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Article

Supply Chain Relationships in Circular Business Models: Supplier Tactics at Royal Smit Transformers

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Abstract: *Background:* Despite growing popularity, Circular Economy has not reached its full potential. One of the frequently mentioned success factors is the adoption of a Circular Business Model. However, fueled by (too) many constraints, its implementation is often hampered by so-called vicious cycles. Successful Circular Business Models require intensive collaboration between buyers and suppliers, with one of the key questions remaining who takes the initiative and leads the development: buyer or supplier? *Methods:* Through a single case study combining desk research, interviews, participative observations and analysis of vicious cycles, we investigate how supply chain relationships managed by the supplier can enhance the implementation of Circular Business Models. *Results:* We show that supplier tactics can relax constraints and break vicious cycles through (1) buyer–supplier relationship management, (2) functional integration of stakeholders and (3) incentive management. We also show that, due to supplier captive conditions, a number of enabling factors are indispensable, namely: (1) the availability of buyer incentives; (2) (joint experimenting to develop) circular knowledge; (3) sharing clear visions on circularity; (4) being transparent in possibilities; and (5) supply chain leadership. *Conclusions:* As a consequence, strategic trust-based partnerships are a prerequisite for turning vicious cycles into virtuous cycles. Future research should also investigate the role of the buyer, including buyer captive conditions, and how to shape supply chain leadership. Finally, the role of supplier tactics in relation to other success factors next to Circular Business Models needs to be further explored.

Keywords: circular business models; supply chain relationships; closed-loop supply chains; circular economy; supplier tactics



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1. Introduction

The Circular Economy (CE) provides tangible solutions for environmental sustainability and the shortage of raw materials [1], through different types and levels of recovery of the materials into useful goods and services. CE is defined as “an industrial economy that is restorative or regenerative by intention and design” (p. 15, [2]). Resource efficiency can be achieved by the prudent (re-)use of raw materials, components and products in all stages of the (closed-loop) supply chain.

Switching from a linear economic model to a circular model may not only reduce the negative impact on the natural environment but it can also bring significant financial savings [3]. Yet, recent studies show that CE is far from reaching its full potential [4]. This gap between full potential versus practice is caused by several constraints. For example, Kaur and Singh [5] underline the complexity of procurement and the many linkages which need to be managed to avoid any supply chain disruption. CE requires intensive collaboration between buyers and suppliers in global supply chains [5]. Circular Business Models are an important success factor in achieving greater levels of circularity within

supply chains [6]. A Circular Business Model (CBM) is “a business model in which the conceptual logic for value creation is based on utilizing economic value retained in products after use in the production of new offerings” (p. 183, [7]).

Mutual interdependency of stakeholders means that actors should share the same vision about CE both top-down and bottom-up to align business processes [8]. A Causal Loop Diagram (CLD) in the study of Schenkel et al. [4] shows that key processes and constraints re-enforce each other in a feedback loop. This creates vicious cycles that hamper closing the loop. Schenkel et al. [9] advise further analyzing methods of breaking the vicious cycles that hamper brand owners and their customers to implement CE. A key issue is whether suppliers should respond only to actual market demand or take directorship and actively look for collaboration with customers [10]. We suggest that supplier tactics are effective in breaking these cycles and turning them into virtuous cycles. Supplier tactics are defined by us as a specific form of supply chain relationship management in which the supplier takes leadership. It includes BS relationship management, functional integration and incentive management. Moreover, operationalizing these concepts by measurable enablers is not consistently reported in the literature.

Supplier tactics serve circularity by supporting strategic success factors [11]. They are in turn implemented by enablers, partly on the buyer side. The case at hand considers supplier tactics and underlying enablers in implementing CBMs for a Transmission System Operator (TSO) and Royal Smit Transformers.

This paper is organized as follows: Section 2 provides an overview of the literature, leading towards the research model for our study. Section 3 provides details on data collection, and analysis, as well as the reliability and validity of the study. The results of our study are presented in Section 4. Section 5 provides the discussion, and frames our results in the existing body of knowledge; general conclusions of our study are presented in Section 6, which also includes limitations of the study and recommendations for further research.

2. Literature Review

2.1. Circular Economy and Business Models

The business model is described by Schenkel et al. [4] as one of the four strategic success factors for brand owner circularity. Business models are based on three elements: value proposition, value creation and delivery and value capture [1,12,13]. A circular business model is “a business model in which the conceptual logic for value creation is based on utilizing economic value retained in products after use in the production of new offerings” (p. 183, [7]). CBMs can trigger a greater potential of the circular economy and are the starting point of companies in the process to become circular [12,14]. They explicitly incorporate the Triple Bottom Line (TBL) approach [15]. Green customers value the manufacturer’s green image and the possibility to return products for recovery [16]. Less production and less consumption are truly required to reduce environmental impact and thus the carbon footprint [15,17]. CBMs require collaboration, coordination between complex networks and communication [18]. Successful implementations of CBMs start with clear visionary statements and goals on circularity [12]. They should involve other strategic success factors and therefore Bocken et al. [12] combine circular PD strategies with CBM strategies as a strategy framework for CE and they define slowing and closing resource loops. Examples of slowing strategy elements are the design of long-life products, extending the product value, classic long life and encouraging sufficiency [19]. Closing resource loops means a circular flow of resources between post-use and production.

Applying CE principles in the supply chain context has led to the conceptualization of Closed-Loop Supply Chains (CLSC) [20]. CLSC management is “the design, control, and operation of a system to maximize value creation over the entire life-cycle of a product with dynamic recovery of value from different types and volumes of returns over time” (p. 349, [21]). Implementing CBMs is a complex process that requires collaboration among the complete supply chain from raw materials suppliers to end customers. Brand owners need to emphasize a focus on the empowerment of the customer and market develop-

ments [22]. Hence, implementing Circular Business Models should aim for multiple value creation [3,11,22].

CLSC key processes and CE strategic success factors face many constraints, summarized in Appendix A.

2.2. Supply Chain Relationships and Circular Business Models

The literature traditionally focused on how a focal company (the buyer) manages the relations with its suppliers within the context of a supply chain or supply network [23]. Best known perhaps is the purchasing portfolio approach [24], in which suppliers are categorized according to their strategic influence on the buyer, hence developing differentiated purchasing strategies. The ‘traditional’ purchasing portfolio presents four categories of product types: strategic; bottleneck; leverage; non-critical. Each quadrant has its influence through differences in power and (inter-)dependence between buyer and supplier [25]. This traditional view has been challenged under the influence of ethical, environmental, social and sustainable sourcing practices [26,27].

Pagel et al. [26] argue: “when organizations pursue common prosperity as part of a larger effort to create a sustainable supply chain, they will make investments in supplier continuity that seem to contradict existing purchasing portfolio models” (p. 70, [26]). In the strategic, bottleneck, and leverage items of the purchasing portfolio, sustainability requirements will become important requirements for suppliers [27]. We argue that the influence of sustainability practices on the purchasing portfolio is evenly important within the context of CE and CBMs. If routine or leverage products will be leased or rented by buyers, the market exchange relationship or captive supplier will turn into a strategic partnership [22]. However, this can only lead to positive outcomes if there is a strategic alignment between corporate and supply functions when strategic products—including capital goods—are concerned. Becoming circular is about making complex decisions together, for example, the reduction in the percentage of raw materials in the product, which affects the financial performance of both companies [27].

The supplier perspective is equally important. Bensaou [28] describes two criteria to declare different types of relationships which can be divided into a relationship spectrum from transaction-based relationships to value-added relationships to collaborative-based relationships [28,29]. There are four known relationships: market exchange, captive supplier, captive buyer and strategic partnership [28,30]. Partnerships focus not only on economical, technical and legal linkages but also on social and personal contacts [1,31]. Long-term buyer–supplier relationships based on trust and commitment are required to become strategic partners [29,32,33]. This relationship is required if supply resources are thin and if essential production skills are scarce [31].

Whether and how to reconcile the relations between circular and sustainable business models and approaches is currently under discussion, as more critical accounts on both reductionist approaches and possible unsustainable effects of circularity are still understudied [34–36]. What is clear, however, is that changing stakeholder requirements have influenced how (focal) companies develop their supply chain strategies. Consumer perspectives and expectations have been analyzed in the context of green, sustainable, responsible, and circular supply chain practices, both in business-to-business [10,37], business-to-consumer [38,39], and public sector [40] contexts.

2.3. Supplier Tactics to Enhance Circular Business Models

2.3.1. Buyer–Supplier Relationship Management

Closed-loop supply chains are enabled by partnerships [41]. Good buyer–supplier collaboration can lead to reductions in waste and raw materials utilization, it enhances CBMs and contributes to a more circular society [1]. Partnerships and joint ventures with supply chain partners are required to develop strategies for overall efficiency along the supply chain while meeting environmental and organizational objectives [42]. Mediation on both sides will significantly improve the circular performance of the supply chain

by sharing information and knowledge. That is why supply chains need to be viewed holistically to guarantee circularity throughout the whole chain [42]. Relationships with customer content will change product ownership and a greater emphasis on digital systems to enable leasing and service-based strategies [11,41]. Brand owners will obtain more ownership and responsibility in the chain. Buyers will become more dependent on brand owners because they are not the product owner, and they need to think about how to become a preferred customer.

A key challenge for Product-Service System (PSS) management is the shift from market exchanges to partnerships [22]. Relationship learning, knowledge sharing, integration into relationship-specific memory and joint sense-making will create value for business services as both the buyer and supplier obtain insight into each other's experiences and processes [43]. It is important how brand owners in their changing supplier role should anticipate their customers through relationship management. From a supplier perspective, it is not only interesting to know how to become a preferred supplier but also to select preferred customers. Brand owners select customers with whom they would like to collaborate and share their resources. This means that some buying firms receive more resources compared to competitors. Two concepts play a role in becoming a preferred customer: customer attractiveness and supplier satisfaction [44]. A customer is attractive if the expectation towards the relationship with this buying firm is positive. Supplier satisfaction is a condition that is achieved if the quality outcomes from the buyer–supplier relationship meets or exceeds the brand owner's expectations [45].

2.3.2. Functional Integration of Stakeholders

Functional integration of the stakeholder groups in CLSCs is a feasible tactic that fosters BS relationship management in a CBM context [46]. Functional integration implies the coordination of stakeholders [47] and channel leadership [48]. Arshinder et al. [47] describe four coordination mechanisms for SCC: supply chain contracts, information technology, information sharing and joint decision-making. To identify the different stakeholders and their salience within the coordination the stakeholder typology of Mitchell, Agle and Wood [49] can be used. They divide stakeholders into eight classes—dormant, discretionary, demanding, dominant, dangerous, dependent, definitive and non-stakeholder—depending on urgency, legitimacy and power. Channel leadership is another variable that plays an important role in the functional integration of stakeholders. Choi et al. [48] identified three main types of participants for the forward and reversed channel: the brand owner ((re)manufacturer), the buyer (retailer) and the third-party collector (recycle company). Manufacturers are used to leading the channel, but others can also do that. Choi et al. [48] suggest that channel leadership should change from upstream brand owner to downstream buyer in CLSCs. If the third-party collector or the brand owner is leading, they may charge higher wholesale or transfer prices, this will result in lower market demands or lower collection efforts. The type of leadership differs depending on how trust and power mediate the relationships between the channel participants [50]. Where transformational leadership is based on trust, transactional leadership is focused on power. Both transactional and transformational leadership performed by buyers will improve the CLSC performance of brand owners [50].

2.3.3. Incentive Management

Brand owners as focal companies create value for and with so-called primary stakeholders, while secondary stakeholders are affected or influenced by the value created, but are not engaged in transactions [51]. Primary stakeholders include customers, suppliers, service providers, shareholders, employees and staff. Secondary stakeholder groups are the natural environment, governmental and non-governmental organizations or society at large. Primary stakeholders have mostly economic objectives, secondary stakeholders have social and environmental objectives.

There must be an alignment of the company's objectives and incentives internally. For example, the PSS which is selected defines how the company does business and who is responsible for the product and who is responsible for the service [6]. Personal incentives are about salary, benefits and job security [52]. Promises need to be fulfilled by the employees; hence, different employers' reward systems should be matched to the situation to have a positive impact on employee attitudes and behaviors [52]. An alignment between the incentives of brand owners versus the expectations of buyers will create multiple values for CLSCs [8]. An interesting aspect is how secondary stakeholders influence primary ones. For example, governments may impose regulations to correct negative externalities created by the free market.

2.4. Causal Loop Diagram on Supplier Tactics

It has been often claimed that CE adds complexity because it involves more actors, stakeholders, more objectives, a higher variety, more uncertainty and the obligation to stay involved with the customer and the product throughout the life cycle [53]. One reason may be that adding sustainability objectives adds complexity to the supply chain or systems. New investments may be more specific than before and hence the relationship must change from market exchange to strategic, even in situations of power imbalance.

Feasible supplier tactics which create multiple values are unclear and more research is required after the dynamics between buyer–supplier relationship management, functional integration of stakeholder groups, incentive management and their constraints. This is reflected in Figure 1. After doing research on the dynamics between these variables, insight into feasible supplier tactics which foster CBM implementation and thus virtuous value creation cycles of CLSCs of brand owners will be provided. In Section 3, we operationalize the concepts by enablers.

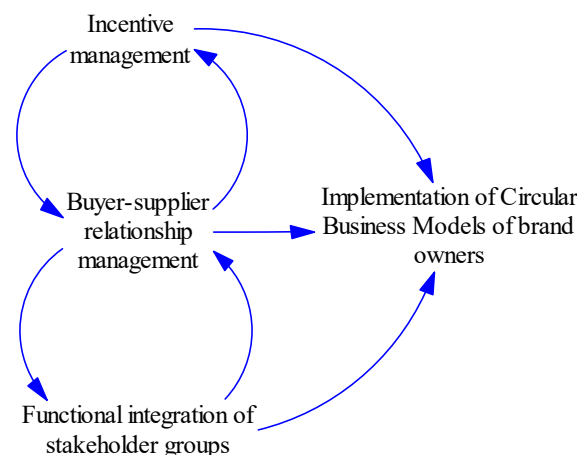


Figure 1. Causal loop diagram on supplier tactics (theory).

3. Methodology

3.1. Research Design

This research focuses on all the aspects (holistic) which influence the CLSCs of a brand owner in their role of a supplier. This is a complex and concurrent real-life phenomenon with limited existing theories and therefore this research is considered to investigate all aspects of the phenomenon (in-depth research). The causal relationships between key variables are unknown and still need to be established, and this requires an explanatory qualitative research approach [54].

This research adopts the single case study method [55] combined with desk research. Due to the complexity of value creation for closed-loop supply chains and the key variables case study research design is the most appropriate. To obtain a more in-depth analysis of the dynamics between the key variables a redesign of supplier tactics and the impact on CBMs and the other critical success factors will be made to realize virtuous cycles and

thus maximum value creation. This is achieved by making a GAP analysis of the current situation of the single case and the desired situation based on the literature review. The current situation is made in a very detailed way to truly understand the interaction of tactics and their underlying enablers. The redesign presents the desired situation. Figure 2 provides the research framework.

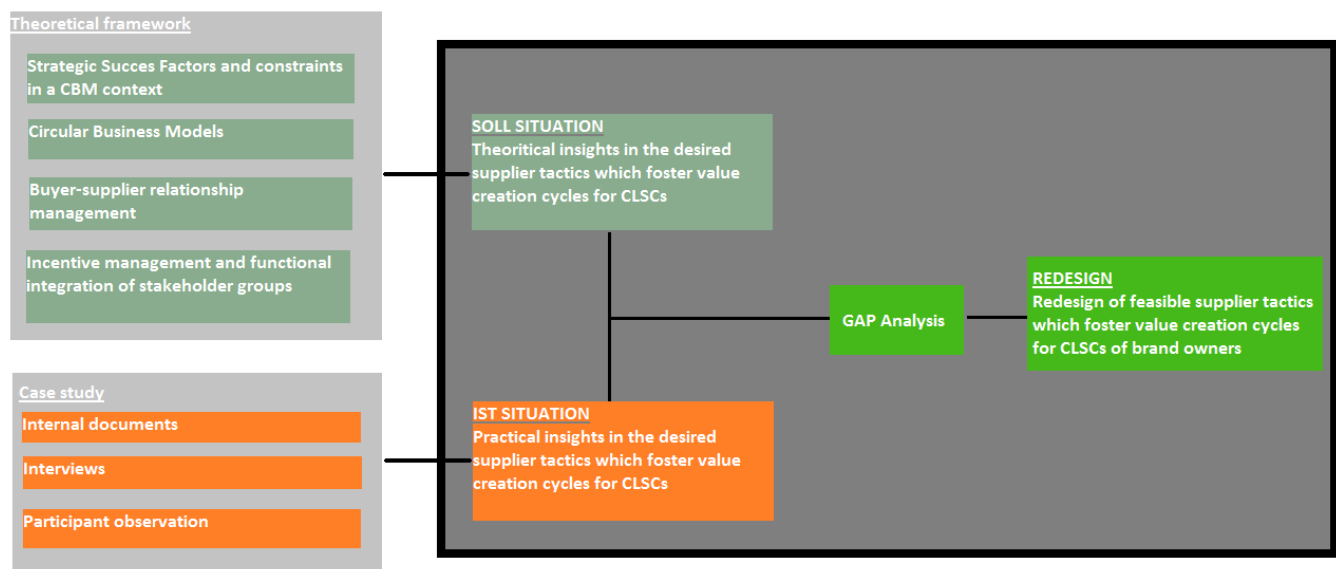


Figure 2. Research framework.

3.2. Data Collection

The selected case Royal Smit Transformers is a brand owner of a product group. This is a typical case where the problem statement can be investigated [55]. The selection of the case is based on the criteria that it requires an upstream brand owner in the manufacturing industry. The chosen case is a Large Power Transformers (LPTs) manufacturer in the high-voltage grid industry of the energy sector. This OEM produces one type of product B2B. Royal Smit Transformers as a Business Unit (BU) for LPTs has approximately 600 employees and is part of the SGB-SMIT Group including in total around 3500 employees. In the transformer business, there is strong market competitiveness and a high level of bureaucracy. In the energy sector specifically, a lot of raw materials are involved and there is a high interest internally and externally in creating maximum value. Particularly in transformers, a lot of copper, e-steel, steel parts, isolation and oil are used. Top-down CSR strategies are known, and the unit of analysis is the entire company including all departments and supply chain actors. The selected case is particularly interesting because they have to contend with these vicious cycles, and with in-depth analyses the results can also be used for other OEMs.

Royal Smit Transformers developed vision 2025: “The preferred partner for leading players in the energy business” (p. 3, [56]). Market trends that are related to circularity are renewable energy, sustainability, shifting knowledge and outdated infrastructure [56]. According to the R&D plan, circularity and life cycle extension are topics that need to be further analyzed with sales and service depending on the market possibilities.

Due to the complexity of the topic, different data collection methods are applied to obtain data sources triangulation [55]. The three data collection sources are internal documents, interviews and participant observation. A content analysis was performed with obtained secondary data from internal research projects, sustainability reports and presentations, and internal documents obtained from interview respondents. Table 1 provides an overview of the internal documents used.

Table 1. Overview of internal documents.

| Number | Company Document | Content | Year |
|--------|---|--|------|
| 1 | Sustainability report of the SGB-SMIT Group. | Several content sources such as a statement of the CEO, countries, markets, customers, environmental, safety, health and quality management. The supply chain, stakeholders, employees, compliance management, resources and energy. | 2017 |
| 2 | Project Green and Circular Transformer | Goal DSO for purchasing transformers, | 2016 |
| 3 | Circularity meeting (conference call) | What is needed to obtain an overview of the complete supplier chain from mine to product? Recycle Nomex, wood, substitute for paper, recycled oil. Percentage of materials in transformers | 2016 |
| 4 | MVO bij SGB-SMIT: Op weg naar circulariteit | Road to circularity at SGB-SMIT Group in line with CRS goals. | 2017 |
| 5 | R&D and Innovation Plan 2019–2023 | Strategic approach including the vision, the market and external developments, the current situation, SWOT analyses and the governance of projects. Moreover, the overview of R&D projects in the current situation and plan. | 2019 |
| 6 | Circular Economy: Contribution to material efficiency applied to transformers | Introduction, target of the mandate, transformers and eco-design directive, transformers' durability, transformers and repair, maintenance, upgrade, retrofit, etc. | 2018 |
| 7 | Mission profile T&D Europe WG Circular Economy | Background information of the push for CE from the European Commission and identified issues including details and finally the mission of a T&D Europe Circular Economy. | 2019 |
| 8 | Circulaire economie in de elektrotechniek | Project information for the developments of circular economy in the electrical engineering sector. Circular properties of T&D equipment with a long life cycle are taken into account. | 2018 |
| 9 | Royal SMIT Transformers Proposal for TSOCircular replacement Transformers | A proposal to TSO including a circular E-platform and two case studies. | 2019 |
| 10 | SMIT Circularity Project | Presentation of the high-level process for preparing a proposal for a European customer, defining tasks for stakeholders, concept of business model and sales model for replacement and new asset orders. | 2019 |
| 11 | Market orientation replacement Power Transformers | Circularity targets, visions and request for proposal of replacement of 29 transformers. | 2019 |
| 12 | Verify Audit Declaration | Audit level verifies B2 of Royal Smit Transformers including health and safety, environment, quality and CSR. | 2018 |
| 13 | Project charter-Sustainability strategy for Royal Smit Transformers | Opportunity statement, goal statement, goals and the business case and stakeholders analyses. | 2019 |
| 14 | Sustainability-Strategic Framework 2020–2025 | Strategic decision on CSR strategy. Working on pillars of responsible business practices, sustainable employability and environmental footprint. | 2019 |
| 15 | 1749-Integrating Circular Economy in Asset Management | Material passport and sustainability in transformers. | 2019 |

Semi-structured interviews were conducted with eight preselected respondents. The selection of these stakeholders is based on internal departments that are in first-line contact with customers and thus involved in the development of CBMs at the earliest stage. Table 2

provides an anonymized overview of the respondents. Appendix B provides detailed information concerning the semi-structured interviews,

Table 2. Overview of respondents.

| Professional Position | Role in Organization | Department | Interview Duration/Length of Transcript A4 | Interviewee Number |
|---|---|--------------------|--|--------------------|
| Commercial director | End responsible for sales and projects. | Sales and Projects | App. 40 min/5 pages | 6 |
| Business development, market intelligence and marketing manager | Responsible for marketing and the development of a business model by researching the market requirements. | Sales and Projects | App. 55 min/6 pages | 2 |
| Area sales manager USA | Responsible for sales in the USA. | Sales and Projects | App. 55 min/6 pages | 1 |
| Area sales manager SGB-Smit | Responsible for sales for the SGB-Smit group with most of the customers within Europe. | Sales and Projects | App. 50 min/6 pages | 3 |
| Manager R&D | Responsible for R&D and Innovation. | R&D | App. 50 min/8 pages | 4 |
| Technical director | Responsible for the engineering department. | Engineering | App. 50 min/5 pages | 7 |
| Manager installations and commissioning | Responsible after the Field Acceptance Test (FAT) up to and including the Site Acceptance Test (SAT). | Sales and Projects | App. 40 min/5 pages | 8 |
| Sales manager Smit Transformer Service (STS) | Responsible for sales for service projects. | Service | App. 55 min/5 pages | 5 |

Due to subject sensitivity and research feasibility, first-hand information on external supply chain actors is excluded from this study. In order to gather this type of data, participant observation together with collecting secondary data helps to obtain information from external stakeholders. Three participant observations were performed by taking part in the project team to gain circularity at the case company. This is a method in which the researcher participates in the activities of the case. Table 3 provides an overview of three participative observations (p. 338, [54]). This data source triangulation is desirable for explanatory qualitative research [55].

Table 3. Overview of three participative observations.

| Observation | Nature of Group | Nature of Activity | Date |
|-------------|-----------------|---|-------------------|
| 1. | Project team | Attending workshop at European customer about optimized reuse of power transformers and/or materials in used power transformers | 10 April 2019 |
| 1. | Project team | Preparing proposal for European customer | 30 April 2019 |
| 2. | Project team | Providing internal documents for CSR strategy, circularity, supply chain relationships | 16 September 2019 |

3.3. Operationalization and Data Analysis

The data analysis of the internal documents, interviews and participative observations is performed by different techniques. Internal documents are generally analyzed to obtain some background information to understand the single case and the market in which it

operates. For this data analysis, a coding technique is applied, based on codes distracted from the operationalized variables as provided in Table 4.

Table 4. Operationalization.

| Tactic | Enabler | Examples | Reference |
|--|------------------------|--|-----------------|
| Buyer–supplier relationship management | 1. Product type | Product delivery risk Product value | [24] |
| | 2. Relationships | Buyer investments Supplier investments Customer attractiveness Supplier satisfaction | [1,28,30,31,44] |
| Functional integration of stakeholder groups | 3. Coordination | Availability of supply chain contracts Availability of supporting IT structure Availability of Information sharing/transparency Availability of joint decision making Availability of defined stakeholders | [47,49,57] |
| | 4. Channel leadership | Availability of defined channel leader Level of trust Level of power | [50,58,59] |
| Incentive management | 5. Company incentives | Clear statement and goals on circularity (Economic, Environmental, Social) Circular product design strategy (slowing/closing) Circular Business Model strategy (slowing/closing) | [12,50,60,61] |
| | 6. Buyer incentives | Vision on circularity (Economic, Environmental, Social) | [8] |
| | 7. Personal incentives | Salary Benefits Job security | [52] |

To analyze the collected data from the interviews open, axial and selective coding is used as an analyzing technique for qualitative research distracted from the grounded theory [54]. For the open coding, the interviews were coded, and this created a code list. For the axial coding fragments were compared and placed in a data matrix on enabler and interviewee levels. For selective coding “the emphasis is placed on recognizing and developing the relationships between the principal categories that have emerged from this grounded approach in order to develop an explanatory theory” (p. 542, [54]).

The coding process ultimately leads to the gap analysis of the theory (desired) and the practice (current patterns). The key variables for CLSCs are already known (desired) but further investigation of the core variables and their interaction with key variables is analyzed based on the theoretical concepts, and enablers as presented in Table 4. In a holistic way, an overall understanding of core variables will be provided to create a redesign with feasible supplier tactics to create virtuous value-creation cycles. ‘System Dynamics’ (SD) is used to provide a causal loop diagram of the operationalized variables [62]. CLDs provide a valid language for articulating our understanding of the dynamics and interconnections in our world [63]. The methodology of combining a case study together with a CLD is well suited to analyze the complexity of CLSCs [9].

For analyzing the observation data in this research, a standard observation schedule is used [54], which is sufficient for the purpose of understanding the interaction of feasible supplier tactics in a CBM context. The number of interactions by category is used as input about what behavior did occur by which participant and how frequently this behavior occurred. Positive behaviors like brainstorming are more strongly associated with meetings

that lead to clear decisions instead of negative behavior like being obstructive. The findings from the observations are also coded and put on the code list.

3.4. Reliability and Validity

The reliability of [55] in this research is assured by the case study protocol for the data collection methods. The structured observation coding sheets and semi-structured interviews are part of these case study protocols. By making use of these protocols another researcher would have obtained similar results and conclusions. Moreover, a case study data matrix and proposition matrix are developed to provide structure in the data analyzing phase.

The anonymity of respondents is ensured in order to minimize socially desirable responses. In order to confirm that the interpretation of the answers is correct the interview transcripts were sent afterwards to the interviewees, which also ensures construct validity. For participant observation, the observer bias and effect need to be avoided [54]. It leads to changing behavior of stakeholders knowing that they are being observed. This can be prevented by secretly observing and minimizing interaction by staying in the background. Furthermore, as a participative observer, it is more habituation that the observer joins the group, and this prevents the observer effect.

The use of open, axial and selective coding in combination with system dynamics will contribute to internal validity, through a detailed analysis of the factors and their interrelations, with the aim to develop new theoretical insights. Making use of coding together with a CLD is a useful way of analyzing data for explanatory qualitative research, in order to provide a redesign of feasible supplier tactics for CLCSs. External validity is about the generalizability within a certain domain. This case study could be used for other B2B OEMs, not only in the energy sector, because it is a typical case and the context is generalizable.

Ultimately, the coding process led to restructuring the data along thematic strands, being: (i) buyer–supplier relationship management (including product type and relationship type); (ii) functional integration of stakeholders (including coordination and channel leadership); (iii) incentive management (including company incentives; buyer incentives; and personal incentives. Section 4 presents the results for each of these thematic strands.

4. Results

Below we discuss all three supplier tactics and then compare the current situation with the desired situation in Section 5.

4.1. Buyer–Supplier Relationship Management

4.1.1. Product Type

The first success factor for the product type is the strategy of pure play transformer manufacturer (interviewee 6,7). “We still have to remain a pure play transformer manufacturer, anything that we do to change or adapt to change the materials, the change of how we purchase materials or use materials, the production process also and waste, it has to go through engineering” (interviewee 6). “We don’t build a standard transformer, we are good in building special transformers, with a low standardization grade, so completely optimized for the customer” (interviewee 7). The other success factor for the product type is the buyer–supplier relationship: “You have to accept that you can make mistakes and that you don’t know something, in the end it’s about solving this again. It is very technical driven, a small world and very based on trust and the people are very work experienced in the company” (interviewee 5). Technical possibilities for reusing materials are seen as a constraint (interviewee 4,7 and observation 1,2). “If you really want to go this way you should give me room in your specifications because if you keep some demands as strict as you have them, I am forced to use the best new materials there are and I can’t, e.g., reuse the oil types unless they give me the incentive to do so” (interviewee 4). Both R&D and the technical director gave this constraint, so the incentives for the product design

need to be clear. “For a high value and technological complex product you strive for these type of relations in order to develop the product together and to engineer a solution” (interviewee 1).

4.1.2. Relationship Type

Interviewees explained that partnerships are a success factor (interviewees 3,4,6,7,8). “Cost neutral, I think these sort of concepts they really define a partnership, that when you look overall and no matter what ends up being the cost picture, there is a shared situation, which I think is what cost neutral means. Ideas like this is a must. I think this would be a great opportunity and will also be a change to get more partnerships” (interviewee 6). Moreover, during observation one strategic partnership was visible as a success factor that influences the functional integration of stakeholder groups and incentive management. Interestingly, a lack of ownership was identified during observations 2 and 3. Furthermore, interviewees also mentioned captive supplier relationships (interviewee 1,2,3,4,5,6,8). This is constraining because the customer has the power, and the supplier is forced to comply in order to continue the business. “At the end the result will be that you are not receiving any orders if you are not able to meet the tender requirements. Your relationship will then become completely different” (interviewee 3). For circularity, there should be an even distribution of power between the buyer and supplier. The knowledge of the supplier should be of a high level (interviewee 1) and there should be an economic balance (interviewee 6). For some customers there is even a captive buyer relationship which can be a success factor because of the market advantage but also a constraint: “We are very open and transparent. We have so much more to lose at sales instead of winning. We almost have the complete Dutch market, this can also be a constraint” (interviewee 5). Supplier satisfaction is an enormous success factor for relationships (1,2,3,4,6,7,8). “If customers have a high investment cycle that means that they have a lot of requirements for transformers which we can supply to them. Another one is the aging population of the assets of the customers. We can then approach a customer with services on this fleet. Provide health checks, to do preventative maintenance. It is very much based on supplier satisfaction and past experience” (interviewee 2).

4.2. Functional Integration of Stakeholders

4.2.1. Coordination

Interviewees mention the role of the availability of contracts between the customer and Royal Smit. “Customers have a lot of power, shareholders have also a lot of power. Right now it is contractual. Then to what degree they want to define, to what degree they want to partner up changes in a supply contract. Whatever it is it comes down to the parties” (interviewee 6). In these contracts, the power of the customers and shareholders is defined. Four other interviewees mention joint decision-making. “Joint decision making is applied, a lot of discussions are starting up for complex topics. Some customers have a great technical background, then we really need to perfectly show the story, in case of life time extension, it’s always first the technical part and then it’s always the questions ok when we do that, how long can we get the transformer in service” (interviewee 5). Moreover, the presence of information sharing can be seen as a success factor for coordination (interviewee 1,2,3; observation 1; Market orientation replacement Power Transformers, (2019); R&D and Innovation Plan 2019–2023, 2019).

Customers’ engineers speak directly to Royal Smit engineers. “Like we are organized and due to our business model and which is also our strength, we have a single point of contact, the project manager. We schedule orders together, we try to make a planning together with the customers as we want them to have the transformers on the right moment” (interviewee 1). Despite information sharing interviewee 4 sees a lack of communication: “wouldn’t call it partnership because I don’t see an open communication during the whole process.” Moreover, the threat of competitors implementing a CBM first is seen as a constraint (interviewee 1), but also the different interests among internal stakeholders are seen

as a constraint (interviewees 3,4). “Currently we have a bit of a fight between the technical guys and the purchasing guys. Often solutions are pushed for purchasing purposes and not for the technical reasons” (interviewee 4). During the brainstorming phase, all stakeholders and their interests need to be clearly defined in order to reach a successful CMB implementation. In the R&D and innovation plan 2019–2023 (2019) it is mentioned that circularity and life extension should be further discussed between sales, service and R&D. Moreover, during the observations, different interests between stakeholders are seen. R&D needs to obtain clear input from sales and sales prefers to sell new transformers instead of refurbished transformers because of unclear buyer incentives and a lack of knowledge. Furthermore, the BS relationship helps a lot in this process (interviewee 3,4,7): “You still see if you have a good relationship with the decision makers on their side, mainly the technical people, you have the advantage. I have the feeling that they judge you a bit more positively if they like you” (interviewee 4).

4.2.2. Channel Leadership

Different internal leaders are identified, such as R&D (interviewee 3,4), project management once (interviewee 1), sales and business development (interviewee 2,6,7,8). This means that Royal Smit lacks a clear internal leader. Internal leadership is mainly based on trust (mentioned by 6 interviewees) and on power (mentioned by 3 interviewees). Leadership on power is used when the sales or business development department is leading, but it is also combined with leadership on trust. There is also a lack of ownership (interviewees 2,4, observation 2,3): “Lack of ownership is the main constraint internal wise. If it is only one person or one stakeholder group pushing this it won’t work” (interviewee 2). “The biggest constraint is the mindset on both internal and external. You have to think differently if you really want to step into a circular approach. The first reaction is “well we cannot do that, because it will cost quality or it will increase the price” (interviewee 4). During observation 2, not all stakeholders brought up ideas, and during observation 3, some stakeholders were obstructive and provided incorrect data. In order to become circular people should take responsibility and turn their thoughts to the bigger picture.

In both forward and backward channels of the transformer, the customer is the channel leader (all interviewees). The customer leads based on trust (all interviewees) and a bit on power (interviewees 2,4). “On the US side some are more on the power side, they are really strict on “I want you to use this type and the other ones I don’t accept”, but that is also a choice in how you want to sell your transformers” (interviewee 4). So, depending on the company strategy, leadership on power can be effective. For Royal Smit this is effective because it strives for customer intimacy. “I think it is a combination of leadership based on trust and power. There needs to be trust in the relationship, but there also needs to be past performance. The evaluation of this relationship is based on the trust and past experience of the buyer and Royal Smit” (interviewee 2). For the backward channel, Royal Smit is not involved (interviewee 1) which is a constraint for the implementation of CBMs.

4.3. Incentive Management

4.3.1. Company Incentives

In order to become circular a holistic view is required: “Circular economy as a business model, the entire message needs to be behind it” (interviewee 2). At the moment there is no circular Product Design (PD) and Circular Business Model (CBM) strategy at Royal Smit Transformers. The lack of a circular strategy is mainly caused by unclear buyer incentives. For example, the sustainability report of the SGB-SMIT Group (2017) describes the high importance of stakeholder expectations of environmental elements like carbon footprint, service lives of transformers and conservation of resources, but it also states that it is less important for corporate development. The current R&D time horizon on circularity is 10+ years. Seven interviewees also declared that company incentives depend on the buyers’ incentives because they should create economic value. “A very small part of the market is pushing on the circular economy, which is not giving our R&D enough ammunition

to actually to perform R&D ideas on circular economy.” (interviewee 2). Moreover, the element of lack of knowledge both internally and externally is constraining company incentives for CBMs (interviewees 1,2,5,6,7,8 + doc 5,10,14).

Moreover, during the three observations, a lack of knowledge was visible, and stakeholders were unable to provide many suggestions or positive ideas. In the R&D plan, (2019) ‘life extension’ is shown as a separate trend but should be seen as a part of circularity (T&D Europe, 2018) which is also an example of a lack of knowledge. Interviewees 2 and 7 declare that the culture is influencing the company incentives: “we are not really started at Smit with CBM. We have now a team, but it should be the whole company who is involved with this. Normally when components are damaged during assembly, the policy is to replace these components” (interviewee 7). BS relationship management is an important success factor for company incentives. Seven interviewees and document four (MVO by SGB-SMIT: Op weg naar circulariteit, 2017) declare that the BS relationship has an effect on company incentives:

“the role of the buyer–supplier relationship management is key, it is very key”
(interviewee 2)

“we will have to develop some if I can expect if we are a serious, or if our partnership with a strategic customer takes us, this is actually something that is developed”
(interviewee 6)

“At the moment you take this direction this will enhance the relationship”
(interviewee 1)

A constraint will be that circularity incentives lead to a more complex network which influences BS relationship management. “You need a lot of other companies who can help to reuse the materials. In this market, we don’t have this. We don’t have knowledge on this circular part. Also interest and willingness. We should find partners for small components” (interviewee 7). BS relationships support incentive management, but buyer incentives in terms of social, environmental and economic value must be clear, and knowledge of direct customer contacts and internal stakeholders should be available. Royal Smit Transformers can then officially start developing and implementing a CBM.

4.3.2. Buyer Incentives

The development of knowledge by experimenting is seen as a success factor by four interviewees: “Customers are continuously working on improving their knowledge. The underlying idea of this is to extend the life cycle of the transformer and to increase the reliability” (interviewee 1). Recently customers asked for health checks in order to reach lifetime extension. Next to this, the service department of Royal Smit received an order in October 2019 to refurbish a transformer for a Distribution Network Operator (DSO). Customers want cradle-to-cradle products, and they expect a cradle-to-cradle design and lifecycle analysis (Project charter-Sustainability strategy for Royal Smit Transformers, 2019; Sustainability-Strategic Framework 2020–2025, 2019). In Europe, buyers are starting to explore CE and further implement it (interviewee 2,6,7; Project Green and Circular Transformer, 2019). More goals and weighting factors are defined which stimulate buyers to implement CBMs (interviewees 2,3,4,5,6,8; Mission profile T&D Europe WG Circular Economy, (2019); 1749-Integrating Circular Economy in Asset Management, 2019):

“There is a goal I think by 2030 20% less virgin material. Which means 20% of the copper in the transformer should be circular. They also want a reduced production waste. They want to see their suppliers reducing manufacturing waste. And it is now starting to form part of their strategic goals” (interviewee 2)

“The weighting factors of certain things that go towards circularity, for example, oil that has been refined will give you so many points for it, and if you do not include it, the chance of winning a tender will be considerably reduced” (interviewee 3)

“A lot of our clients are governmental or semi-governmental and that you see a trend that they are more and more incorporated in the tenders ideas about circularity”. (interviewee 8)

The European Commission is pushing the transition to a circular economy (T&D Europe, 2019). There's a movement in the European market towards circularity and the role of the government influences these weighting factors and clear goals. Still, there is a lack of knowledge of the customer (interviewee 1,2,6,8; Circulaire economie in de elektrotechniek, 2018) and also a lack of willingness (interviewee 1,3,4,5,6,7):

“At the customer side it is important that the contact persons have the drive and the knowledge and willingness as well, because they have an enormous influence on the successful implementation of CE in the supply chain” (interviewee 1)

“Our customers say they want to go to circular ways of more durable solutions, solar power, wind power, but in the end if it's more expensive, or there are technical uncertainties involved they don't make the steps” (interviewee 4)

Another constraint is the complexity of the network because you need a lot of other companies to help reuse materials and in this market, these are not available (interviewee 7). Moreover, the type of BS relationship between a non-profit and profit organization and two profit organizations has an influence on the CBM implementation. “As a manufacturer, we have to make money and the DSO's of course are partly government, TSO's also they have a whole other business model then we have” (interviewee 5). However, the BS relationship can also be a success factor for the CBM implementation (interviewee 6,8; Project Green and Circular Transformer (2016); Circularity meeting, (2016); Market orientation replacement Power Transformers (2019)).

4.3.3. Personal Incentives

All the interviewees are interested in a circular economy, and personal interest proves a success factor for personal incentives. “I think that we need to be triggered to be more environmental driven and to think in ideas and solutions to get more circular economy or a circular way of thinking” (interviewee 8). Interviewees 2 and 6 are getting job security by creating a CBM: “In my current task an official target is to create a business model for circular economy.” “Further making them (customer) dependable on us and ourselves differentiating in the market. Therefore we are increasing our competitiveness.” (interviewee 6). None of the interviewees obtain more salary or benefits by implementing a CBM and interviewees 4 and 8 declared a constraint for a lack of benefits: “So far I am not very driven to do it, because for my personal benefits it doesn't make any difference. The easiest way to change behaviour is by money. I personally know that we have a problem, but we do not change or way of consuming things” (interviewee 8). Interviewee 4, in this case the R&D manager, is a key-player and this constraint, therefore, has a high impact and should be taken away. Another personal constraint is the lack of knowledge given by interviewees 1 and 5.

To wrap up, Table 5 provides an overview of supplier tactics, enablers and shortcomings as identified in the different data sources. The shortcomings lead to (current) vicious cycles that need to be redesigned. We elaborate in Section 5.

Table 5. Overview of supplier tactics and shortcomings.

| Tactics | Enablers | Source | Shortcomings (Gap) | Source |
|-----------------------------------|---|----------------------------------|---|--|
| BS relationship-Product type | Pure play transformer manufacturer | Int. 6,7 | Technical possibilities for reusing materials | Int. 4,7 |
| | BS relationship | Int. 1,5,8 | | |
| BS relationship-Relationship type | Partnerships | Int. 3,4,6,7,8 Obs. 1,2 | Lack of knowledge | Int. 1 Obs. 1,2,3 |
| | Captive buyer | Int. 5 | Captive supplier | Int. 1,2,3,4,5,6,8 |
| | Supplier satisfaction | Int. 1,2,3,4,6,7,8 | Economic imbalance between BS | Int. 6 |
| | | | Captive buyer | Int. 5 |
| Stakeholder-Coordination | Joint decision making | Int.1,2,3,5 | Threat of competitors | Int. 1 |
| | Information sharing | Int.1,2,3 Doc. 5,11 Obs. 1 | Different interests among internal stakeholders | Int. 3,4 Doc. 5 Obs. 1,2,3 |
| | Defined stakeholders | Int. 1,2,4,6 | Lack of open communication back and forward | Int. 4 |
| | Availability of contracts | Int. 6,7,8 | | |
| | BS relationship | Int. 3,4,7 | | |
| Stakeholders-Channel leadership | Internal leader | Int. 1,2,3,4,6,7,8 | Lack of involvement for backward channel | Int. 1 |
| | Internal leadership on power | Int. 2,7,8 | Lack of ownership | Int. 2,4 Obs. 2,3 |
| | Internal leadership on trust | Int. 1,3,5,6,7,8 | | |
| | External channel leader | Int. 1,2,3,4,5,6,7,8 | | |
| | External leadership on trust | Int. 1,2,3,4,5,6,7,8 | | |
| | External leadership on power | Int. 2,4 | | |
| Company incentives | First mover advantage | Int. 5 | Lack of buyer incentives | Int. 1,2,3,4,5,6,8 Doc 1,4,5,6,12 |
| | BS relationship | Int. 1,2,3,4,5,6,8 Doc 4 | Economic driven culture | Int. 2,7 |
| | | | Lack of knowledge | Int. 1,2,4,5,6,7,8 Obs. 1,2,3 Doc. 5,10,14 |
| | | | Complexity of network | Int. 7 |
| Buyer incentives | Development knowledge by experimenting | Int. 1,2,3,4 Doc. 2,13,14,15 | Lack of knowledge | Int. 1,2,6,8 Doc. 8 |
| | Weighting factors and clear defined goals | Int. 2,3,4,5,6,8 Doc. 7,15 | Lack of willingness | Int. 1,3,4,5,6,7 |
| | BS relationship | Int. 6,8 Doc. 2,3,9 | Complexity of network | Int. 7 |
| | | | BS relationship | Int. 5 |
| Personal incentives | Job security | Int. 2,6 | Lack of benefits | Int. 4,8 |
| | Personal interest | Int. 1,2,3,4,5,6,7,8 | Lack of knowledge | Int. 1,5 |

5. Discussion

Figure 3 captures the current situation in a CLD. It represents a vicious cycle as the constraints prove stronger than the enablers. Incentive management requires that buyer incentives are present at strategic customers and circular knowledge is available. Both are not the case. It is also constrained, yet less, by a lack of willingness to adopt circularity. Regarding incentives, the lack of personal benefits is constraining key players but other types of incentives also prove crucial. Different interests of internal stakeholders, a lack of ownership and a lack of an internal leader limits the functional integration, and hence, the CBM implementation process. Joint decision-making, information sharing, the availability of contracts, the availability of internal and external channel leaders [48] and clearly defined tasks and responsibilities of all stakeholders related to companies' circularity goals enhance coordination and ultimately the three supplier tactics.

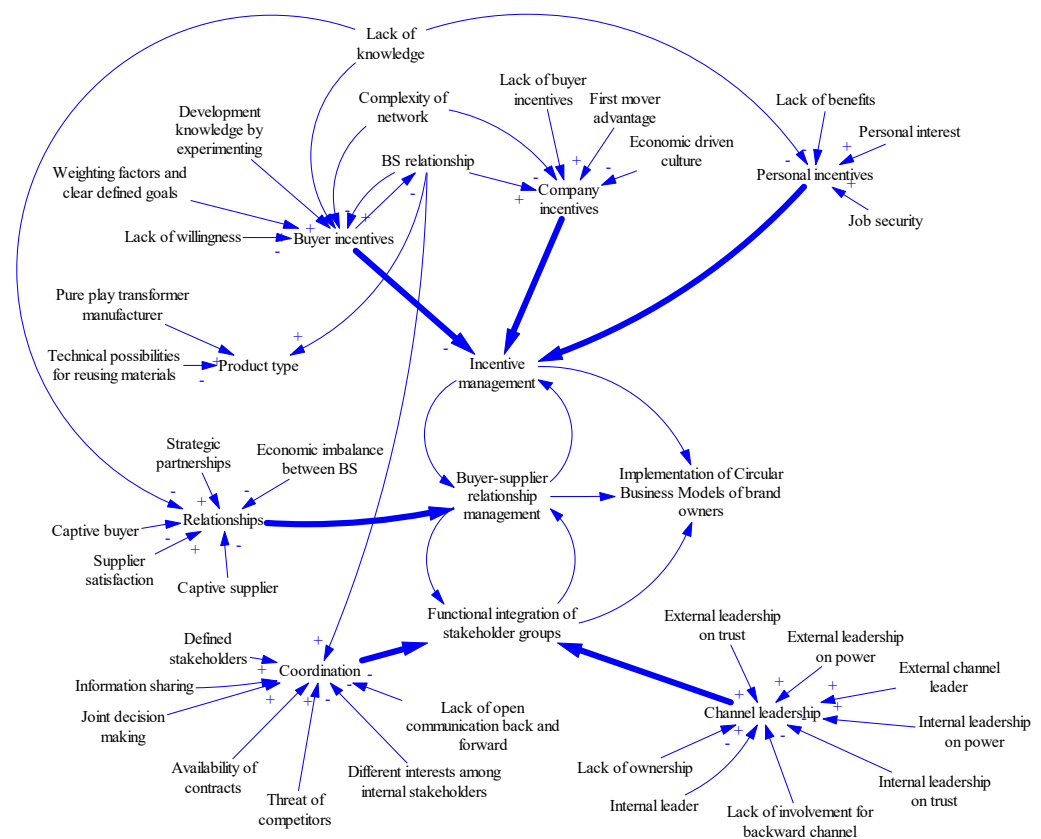


Figure 3. Causal loop diagram of the current situation (vicious cycle).

In the next paragraphs, we will discuss how supplier tactics should be applied based on the CLD that sketches the total context. Another remarkable aspect is that the influence of secondary stakeholders is practically absent. In principle, the objectives of NGOs, governments and society at large are reflected in the CSR policy. Although the company has such as CSR policy, its impact in real life was hardly ever mentioned in the interviews nor observed by the researchers.

5.1. Buyer–Supplier Relationship Management

According Antikainen and Valkokari [18], successful CBMs require co-creation [18] and collaboration between a variety of stakeholders [64,65]. Within a circular supply chain perspective, supplier tactics must be embedded into proper BS relationship management. Changing one business model will affect the business activities of other organizations and their supply chains [6,7]. In this case study, partnerships are important because of the high delivery risk and product value [24]. Moreover, CBMs are based on trust and

commitment and not only focusing on economical, technical and legal linkages but multiple value creation [1,31]. Good buyer–supplier collaboration can lead to reductions in waste generation and raw material utilization, it improves CBMs, and hence, contributes to a more circular society [1]. Enhancing the BS relationship is a crucial supplier tactic, since a high level of trust is needed due to the technical complexity of transformers, and it should be accepted that mistakes can be made by experimenting. This trustful relationship has a direct influence on a successful CBM implementation. This pivotal importance of trust corresponds to findings reported in the literature, pointing to trust deficit as an external barrier to Circular Business Models [64,66].

Customer attractiveness and supplier satisfaction are enablers for relationships and therefore have an impact on BS relationship management [44]. In the case study, supplier satisfaction is seen as a success factor for BS relationship management. If suppliers are satisfied based on their BS relationship experience this will help the CBM implementation process. Technical possibilities are given as a constraint by two key-players: the R&D manager and the director of the engineering department. This constraint is probably caused by unclear incentive management of all stakeholders. Moreover, the given captive supplier relationship constrains the CBM implementation in the case. This is confirmed by Dabhilkar et al. [27] who state that sustainability programs have an impact on supplier compliance for all Kraljic categories except for bottleneck items, where mostly captive supplier relationships are in place. This all means that buyer–supplier relationship management has a positive causal effect on the implementation of CBMs by brand owners.

Sustainability management can only lead to positive outcomes if there is a strategic alignment of sustainability purposes between corporate and supply functions when strategic products are concerned [27]. In this case, strategic products are concerned since the social and environmental resources for these products are integrated and the knowledge is difficult to imitate. In the results, it is given that the BS relationship is a success factor for buyer and supplier incentives to become circular if the weighting factors and clearly defined goals are given and the buyer is a strategic partner. If the supplier is a strategic partner and supplier satisfaction is available, BS relationship management will have a positive effect on the incentive management of all stakeholders.

Kohtamäki and Partanen [43] describe that relationship learning, sharing knowledge and joint decision-making will create value for business services because it creates insight into each other's processes. The basis for this PSS management is the exchange of partnerships [22]. Joint decision-making, information sharing, defined stakeholders, and availability of contracts are success factors and they are influenced by the customers and their requirements. The case company should be an example of information sharing and joint decision-making by sharing each other's visions on circularity. Still, there is no complete transparency caused by captive supplier relationships, which constrain the coordination between the buyer and supplier. Again, this constraint is linked to a lack of trust between the supply chain partners, as identified in the literature [64,66]. In order to become circular, customers must act more as partners, and they should become more transparent in their way of coordinating. In the case study, the customers are leading the channel, they have the power, and they lead mostly based on trust, which means that the relationship has a big influence on the functional integration of stakeholder groups. If more partnerships occur, it is expected that the coordination among stakeholders will change into more joint decision-making and information sharing.

5.2. Functional Integration of Stakeholders

According to the theory of Arshinder et al. [47] and Mokhtar et al. [50], close coordination among departments and effective channel leadership are means to achieve functional integration of stakeholder groups in CLSCs and lead to a realization of full potential for a circular economy. Leadership has been identified in the literature as one of the main drivers for CBM realization [66,67]. Effective supply chain coordination should consist of supply chain contracts, supporting IT structure and information sharing/transparency, and joint

decision-making [47,57]. Another important element is to define the stakeholders and their power and responsibility [49] related to CE. The results share that joint decision-making, information sharing, the availability of contracts and clearly defined stakeholders are a success for the coordination and implementation of CBMs. For channel leadership, there needs to be a leader for both the internal and external channel (back and forward) and it is important to understand the level of power or trust in order to enhance the implementation of CBMs [50,58,59]. The case study shows that the availability of internal and external channel leaders who are leading based on trust or power will enhance the CBM implementation. Different interests of internal stakeholders or lack of ownership constrain the internal coordination which can have a negative impact on the CBM implementation. Schenkel et al. [4] state that value creation for CBMs requires not only close supply chain coordination but also internal incentives among the departments. In this case, inadequate incentive management of buyer incentives and company incentives causes different interests and the absence of an internal leader. If incentives are available then relationship learning, knowledge sharing, integration into relationship-specific memory and joint-sense-making will create value for business services. Both the buyer and supplier obtain insight into each other's experiences and processes [43].

Arshinder et al. [47] state that stakeholders need to appreciate the importance of coordination across organizational boundaries otherwise it can lead to conflicting goals and short-time relationships. The coordination between the buyer and supplier is also in the results seen as a success factor. The lack of communication back and forward between the buyer and supplier is constraining this coordination, but in the case study, this does not influence the type of relationship. The lack of open communication, the lack of an internal leader and the type of leadership have no significant impact on the BS relationship, and vice versa. In the case study, the functional integration of stakeholder groups does not affect the buyer–supplier relationship. This finding contrasts with the theory regarding power and interdependence, within the context of strategic buyer–supplier relationships [25].

5.3. Incentive Management

In theory, companies should have clear statements and goals on circularity in terms of economic, environmental and social value [61]. Our results show that incentive management is constrained by the lack of knowledge of all stakeholders, the lack of buyer incentives and a lack of willingness of the buyers' employees. This explains the correlation between the variables of buyer incentives and company incentives. If buyers do not specify proper requirements suppliers cannot provide clear statements and goals on circularity and implement a decent Circular Business Model. This confirms the theory of Lieder and Rashid [8] who state that alignment between company incentives and buyer expectations creates multiple values for CLCSs. Both their vision on circularity and the CSR aspects needs to be clear. Buyer employees should have knowledge in combination with the willingness to become circular. The development of knowledge is both in the theory and case study seen as a success factor [9,32]. Bocken et al. [12] state that experimenting creates engagement for changes towards CBMs. Suppliers need to have this knowledge and willingness as well. Both buyers and suppliers should be open to improving each other's knowledge, if buyers are open about what they want and suppliers will explain whether this is possible both levels of knowledge in the circularity field will increase. For personal incentives, Čiarnienė and Vienažindienė [52] describe salary, benefits and job security as enablers. In our case study, personal interest and job security are found to be success factors. Personal interest is a basic requirement and should be added to the theory, job security is important in order to challenge project leaders for implementing CBMs. The lack of personal benefits is constraining key-players like R&D and engineering. We assume that key-players on the customer side also face a similar lack of benefits.

Our results show that the company and buyer incentives are a success factor for buyer–supplier relationship management because they creates opportunities for partnerships and a bigger network with more actors. Blome et al. [42] also require these partnerships,

especially when buyers and suppliers are working on developing circular strategies because they create efficiencies on the demand and supply side of the chain. Our results in buyer–supplier context with a focus on incentive management concur with the existing literature pointing to the importance of financial viability and benefits of CBMs for all partners, as well as customers [68,69]. If the buyer provides clear goals and weighting factors this will be another success factor for buyer incentives, which will finally result in a better buyer–supplier relationship. If a buyer does not have clear incentives this will constrain the company incentives and relationship. Technical information is required from the R&D and engineering department of the supplier in order to write these proper buyer incentives by the purchasing department of the buyer. It is possible that this lack of information sharing is constraining incentive management. This is an example of the relation between the variables incentive management and BS relationship management. If buyer incentives for circularity are available and the supplier meets these buyers' expectations this will enhance the buyer–supplier relationship.

5.4. Redesign of the Supplier Tactics

From Figure 3 the following lessons can be learned. Three important enablers to turn this around are the availability of buyer incentives, circular knowledge and (strategic) partnerships. They enhance supplier tactics and ultimately the CBM implementation. Figure 4 visualizes the CLD of the desired enablers and supplier tactics that foster value creation cycles for CLSCs of brand owners.

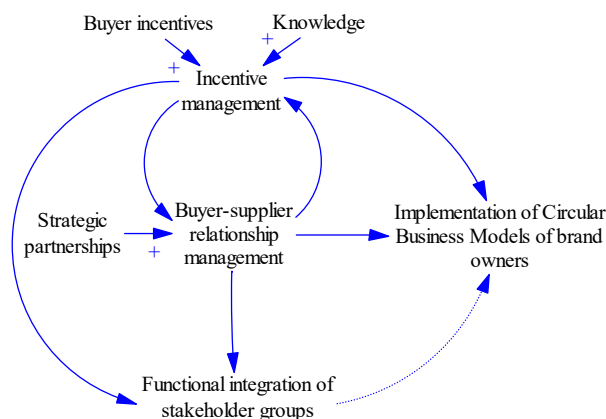


Figure 4. Causal loop diagram of the desired enablers and supplier tactics to break vicious cycles.

6. Conclusions

Circularity is a complex topic that requires consciousness about what it means for a buyer, supplier and the complete supply chain.

Managerial conclusions consider the following. Supplier tactics can help to break vicious cycles. This requires sharing clear visions on circularity, being transparent in possibilities, together experimenting and developing knowledge jointly. Buyer–supplier relationship management, functional integration of stakeholders and incentive management can support the implementation of Circular Business Models, but only in a strategic (co-) initiative with a (major) customer. However, the initiative remains with the supplier. Enablers are the practical tools to support supplier tactics and, in the end, implement Circular Business Models (CBM). They vary per case.

The main theoretical findings of this paper are as follows:

- Closed-loop supply chains and circular economy involve more stakeholders, more objectives and specific investments from both buyer and supplier, which makes strategic, trust-based partnerships a must. Captive situations (dead-locks), modeled as vicious cycles, prove to be a serious obstacle in implanting CBMs.
- Supplier tactics in this study focus on BS relationships and operational enablers essential in implementation. In other words, next to supplier tactics we need enablers

as well to successfully implement CBMs. The question here is which one of the two can provide leadership, i.e., who takes the initiative and supply chain directorship.

- Our case shows that economic objectives are dominating the closed-loop supply chain and also how primary stakeholders (buyer–supplier) struggle together to implement CBM. Secondary stakeholders may influence primary stakeholders, however, not fundamentally. Despite the fact that (top-down) CSR policies are formally in place, social and environmental objectives are hardly mentioned by the interviewees. The only exception is compliance which is usually ‘economized’, by regulations and fines.
- *Limitations and future research.* Our study also has a number of limitations, that lead to recommendations for further research. In order to obtain extra insights into how to break through the vicious cycles by actually implementing supplier tactics, it is recommended to do additional case studies. Furthermore, the interviewees all come from the brand owner, therefore, it would also be interesting to involve buyers as well, in order to obtain more validated results. Moreover, the role of supplier tactics in relation to the other SSFs next to CBMs can be further explored.

In future research, we should also investigate the role of the buyer, including buyer captive conditions, and how to shape supply chain leadership. The role of supplier tactics in relation to other success factors next to Circular Business Models needs to be further explored.

Regarding incentive management, it would be interesting to investigate personal incentive management for key-players and how this is related to the implementation of CBMs. What should companies do to motivate key-players to move to the circular economy? And how should objectives of secondary stakeholders be incorporated in a multi-value closed-loop supply chain rather than maximizing economic value only?

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Appendix A

Table A1. Constraints for CLSC Processes.

| CLSC Process | Constraint | Reference |
|--|---|-----------|
| Return process and trade-in of used products and parts | Capacity and utilization, uncertainty of timing, quality and quantity, trade-in price, installed vase visibility, reverse logistics costs and uncontrolled disposal | [4] |
| Recovery of used products and parts | Ease of disassembly and recovery, compatibility and recovery costs | [4] |
| Sales and re-integration into forward supply chain | Market uncertainty, bonus systems, third-party influence, regulation and customer demand for new products | [4] |
| SSF for CE | Constraint | Reference |
| Product Design | Limited R&D budget, time to market pressure and lagging supplier integration in the design process. Resistance to change and communication which can influence implementing sustainability in designs | [4,70] |

Table A1. *Cont.*

| | | |
|------------------------|---|--------|
| Business Models | Organizational inertia, limited time and resources, no explicitly developed guidelines, linear accounting system, focus on short-term profitability and selling new equipment, uncertainty about quality of recovery and lacking top-management commitment | [4,71] |
| Customer Service | Limited customer demand for leasing, customers wish to keep control over products, no reduced total cost of ownership or economic benefits of leasing, pre-investment and risk that customer might go bankrupt during leasing period and preference for traditional ownership | [4] |
| Information Management | Complex information systems, e.g., due to multiple databases | [4] |

Appendix B

Table A2. Interview Guideline.

| ID | Question | Source |
|---|--|---------|
| Incentive management section | | |
| 1 | What are the company's incentives in terms of economic, environmental and social value to implement a CBM? | [52,61] |
| 2 | How are these circularity incentives communicated and shared in the company? | [52] |
| 3 | What are the buyer's visions on circularity and how are the company's incentives in line with the buyer's expectations of circularity goals? | [8] |
| 4 | What are your personal incentives (in terms of salary, benefits, job security) to implement a CBM? | [52] |
| 5 | What is the circular product design strategy? Is it based on slowing and/or closing the supply chain? Slowing; designing long-life products and for product-life extension. Closing; design for a technological, biological cycle, for dis-and reassembly. | [12] |
| 6 | What is the Circular Business Model strategy? Is it based on slowing and/or closing the supply chain? Slowing; access and performance model (PSS), extending product value, classic long life, encourage sufficiency. Closing; extending resource value, industrial symbiosis. | [12] |
| 7 | What is constraining the incentive management for CBMs? How are these constraints related to each other? | |
| 8 | How is the incentive management related to the buyer-supplier relationship management? | |
| Functional integration of stakeholder groups section | | |
| 9 | Who are the internal and external stakeholders for CBMs in terms of power, urgency and legal? | [49] |
| 10 | Which stakeholder is leading the forward and reverse channel? (buyer/supplier/third party) | [48] |
| 11 | How is this channel coordination organized? (supply chain contracts, IT structure, information sharing, joint decision-making) | [30,47] |
| 12 | What type of leadership (based on trust or power) is applied in this channel? | [50] |
| 13 | Which internal department is leading the forward and reverse channel? | [50] |
| 14 | What internal type of leadership (based on trust or power) is applied? | [50] |
| 15 | What are the constraints for external and internal stakeholder coordination and leadership? How are these constraints related to each other? | |
| 16 | How is the functional integration of stakeholder groups related to the buyer-supplier relationship management? | |

Table A2. Cont.

| BS relationship management section | | |
|------------------------------------|--|---------------|
| 17 | How are customers selected and managed? (based on customer attractiveness and supplier satisfaction) | [44] |
| 18 | What type of buyer–supplier relationships are applied? (market exchange, captive buyer, captive supplier or partnerships) | [28,31] |
| 19 | Why is this type of relationship applied? (product type, level of investments) | [24,28,30,31] |
| 20 | What are the constraints caused by the buyer–supplier relationship management which have an effect on the implementation of the CBM? | |

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