Sustainable supply chains in road freight transport is an under researched area, however some studies are focusing on this sector. For example, the study of UK truck manufacturer and its downstream supply chain by Chakkol et al (2014), focusing on solution sales from the service-dominant logic and value co-creation perspectives. In order to create value within truck supply chains, the actors within the network should understand the complexity of solution sales and the flow of resources amongst actors. The needs of customers can be tailored more through improved communication channels, collaboration and learning. The similar approach is taken by other empirical example from the international study by Agndal et al (2013) and Pereseina et al (2013), where the value propositions of Swedish truck manufacturer are explored. Moving further from the solution sales to the performance sales, the study exemplifies the challenges and interaction patters within heavy vehicle industry actors, including transport companies. The extended services, actors network and life cycle perspective contributes to the more sustainable offerings in this industry, where the solution for the customer include long term focus, environmentally build product with added value services and even further, performance based contracts (Agndal et al, 2013; Pereseina et al, 2013). Through the obtained collaboration in the supply chain, the concept of added value is important. As assessing products and services during its life-time, the added value appears to exist for both manufacturer and customer. The value for the customer could be seen through the improved quality and optimization of the processes, at the same time bringing value to other actors in the supply chain (Finnveden, 2009).

Boudreau et al (2008) emphasize the use of information systems and information technologies as the major force for creating sustainable business systems. Green IT is focused on better equipment utilization and energy efficiency. The authors mention several frameworks in terms of Green IT: information drivers like universality, pollution prevention and clean technology by action level through strategic alignment of IS with the enterprise and ecological thinking. However, they mention that green IS has a bigger potential for adding to the sustainable business processes – for example in transportation: reducing transportation costs and environmental burdens, also avoiding traffic congestion and minimizing energy consumption with a fleet management system and dynamic routing of vehicles (Boudreau et al, 2008). In heavy vehicle industry IT systems (especially fleet management systems) can help in improved information sharing towards better management of products (trucks).

2.3 Social network theory

Following the systematic review of theoretical lenses in sustainable supply chain management Touboulic and Walker (2015) suggest that, in addition to those commonly used that include the (natural) resource based view, stakeholder theory, institutional theory and transaction cost theory, other approaches drawn from the SSCM literature could be used in order to investigate the evolution of business practices. One which the authors propose is that of employing social network theory (Granovetter, 1983) on the basis that this can help to investigate ‘how organizations adapt and respond to the sustainability challenge through their social relationships and the development of social capital.’ (Toubulic and Walker, 2015, p. 34). In a similar way, Gold, Seuring and Beske (2011) also suggest that social network theory can be seen as a tool to explain mutual organizational learning or the development of trust-based interdependencies between supply chains. Also, due to the fact that trust is central in most theories of social network effectiveness as it is true in supply chain networks (Galaskiewicz, 2011).

Academics who support the use of social network theory argue that it can help understand the inter-dependence relationships among actors within networks and also the need for trust and collaboration between players within the network. The resulting network governance model reflects the uncertainty and complexity within the network as well as its connectedness and the resultant need to ease information flows (Vuuro, Russon & Perinni, 2010). In this way, social network theory examines the connections between actors within the network and, in a business-to-business context, it means that exchanges are not to be examined as discrete transactions but rather as business relationships (Tokman & Beitelspacher, 2011). This point is emphasized by Bernardes (2010) who suggests that the central tenant of social network theory is that social capital affects economic transactions in such a way that behavior is predicated on social relations.

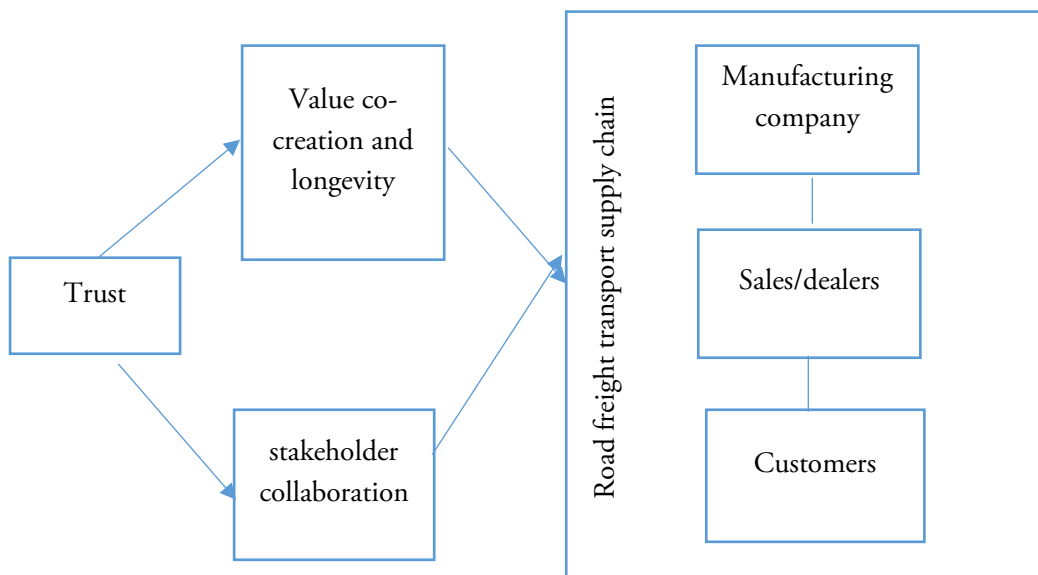


Figure 3. Explaining road freight transport supply chain sustainability through social network theory

Stakeholder participation in the organizational strategies has been known as a key to increase collaboration amongst the supply chain actors. The value co-creation then helps developing organization’s vision and affect its actions as well as building the relationships with diverse stakeholders (Matos and Silvestre, 2013). While building it on trust, this will have an influence on sustainability of road freight transport supply chain through the social relationships in between nodes (actors) via stakeholder collaboration, value co-creation and longevity (long term relationships).

3 Study methods

This study is designed as a qualitative case study with the goal of answering the research questions by mainly collecting the primary data through personal interviews (as in Myers, 2009). Within organisational management and supply chain studies, this approach is argued to be a way to profoundly understand certain phenomenon (Eisenhardt, 2007) and seen as an effective method of exploring the phenomenon while answering questions in a real time setting (Yin, 2003). This type of study helps to solve the issue of stakeholder relations complexity through the identification and analysis of actors in the supply chains.

The main respondents of this study: major truck manufacturers in Sweden and Australia and their customers (as well as dealers). The countries are both the examples where high-end vehicles and sustainable transport solutions are offered. Being similar in high proportion of road transport, both countries set the challenge in this industry. The choice to focus on downstream supply chain of heavy vehicle manufacturers is due to several reasons. First, the strategic focus on sustainability requires the participation and common agreement within the network, therefore several actors of the supply chain are to be included. Second, the road transport supply chains clearly include many actors, however, in order to meaningfully collect and analyse the data, three important actors of transport supply chain were chosen: truck manufacturers, dealers and transport customers. Finally, in the light of recent focus of high end truck manufacturers to provide sustainable transport solutions, the research questions of this study can be answered by understanding what is meant by these claims together with understanding of customer needs. Therefore, a semi-structured interviews were prepared for this study, comprising the general questions about the business and industry and focusing on sustainability practices and strategies within the network (see the interview questions in the Appendix 1).

Data collection. The primary data was mainly collected through 17 personal interviews (See Table 1). Few interviews with dealers from the project (V2B project –see more in the Appendix 2) were used. The secondary data collection included companies’ printed material (reports, promotional material) and websites. Several interviews with general truck industry representatives were also conducted. The truck manufacturers in Sweden and Australia are major truck manufacturers having the biggest share in the market. The selection of dealers and transport companies was done through the references (suggested by the industry experts or truck manufacturers). The dealers were not necessarily representing only one truck manufacturer, but instead, several truck manufacturers. The transport companies (customers) were also the ones having several truck brands in their fleet. The sizes of the transport companies are medium and large (see Table 1).

	Number of interviews (number of people)	Country	Roles
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Truck manufacturers			
Company MA	2	Sweden	Headoffice: Sustainability Manager, Strategy Manager
Company MB	2	Sweden	Headoffice: Transport Solution and Services
Company MC, MD	2	Australia	Headoffice: Strategy and Sales Managers
Dealers			
Company DA	1	Sweden	Sales Manager
Company DB	1	Sweden	Sales Manager
Company DC	1	Australia	Sales Manager
Transport companies			
Company TA	1	Sweden	Head of Sustainability
Company TB	2	Sweden	Owners of the company
Company TC	2	Australia	Owners of the company (General Manager and Compliance and HR)
Company TD	1	Australia	Owner of the company (Director)
Industry representatives	2	Australia/Sweden	Director of Research at National Truck Accident Research Centre, Swedish Association of Road Transport Companies

Table 1. Interviews and respondents

Data analysis. The interviews were collected during 2015-2016 and all transcribed verbatim. The coding was used while analysing data from the interviews (Ellram, 1996; Myers 2009) – see Table 2. The coding helped to indicate the issues raised by the research questions.

Coding category	Description
Sustainability practices	These include the practices in the upstream supply chain (working with suppliers), recycling practices, on-site practices (manufacturing or workshop)
Customer needs and perceived value, long term relationship	These include the understanding of customer (or customer's customer) needs and perceived value of diverse offerings by customer (or customer's customer).
Essence of sustainable business models	These includes the values, features and components, principles that help in building sustainable business models

Table 2. Coding categories and description

Study quality. Credibility and transferability of the study was increased by case protocols and data organization (Huff, 2008).

4 Empirical data

The discussion on sustainable business model with the respondents included diverse aspects of sustainability in transport and logistics area. The focus was on business processes, but also some industry background and structure as well as the network construction (Appendix 1).

4.1 The industry context

Long haulage trucking industry in Sweden and Australia has quite many similarities. It is a fragmented market with many small trucking companies 1-5 trucks, few mid-size operators and some big ones (up to few thousands fleet)). The industry is also quite conservative (as described by industry representatives in both countries) and cost oriented since there is a tough competition in the market and the margins are quite low.

One observable trend for Sweden is a move toward bigger vehicles with greater load capacities. A similar trend is also evident internationally, and is already applicable in the Australian freight industry (Transport Analysis Report, 2014:17). Road transport is the main mode of transport as Australia as well (for majority of commodities produced and consumed). And the % of the road transport is increasing. B-double combinations (bigger vehicles) are the most significant road freight vehicle combination (Bureau of Infrastructure, 2014).

The interviewed manufacturing companies are the high-end heavy vehicle manufacturing companies in Sweden and Australia. The transport companies were selected according to the maturity in the industry in terms of sustainability concerns (initial research and peer recommendations). The size of the transport companies - medium to big size companies with more than 100 fleet.

Both country cases are expected to represent the integration of sustainability into road transport supply chains, while the countries were expected not to differ too much in terms of the topic however this was not fully confirmed.

4.2 Sustainable business model

The empirical data is structured according to the principles, architecture and components of business model for sustainability by Wells (2015).

Engagement with the customer. As manufacturers indicate, the journey towards product/services combination sales (or solution sales) has already started. *‘And we are not alone, we see strong indications that (other truck manufactures) are doing the same now, so try to go away from this upfront sales of the truck and then leave the customer, but try to engage with the customer during a longer period of time, during at least customer life cycle ownership of that vehicle, and try to work together with the customer to provide more efficient solution for the customer, I think that is something that we are now we have started and we are on the journey here, turning the mindset, because it’s a mindset change, it’s a business model change.’*
– MA Truck manufacturer, Sweden

One of the ways to provide a better solution to the customer is through interaction with the customer more, knowing and understanding not only customer’s but also customer’s customer

business. MB: *'While others are focusing more on the vehicle, we try to understand how the vehicle brings value and benefits to the customer, so we work closer to the customer, to the operation of the customer, on slightly higher system level than only the vehicle and understanding the operation of the customer.'*

Value co-creation. The value is being created and co-created between the customer and the seller. And as demands from the customer's increase in terms of environmental and social issues, transport companies are following the environmental and social requirement, it is beneficial when seller can offer services connected to e.g. sustainability reporting etc. *'...CO₂ reporting for instance, so the entire reporting area, our customer's customer requires reporting then we need to label that with high accuracy and ease so that our customers can provide their customer with reports.'* – MB Truck manufacturer, Sweden. *'Its becoming more important for customers, they have to report their environmental impact to the government every year so it is surely important for them'* – MC Truck Manufacturer, Australia.

Circular value systems (closed-loop), design for remanufacture. When talking about the components of sustainable solutions several respondents responded in this way: *'Its minimizing impact that we have on society and the environment and then to provide solutions that customers and their customers can work with, with a long term view, that we are committed ongoing safety innovation, quality innovation, environmental care innovation, sort of staff with a long term view. That's the point I guest with recyclability, our trucks are 100% recyclable and so, yeah, it's a communication message that we part of the challenge in the society but we also can become part of solution on how to do things better incrementally over time always thinking about how to get better solutions for our customers, minimizing impact.'* MC Truck Manufacturer, Australia.

The system view is important in order to understand the footprint on the truck life cycle. The supply chain view is important, since there many things influencing the truck-in-use. *'So, system level, if you have supply chain as your unit of analysis, the I think you need to see where on this system level can you find what it will have an impact on the life cycle foot print of logistics'.* – MB Truck Manufacturer, Sweden.

'One of the things that we are working closely is at least to offer the clients to close the circle. We can distribute in an efficient way and with quality in environmentally sound way, but we can also take care of the return flow, and we are doing it already, but also making waste to be something valuable, so circular economy kind of thinking for our clients, it's something that we work along with our clients, an initiative with our clients. We bring things but also we return it, but also going to welfare, hoping to close the cycle thinking. We think it is a good thing. I think that would be increasing.' – TA Transport Company, Sweden.

Longevity. Consideration of circular or closed loop systems require the long term focus: *'Yes, I think there will be much more of the discussions now, so sustainable transport solutions to me means that our factory is carbon neutral, and that everything that we do as a product, that we offset our carbon footprint, but in doing so, we ensure that we can have long term solutions for our customers and for us, that its good on the environment and profitable for our customers...'* – MD Truck Manufacturer, Australia.

Also, sustainable transport solutions, both ways – upstream and downstream – is the hot topic for transport companies (as per requirement from their customers). TB Transport Company (Sweden): *'Another kind of clients setting demands on us to be sustainable. And our state owners set their hard demand on us be sustainable and have long term sustainable business model.'* Therefore, the understanding of the principles and components of sustainable business

models is really important for all the actors within supply chain. The examples of what can be seen as a sustainable business models vary as well.

Financial sustainability. The business case, or financial sustainability, however, is seen as a threshold for sustainable business model. *‘And really, it is important to know what is the business benefit when working with sustainability aspects, because it is still very much an overarching perception that sustainability aspects are just environmental aspects, which is really not the case. So showing the business case in doing sustainable activities, I think, is a key, at least for us, and to show good examples, even though you cannot really transfer them and do it yourself, it’s a good inspiration.’* MD Truck Manufacturer, Australia.

it has to be (profitable), whilst its always going to be sustainable solutions or environmental factors as an impact, it has to be a commercial decision, at the end of the day, whether a short term or long term, otherwise it won’t even pass, it has to be realistic. – MC Truck Manufacturer, Australia

IT and ICT.

Fleet management systems seem to play a big role in building trust, improving the relationship and efficiently exchanging the information within road transport supply chains in both countries. From the transport companies’ perspective these systems along with planning systems could be very helpful in the long term supplier-customer relations. TB Transport company in Sweden: *The manufacturing company should focus much more on IT systems that can help us in efficient truck management.*

Trust in building the relationships towards being more sustainable. Trust was mentioned by all respondents. By trying to build the long-term relationship, trust is the background of building the relationship within the supply chain. It can also help to facilitate the right discussion on the emerging issues of sustainability within the already built relationship. *‘For us it is to build long term relationship with the customers, to take long term view of what their business needs are, where they are heading with their business as opposed to selling truck kind of business. We want to be there for them for a longer time and build trust’* - MC Truck Manufacturer, Australia.

4.3 Main differences between Swedish and Australian road transport supply chains

Main Differences	Sweden	Australia
Compliance or strategic focus of sustainability	The focus on sustainability as a strategy for the company and its stakeholders	The focus on compliance rather than strategic sustainable business <i>‘It’s a shame that the industry is compliance focused because of the big stick rather than wanting to do the right thing’</i> TC Australia
Industry	Heavily regulated	Heavily regulated but differences in between states
Supplier relations	Still some sales processes depend on handshakes <i>‘No matter how much paper, the handshake is important.’</i> - DA Dealer, Sweden	Became very contract oriented (extremely detailed contracts)

Table 3. The main differences between Swedish and Australian road transport supply chains

5 Analysis

According to the theory and empirical data, the principles, architecture and components from Wells (2015) are analyzed and presented in Figure 4. There are some emergent issues found through the case study that are not mentioned in the Wells framework and are specific for the road freight transport supply chains.

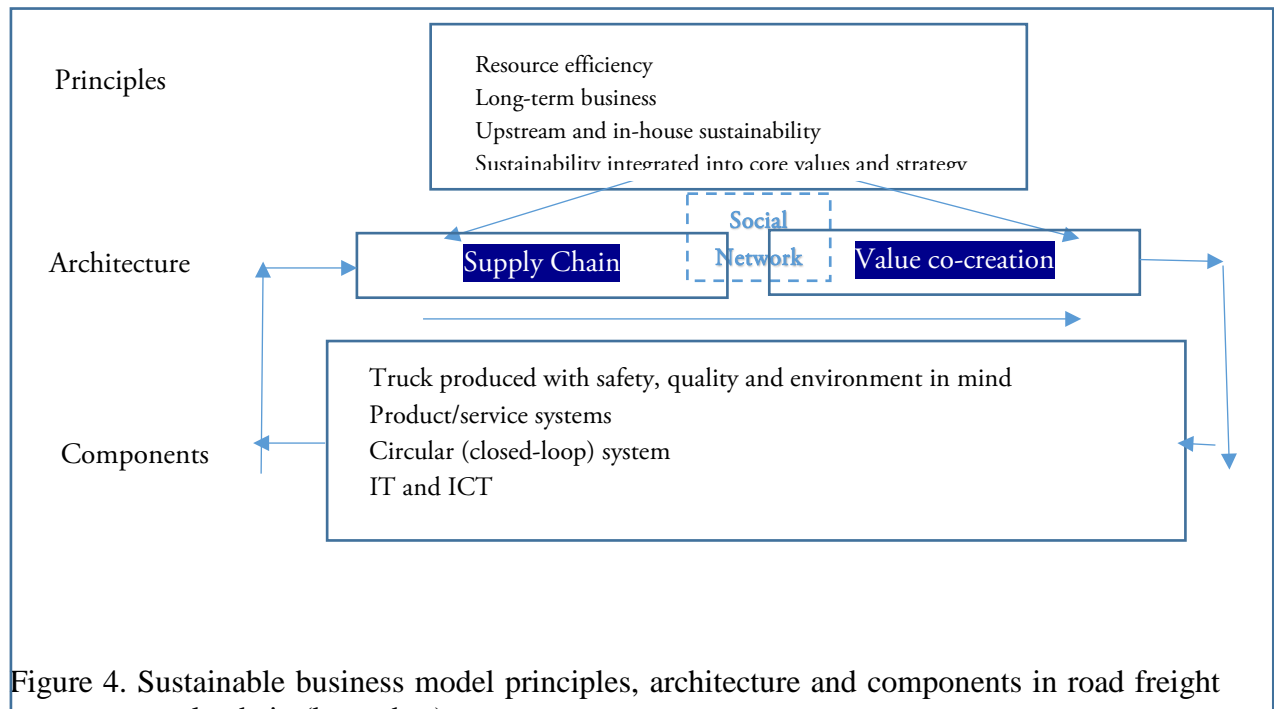


Figure 4. Sustainable business model principles, architecture and components in road freight transport supply chain (by author)

From the study, the main **components** of the sustainable business model in the road transport industry includes the truck that was built with quality, safety and environmental care in mind (bearing in mind upstream – suppliers sustainability, manufacturing environmental requirements and downstream – closing the loop or cycle – with the design for remanufacturing and circular value systems). Propositions of sustainable business solutions require sustainability for the whole supply chain – for manufacturers as well as for their customers, - environmental as well as financial and social. The product service system, where the repair and maintenance, driver training and coaching and other services are offered. The customers requiring PSS are growing in numbers, indicating the development towards sustainable business model. Technology is to play a big role in analyzing the work of truck drivers and providing this information life to the manufacturer or customer for efficiency improvement.

The main **principles** based on long-term partnerships with the customers and other actors within supply chain is based on trust and therefore allowing for mutual value co-creation. The resource efficiency is something that is embedded into truck industry specifics. However, the strategic focus on sustainability and core values are in the transformation process within the industry (according to the study).

The social network theory helps explaining one of the reasons why the companies want to

develop towards more sustainable business models and build long term relations within the supply chains. As it is not only the trust, that is extremely important in the sustainable supply chain context, but also the motivation of single organizational actors who build social relationships with the sustainability goals in mind. The **architecture** of sustainable business model, where the focus should be on value co-creation, stakeholder collaboration within supply chains and longevity, is to be dependent on the social network theory.

6 Conclusions, limitations and further research

Drawing from the social network theory and the sustainable business model and sustainable supply chain literature I looked at the differences and similarities of the cases in Sweden and Australia, specifically on the high end heavy-vehicle manufacturers' supply chains that have acknowledged the added value of sustainability principles and have focused at providing sustainable solutions, as well as to tackle the complexity of sustainability through their long-term stakeholders' relations building.

The main heavy-vehicle manufacturers who are to offer sustainable transport solutions do not only talk about recent technologies in the heavy-vehicles or sustainability concerns in their production processes with possibility for recycling. They are focusing on the propositions of sustainable business solutions, sustainable for them as well as for their customers, in the long term. The future, however, is about 'a jigsaw puzzle' – multiple solutions for the optimum result *'There are different solutions for different customers'* – DA Dealer, Sweden.

Limitations and future research: The study was conducted in the downstream supply chain of truck manufacturers, therefore, it is limited to several actors in this supply chain. All of the actors of truck manufacturer supply chain could be included in the future study. Most of the interviews were presented by the single interviewee thus the bias of interpretation is possible, however, minimized with information triangulation through different sources and confidentiality of data. The future research could also exemplify other industry sectors, where sustainable business models are in focus.

Relevance and contributions: Expected contributions to theory: the contributions to theory are seen through the discussion on sustainable business models with theoretical lenses of social network theory

Expected contributions to practice: the expected results are to show and advise various stakeholders of road freight transport supply chains about possible sustainable solutions in the industry

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Appendix 1.

Semi-structured questions for the interviews:

Intro questions

1. Your background
2. Your role in the organization

Market related questions

1. The development of the market
2. Market (customer) structure
3. Main alternatives for trucks (used vehicles, other brands, other modes)
4. Customers' customers and suppliers (what does the transportation "network" look like);
5. Intermediaries and specialists in the system
6. Main challenges faced by your customers

Environmental and social concerns (SSCM)

1. Stand and image in regards to sustainability concerns
2. How transport networks can be more sustainable?
3. Where comes the requirement for sustainability?
4. How do you disseminate sustainability culture in your organization and beyond?
5. Regulations in Sweden, Europe, Australia and other countries

Sustainable solutions

Truck manufacturers are talking about sustainable solutions, what does it mean to you?

1. What are the main features (principles and main components) of sustainable solution (in your opinion)?
2. What has to be included in the sustainable solution?
3. What services have to be included?
4. How should the costs be calculated?
5. What happens when you stop using the vehicles?
6. What about the second hand market?
7. Who has to be involved in the sustainable transport network?

Appendix 2.

VALUE TO BUSINESS – V2B

V2B is an international research project carried out in cooperation between the heavy-vehicle manufacturer Scania and members of several academic institutions. By comparing developments in Sweden, Poland, mainland China and Taiwan, the project focuses on the process of an industry transitioning from investment cost orientation to considering life cycle operating economy when making purchase decisions. V2B runs from 2012 to 2015.



Background

Many firms in developed markets emphasize operational efficiency and life-time costs when evaluating competing products. In response, modern industrial manufacturers increasingly focus on extended offerings. This is not least the case in the heavy vehicle industry where the combination of optimized specifications, full service offerings and driver skills improvement can help increase uptime and vehicle utilization rates as well as add to both customer's and manufacturer's efforts towards greater sustainability, e.g. by reducing pollution and increasing traffic safety. Acceptance of such offerings vary between markets and vehicle manufacturers experience challenges in communicating the added value of their extended offerings to many customers, not least in emerging markets.

Purpose of the project

The project aims to generate a greater understanding of the acceptance and adoption of extended offerings concept by different markets. To this end, a study is performed on extended offerings concept in four markets in different stages of maturity.

Research method

- Case studies are carried out on mainland China, Taiwan, Poland and Sweden

- Interviews are performed with key actors in the industry
- Archival material is studied to gain a better understanding of developments over time
- Surveys are undertaken on a Swedish sample in order to understand causal relationships of solution business

Expected results

Improving competitiveness and efficiency within industry and academia through **better understanding of:**

- more efficient and safer solutions in heavy vehicle industry
- high-value business concepts as well as its enablers, facilitators and impediments
- how high-value business concepts can be adapted to different market characteristics
- global challenges regarding energy and raw materials as well as other negative effects of transport systems through intensified international collaboration on environment, traffic safety and sustainability

Project outcomes: scientific publications, case studies used in undergraduate, graduate and executive training, PhD and Master/Bachelor theses, extensive involvement of industry practitioners in workshops, seminars and meetings in both mainland China and Taiwan

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