

A PROPOSITION FOR AN UPDATED CONFIGURATION OF THE VALUE CHAIN

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ABSTRACT

The purpose of this article is to provide an updated configuration of the reviewed value chain considering specific requirements and evolutions in business processes. The scientific approach of this paper is a conceptual and analytical one. Firstly, on the basis of previous research and analysis of statistical data the relevance for value creation is highlighted. Secondly, the analytical and conceptual findings are consolidated for an updated configuration of the value chain. The scientific aim of this article is to contribute a contemporary approach of a reviewed value chain to academic discussion. The concept of the value chain is a reasonable tool to assess competitive advantage. As time changes, methods and tools have to be changed, too. Especially in the age of Internet of Things it is important to review all influences. Due to current findings of research it is justifiable to incorporate innovation management and procurement into the primary activities, because these activities have changed into considerable value creators. On the other hand logistic activities do not contribute noticeable share of added value and therefore should be considered as a secondary activity

Keywords: competitive advantage, innovation, logistics, primary activities, procurement, value chain

1. Introduction

Competitive advantages are mandatory preconditions for enterprises to create value in their business operations. The value chain introduced by Porter in 1985 is a well-proven tool to analyze competitive advantage based on business activities of a company. In order to do this, the business activities of a company are separated into primary and secondary activities. Primary activities are characterized as value creating activities. Secondary activities are supporting activities to facilitate primary activities.

New and sometimes revolutionary technologies emerged especially during the last two decades and changed business operations decisively. The digitalization changed nearly all areas of operations in execution and performance as well. This is the motivation to review the basic concept of the well-known value chain whether all assumptions and requirements are still valid, or have to be adopted due to those major changes. As time elapses, reality advances and the management literature has to keep up with the progress to stay up to date.

The basic concept of the value chain will be explained in this paper first. Then the primary activities will be introduced. The basic question of research is whether all value-creating activities are considered and properly integrated into the primary activities. In addition, the secondary activities will be completed and arranged in a contemporary manner.

The benefit of this paper is the presentation of an updated conceptual framework of the value chain. This is the first consistent revision of the value chain under contemporary conditions and circumstances in the age of smart manufacturing and internet of things. This revised version may become subject of scientific discussion as well as practice for industrial implementation.

2. Problem formulation

Porter’s concept of the value chain (Porter 1985; 2004) to analyze the activities of an enterprise is one of the most frequently used management methods of the last decades. The mentioned value chain (Figure 1) is a composition of business activities and differentiates primary activities and support activities.

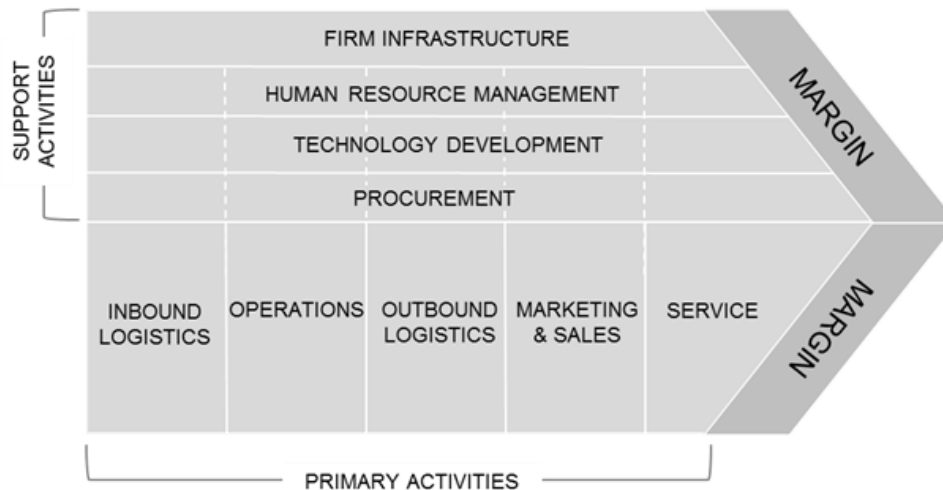


Figure 1: The Generic Value Chain. (Porter 2004)

A company has to perform all these activities properly in order to create value for its customers. Primary activities directly refer to the physical creation of a product and thus are considered to create value. Support activities are necessarily required to facilitate primary activities.

The whole area within the picture in figure 1 represents total sales of a company. Total sales minus total cost of all activities equal the margin. Innovative products will push sales figures, provided that there is value added. Because customers are only willing to pay a higher price, if there is a higher value. The task of the management is to perform all activities in an effective and efficient way at a minimum of cost. Hence the margin and profitability will rise. The way in which these activities are performed affects the cost and value proposition. In the long term the

competitive advantage of a company will be increased. The value chain shows the value creators and the cost drivers. Thus managers are able to understand the value creation process.

According to Porter (2004), inbound logistics, operations, outbound logistics, marketing & sales as well as service are considered as primary activities.

This approach has provided a basis for an appropriate management concept for 35 years now. The supposition is that there is a necessity to consider modifications in the composition of the value chain. Due to time passed by and rapid development of technologies and conditions all activities will be analyzed.

3. Question of research

The value chain should include all mandatory steps of value creation of a product in a structured process of activities. These activities refer to each other and they consume resources. To be characterized as a primary activity, an activity has to be involved in the physical creation of the product (Porter 2004). Primary activities are characterized to create value which is higher than the cost of these activities. According to this logic the support activities consume resources without creating value. But they are necessary supporters of the primary activities.

The basic motivation of this paper is to examine the composition of the value chain and to verify whether it is still applicable or it has to be adjusted due to technological or environmental changes in business processes. Depending on the findings it will be considered how to rearrange the value chain. Especially the primary activities are under revision and will be rearranged after careful considerations. The secondary activities will be reviewed and completed, if necessary.

The overall question of research of this paper is formulated as follows:

Are all determining activities included in the value chain and characterized properly as primary or secondary activity?

This leads to the following theses:

Thesis no. 1: If it is substantiated that a determining activity is missing, then this activity has to be integrated into the value chain at the appropriate position.

Thesis no. 2: If it is verified that a secondary activity is considered to create value, it has accordingly to be allocated to the primary activities.

Thesis no. 3: If it is proven that a declared primary activity does not create value, then it has to be classified as a secondary activity.

4. Literature review and proposition statements

In this chapter the completeness of value creating activities and the classification of selected activities will be argued. An additional activity, which was not considered so far will be introduced. The argumentation is outlined in subchapter 4.1.

Subchapter 4.2 and 4.3 are presented briefly, because those activities have already been discussed in detail (Hofbauer/Sangl 2016, 2017, 2018a). Some quantitative arguments have been updated, but the underlying reasoning remains the same.

4.1 Reasoning of innovation management as a value creator

In this chapter the question will be answered, whether a so far missing activity will be integrated or not. The corresponding working hypothesis no. 1 is: If it is substantiated that a determining activity is missing, then this activity has to be integrated into the value chain at the appropriate position.

Innovation management is one of the most important entrepreneurial functions. The outcome in terms of new products or applications are inevitable requirements for prosperous enterprises. An innovative enterprise may be characterized by means of: introducing new products, entering new markets, development of additional benefits, increase of market share as well as enlargement of sales and profit (Hofbauer and Sangl 2018, pp. 71-76).

Innovations substantiate competitive advantage (Hofbauer et al. 2009). Innovation management in turn is driven by R&D activities. The outcome of R&D activities are goods, products and services, which provide a specific benefit for the customers. If the benefit is high, the customer is willing to pay a higher price. Hence all activities refer to the value of the enterprise, which is based on the value for the customer.

The internal R&D mostly focuses on exploitation, whereas the exploration is more and more done by external sources (Hofbauer and Hofbauer 2016). Companies know that they have to exploit their existing knowledge and resources to achieve competitiveness. In addition to that open innovation (Brening and Hofbauer, 2017) is a major opportunity to get beneficial innovations done within a shorter time frame and with a lower budget.

Impact of Innovation management

The importance of innovation activities will be displayed in terms of facts and figures on a quantitative basis. Large budgets are invested in the search of innovations and there is a huge impact of new products on the competitiveness and profitability of a company.

The total expenses for innovation activities of German enterprises have a total amount of 166.9 bn EUR in 2017. This means an increase of plus 4.7 % in comparison to previous year. The total amount for 2018 is 172.5 bn EUR (+3.4%). The estimate for 2019 is about 175.9 bn EUR (ZEW 2019). These figures show that the innovation expenses are a serious economic factor, though

representing only an overall fraction of 3.14% of total sales. Thereof industry has a share of 4.8 and service 1.4%.

A more detailed analysis of all companies in Germany shows more findings about innovation activities and their results. In total there are 106.700 innovative companies identified. This counts for a share of 36.0% of all industrial companies. Table 1 shows also figures about product and process innovation as well as novelties and cost reduction.

Table 1: Innovators in Germany 2017, (source: ZEW 2019)

	in 1.000	percentage
Total number of companies	296.6	100.0
Companies with innovation	106.7	36.0
... with product innovation	74.4	25.1
... with process innovation	71.2	24.0
focus on novelty	22.2	7.5
focus on cost reduction	29.9	10.1

The output of the innovation activities of German companies can be summarized in some figures, which show again the huge impact of innovation activity on economy. In 2017 the total sales with innovative products scored the amount of 822.5 bn EUR, this figure increased 14.5% compared to previous year and represents 15.5% of total sales (ZEW 2019).

Another important outcome of innovation activities in terms of patent applications is shown in Figure 2. There was an increase from 59.444 up to 67.895 patent applications in Germany from 2010 until 2018 (source: DPMA 2019). These figures indicate an increasing innovation activity as well as an increasing technological progress comparably increasing with technological value added. Patents help to protect the know-how of a company and support to gain competitiveness as an important precondition for value creation.

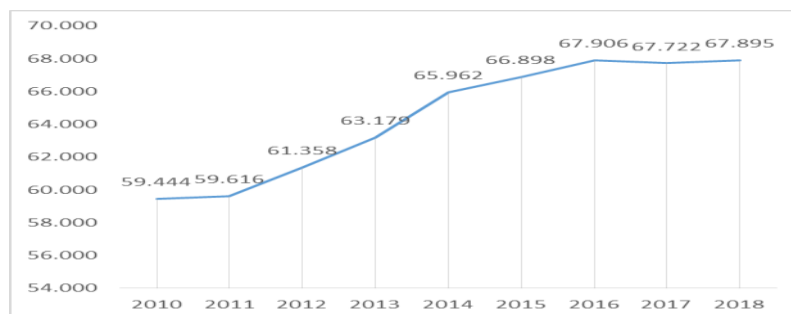


Figure 2: Patent applications in Germany (source: DPMA 2019)

The innovation activities of different industrial sectors in Germany are displayed in figure 3. The analysis of these figures show the intensity of innovation effort and the most innovative sectors can be identified. In figure 3 the innovation rate (percentage of new products), the intensity of innovation activity (expenses for innovation activities as a percentage of sales) as well as the share of sales with innovative products innovation on total sales for different sectors is shown. It can be assumed that there is a strong positive correlation among these three indicators.

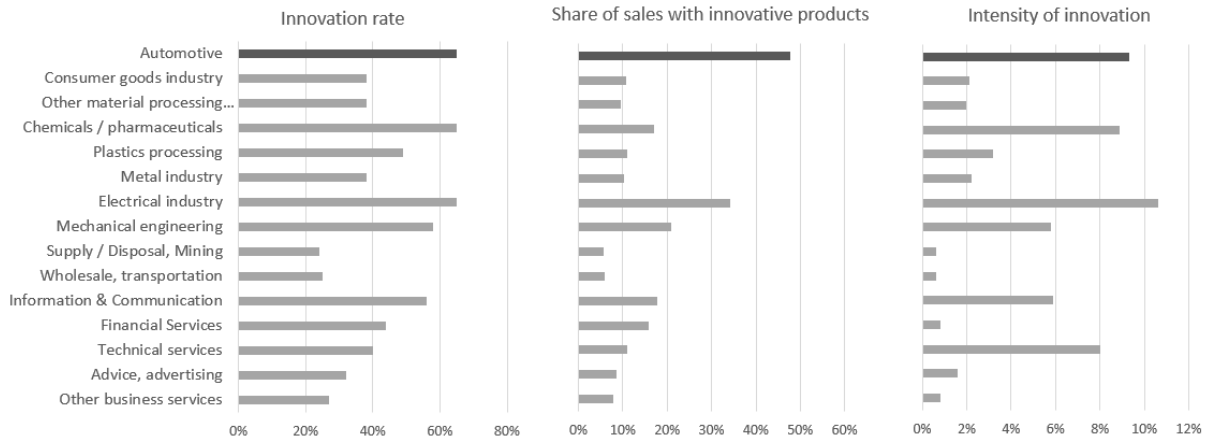


Figure 3: Comparison of innovation measures for industrial sectors in Germany (source: ZEW 2018)

Open innovation

In this part the qualitative argumentation will be given. In comparison to the end of last century the role of innovation management changed dramatically. The imperative for innovation is accelerated by rising competitive pressure, shortened product life cycles, increasing rivalry on the markets and the battle for customers. New products with new technologies have to be launched within shorter periods of time. Companies are forced to speed up innovation efforts and to allocate higher budgets. In addition to that, new technologies as well as cost and time pressure have changed the practice of innovation procedures. Companies cannot hold available all the different technologies and corresponding know how. Thus companies are in search of expertise, wherever it is available.

Internal innovation activities have moved increasingly into open innovation (Brening and Hofbauer2017) towards the innovative potential outside the company. The basic idea of open innovation is to integrate innovative ideas, proposals for solution and technologies coming from outside the company into the internal innovation process. In doing this, companies can use an enormous technical and creative potential from outside the company. An important advantage is, that the company does not have to pay for the resourcing; the adequate payment is only for the intended usage, licensing or purchase of know how. This enables companies to explore more innovative possibilities and exploit more ideas in a shorter period of time, save money and reduce flop rates (Loren 2011, p. 5). Open innovation is a major opportunity to get new ideas and

know how on demand and tasks quickly executed and solved. These arguments strongly suggest that there is a high potential for value added.

Figure 4 shows the principle of open innovation (Chesbrough2003, p. 43). The standard procedure is that promising ideas will be identified outside the company and will be sequentially integrated into the internal development process to provide new offerings to the current market. In case that there are valuable ideas, which do not fit to the current market, those ideas can be marketed from inside to outside as well (Chesbrough2003).

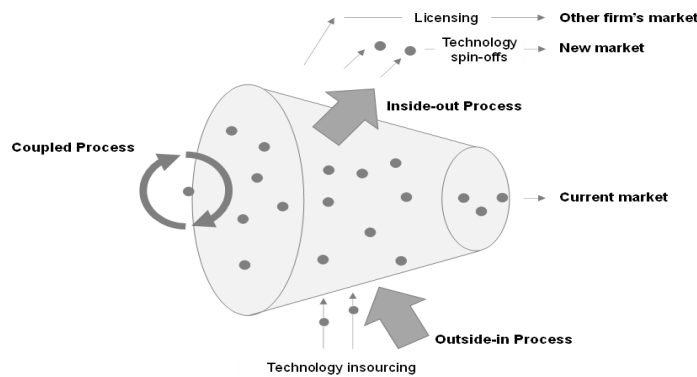


Figure 4: Principle of open innovation

The principle of open innovation provides new possibilities to create value of using additional potentials outside the own company. This proceeding shows that ideas can be integrated from outside (outside-in process). Valuable outcome of the internal innovation process, which does not fit to the current market may be finalized with external partners and marketed over other channels (inside-out process). A combination of both ways is possible in terms of a coupled process (Chesbrough2003). Figure 5 shows different providers of ideas and solutions from outside the company.

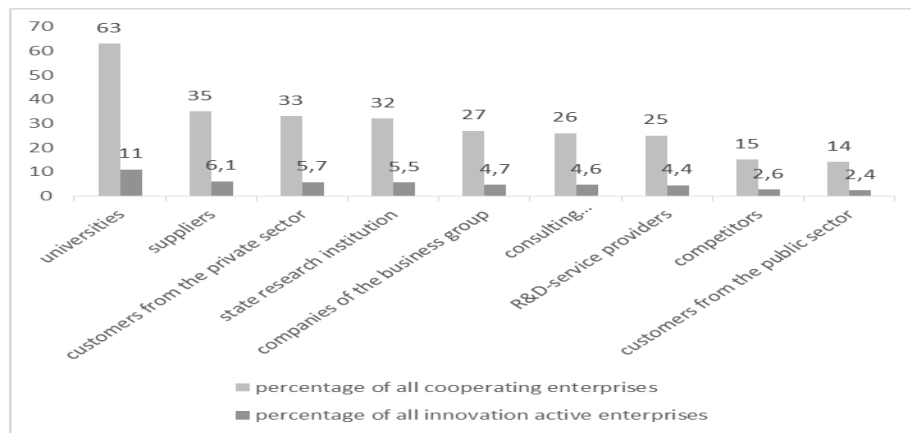


Figure 5: Innovation partners from outside the company (Rammer et al. 2016, p. 78)

The most advantageous approach for a company to create competitive advantage in its innovation initiative is the outside-in process. Here the knowledge base of a company is enhanced by contributions of external co-inventors. External sources like experts, technology consultants, suppliers and even customers initiate ideas and elaborate solutions for the respective assignment of tasks. Figure 6 shows different possibilities of collaboration on innovation (ZEW 2019).

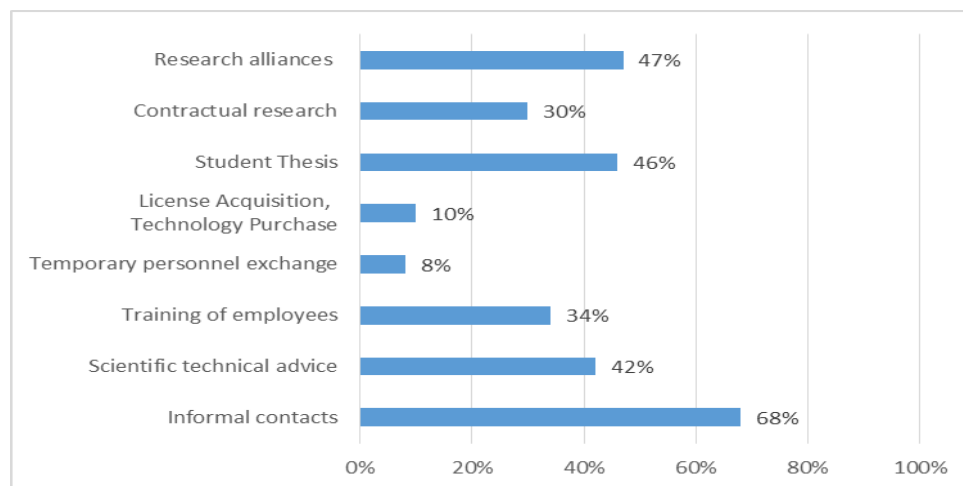


Figure 6: Forms of Cooperation with scientific facilities 2015 – 2017 in % of all companies with cooperations (ZEW 2019)

In order to create suitable value by the use of open innovation, the management needs to have specific capabilities. Absorptive capability is the most important precondition (Reich weld and Pillar 2009, p. 99). Companies in search of new ideas need the ability and competence to accept and absorb know how from outside. This absorbed know how is useful for the own innovation activities and value shall be created by commercialization (Engelhard and Hofbauer 2017). Multiplicative capability is also a major issue (Gassmann and Enkel 2004, p. 13), because the inside-out process refers to value creation by marketing internal know-how outside the company. The motivation for this advancement is to market the innovation faster than through the internal standard procedure. This shift of business activities offers added value through licensing, spin-offs, start-ups and multiplying technology use. The so-called coupled process describes the combination of the outside-in and the inside-out process. The consolidated activities may be realized in alliances, strategic networks, joint ventures and cooperations. In order to establish competitive advantages the members try to develop technical standards and dominant designs of their products (Gassmann and Enkel 2006, p. 13). To have the right balance between absorb and provide is the most important precondition in these partnerships. In this case relational capability is needed, which refers to balance the efforts and wins within a network, otherwise the network would not be successful. Thus all partners are able to establish competitive advantages and create value accordingly.

Summing up the arguments for innovation activities

Innovation activities are vital for successful companies and prerequisites for establishing competitive advantage and value added. The empirical data show that innovation activities and corresponding budgets on the input side as well as the outcome of innovation on the sales side have a huge impact on companies and economies. Innovations in terms of products and services are essential to create value for the company and for the customer (Hofbauer and Gandhi, 2016).

In collaboration with advanced procurement and suppliers the most important issue is to detect and utilize innovations and innovative potential for the company. Therefore an extensive market research is necessary. Once suppliers are identified, they should be closely involved into the pre serial and serial development process of the company (Engelhardt and Hofbauer 2017). Further on products will only be designed best for subsequent manufacturing at supplier's site, if their manufacturing know-how is considered prematurely during the product development process. Far too often products were designed and physically developed before the production feasibility is checked, which is necessarily the next step (Hecht 2014, p. 5). In order to support value creation in terms of the return of the products, the procurement management has to look for innovations and solutions to reduce complexity and optimize the product for the whole value chain.

The opening of the innovation process provides a significant strategic advantage (Bischoff et al. 2010, p. 277). The utilization of open innovation processes provides additional creative potentials. The most important advantages are reduction of time-to-market and cost-to-market and an enhancement of fit-to-market and new-to-market. The first two issues concerning time and cost are related to advanced access to information about solutions of problems (Reichwald and Piller 2009, p.172ff). This information is about specific knowledge how to solve specific problems. Further on how to use efficiently given resources to elaborate solutions. The next points fit and new refer to the availability of information about customer requirements (Reichwald and Piller 2009, p. 173). The knowledge about the needs and wants of customers is essential to provide tailored solutions. This helps to improve the affectivity, because the products will meet the needs of the customers and thus the flop rate will be reduced. So the success of new product entries will increase and value will be created.

Based on the outlined argumentation in this chapter there is a strong indication that innovation should be characterized as a value creating activity.

4.2 Reasoning of procurement as a value creator

This chapter will answer the question, whether a secondary activity should be allocated as a primary activity or not. The corresponding working hypothesis no. 2 is: If it is verified that a secondary activity is considered to create value, it has accordingly to be allocated to the primary activities.

Porter argues that procurement is one of the so called support activities in the value chain. The initial position of Porter's statement was that procurement was just the operational execution of an order, without adding any value. Porter recognizes the value contribution of procurement departments for companies, but he argues that the cost proportion of procurement activities is quite low or even an insignificant share in total costs (Porter 2004). In this day and age the procurement activities have a huge impact on the company's strategic position regarding benefit, overall costs, quality, innovativeness and its differentiation. So contemporary purchasing and procurement activities can strongly improve the cost and value proposition.

In the contemporary practice procurement is involved right from the very early beginning of the product development. This involvement ranges from advising the internal development department to supplier selection for utilization of external potentials (Hecht and Goldbach 2017). This undelays that targeted execution of the modern sourcing process generates value. By doing this, the modern procurement contributes to a product's concept and so to its physical creation and value generation. These activities include frontloading, innovation management, and selection of (development) suppliers, production materials as well as manufacturing equipment and processes.

The strategic evolution from simply purchasing to contemporary procurement forms the underlying basis for this reasoning. In former times the operational buying execution was recognized as a supporting activity within the value chain of a company. Since the late 1980s, when the competitive potential of procurement was emerging, the substance and impact of procurement is increasing (Lingohr and Kruschel 2011).

Ambition of procurement

Procurement operates as the link between the company and the relevant sourcing markets. Procurement can contribute to competitive advantage by qualitative and quantitative issues. Qualitative issues may arise from the shift towards strategic tasks like forward sourcing and frontloading. Qualitative issues also arise from the integrational perspective, this means integration on vertical and horizontal dimensions (Hofbauer and Sangl 2017). All the setopics contribute to the value added. The scope of procurement is directly related to corporate objectives (Hofbauer 2017, Hofbauer/Hecht 2017, Hofbauer et al. 2016).

Important objectives refer to assurance of quality, capability of suppliers and flexibility. These objectives are important to ensure continuous production, reliable supply with raw material and other bought-in parts, modules and systems. The increasing flexibility is a procurement objective as well (Janker 2004 and Kerkhoff 2008), because this helps the OEM to react adequately on external influences.

Cost objectives for example have a significant importance, because material costs have a high impact on a company's profitability. A common example points out this statement: a decrease of material costs of only 3% generates the same impact on profit as an increase in sales of 60% (assumptions: calculatory expected return 3%, share of costs of materials 60%) (Wildemann

2008). Cost targets have to be harmonized and adjusted with all other objectives of a company in order to avoid mutual contradictions.

There is no doubt that procurement is nowadays a decisive activity and contributes a noticeable portion to the value added within the value chain of a company (Hofbauer and Sangl 2017). This becomes obvious as we take a deeper look into a typical cost structure. Figure 7 shows the cost structure for the automotive industry. This figure exemplifies that the value of the sourced material (including trading goods) exceeds 70% of the gross production value. This verifies the close link between OEMs and their suppliers. Powerful suppliers have taken responsibility over complete production chains through the various outsourcing processes over the last couple of years (Mönnig 2014).

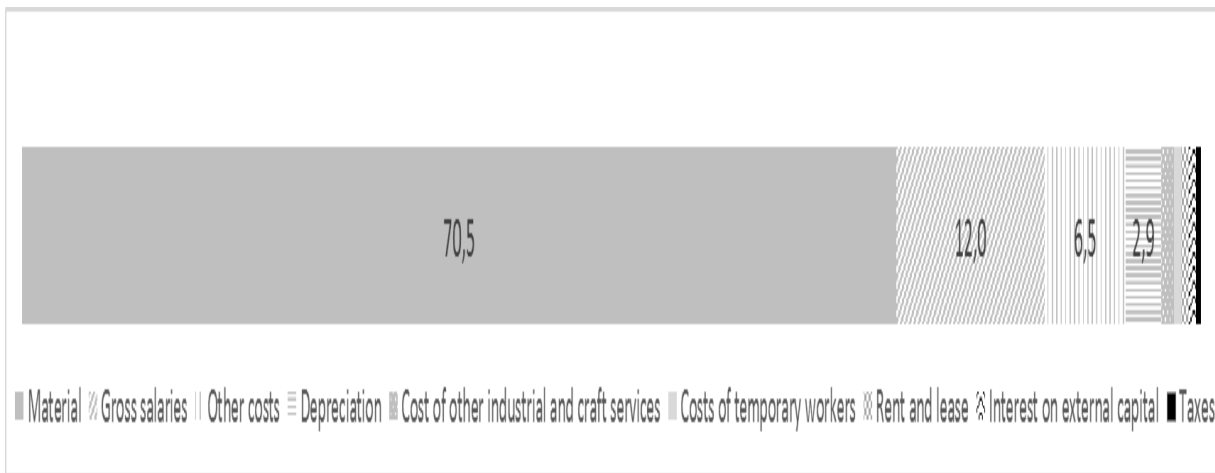


Figure 7: Proportions of material costs in the automotive industry (proportion to gross production value)

Source: own graph, based on data from Statistisches Bundesamt, 2018

This trend is an outcome of the rising concentration of the OEMs on their core competencies. The reduction of steps in the production process and on different research and development levels results as a consequence. The required parts and components are not any more produced by the OEMs. More and more parts and modules are sourced from subcontractors. So those parts and modules can be produced by specialized suppliers on a lower cost basis.

The meaning of procurement was changing over time. In the beginning of industrialization the purchasing department had to supply goods at the lowest price. The main task was affectivity and cost optimization. In the following step of evolution the buying process had to be executed in the most efficient way by introducing a structured process. Thereafter the process optimization focused on suppliers. The intention was to synergize the own supply chain with the value chains of the suppliers. Thus the performance of suppliers can be raised and discontinuities in the supply chains can be avoided. The latest step was about integration management. So suppliers can be integrated in a vertical and horizontal way (Hofbauer and Sangl 2016).The importance

and the impact of contemporary procurement was already shown and argued in other publications (Hofbauer and Sangl 2017).

Various circumstances like saturated markets, decreases in prices and margins and rising pressure of competitors required the change from traditional purchasing towards a value creating character of procurement management (Hofbauer 2017;Kerkhoff 2008).Manycompaniesconsider the leverage effect of procurement to be important. A survey among nearly 400 companies of the Swiss Mechanical and Electrical Engineering Industries points out the high importance of procurement: 60% of them indicate, that the optimization of the procurement activities will have a crucial importance to enhance sourcing efficiency and achieve noticeable cost reduction (Deloitte 2015).

In combination with the forward sourcing task of procurement there is a strong interrelation between R&D and procurement (Hofbauer and Wilhelm 2015). Both have to deal with R&D duties and challenges, both have to deal with innovations. Internal innovations have to be integrated into specifications for goods to be sourced from outside. Further more the procurement activity has to look for external potentials and innovations to be applied for utilization in new products.

All the arguments stated in 4.1 und 4.2 strongly suggest to propose a compound activity in the beginning of the revised value chain. This activity consists of procurement in strong collaboration with innovation management. As explained above, both activities have an impact on the following manufacturing and operations activity.

4.3 Reasoning of logistic effort as secondary activity

This chapter answers the question, whether a primary activity should be reclassified as a secondary activity. The corresponding working hypothesis no. 3 is: If it is proven that a declared primary activity does not create value, then it has to be characterized as a secondary activity.

For the classification as a primary activity it is essential, whether there is an added value or not. If not, this activity should be reclassified as secondary activity. The observed logistic activities are inbound and outbound logistics: *Inbound logistics* cover receiving and storing of goods, these activities include the internal distribution of inputs, such as material handling, warehousing, vehicle disposition, inventory control and returns to suppliers. The *outbound logistics* put the relation to customers, retailers and wholesalers in execution. The company's offer has to be supplied; these activities contain order processing, storage, scheduling, warehousing, picking and physical distribution to customers as well as delivery vehicle operations.

Technological progress in terms of digitalization as well as immediate and automatic accomplishment of activities changed the whole supply chain. These processes are highly automated nowadays and changed the configuration and workflow of the supply chain. The significance of logistic activities goes down in times of digitalization with automated supporting processes and sensor controlled internal supply as well as external supply chains across

companies and modes of transport. In the near future these activities will be executed by autonomous systems. This is why added value to the product can hardly be observed anymore. Inbound logistics like receiving goods, storage, transportation and distribution of input factors are needful, but an increase in value added is not observable. The same argumentation can be provided for outbound activities. Consignment, stockpiling, collection, intra-plant logistics and distribution is quite needful as well, but value added in these activities is hardly to find, too.

In consideration of these tremendous changes in technology and circumstances it is advisable to have a closer look on the logistic activities. There are qualitative and quantitative reasons to be mentioned:

The basic quality ativeargumentation is based on the work of Taiichi Oh no, former head of production at Toyota (Ohno1988). He evaluated activities with regard to the additional value of respective activities. In doing this, he identified efficient principles in production technology. The ambition was to identify the activities, which facilitate effectiveness, meaningfulness, usefulness and feasibility. Oh no also introduced the term MUDA, which was the denomination for unnecessary effort or needless operating expense (Ohno1988).His intention was to identify and eliminate unnecessary efforts in order to increase profitability. Coming from this perspective, it is major to understand that unnecessary means useless for value creation. It may be necessary to execute a specific activity, but in terms of value creation it can be considered as waste. It is a matter of fact that for the value of a product it makes no distinction by whom, where, how often and by what vehicle a specific item has been transported, stapled, collected or stored. Added value cannot be perceived.

Oh no identified seven types of unnecessary activities: transportation, inventory, overproduction, waiting, over-processing, defects and motion. The first three of them directly relate to the value chain. Beyond doubt these activities are requested to perform operations, but they are useless for value creation. Above all in times of sensor controlled, connected and process optimized conditions within Internet of Things, there will be a huge potential to optimize logistic activities on a huge scale. By means of digitalization in the fourth industrial revolution operations can be executed and entire processes can be realized in an optimized way. Especially transportation, inventory and overproduction can be reduced to the minimum.

The *quantitative* reasoning refers to the percentage of logistic costs on total cost. This portion came down from 15% in 1990 to about 7% in 2008 (Handelsblatt2009). In innovative industries like car manufacturing, mechanical engineering, electronics and precision engineering the proportion already realized a level of 4.5% in 2012 (Hofmann et al. 2012).The proportion of logistic cost is estimated to reach a level of 3% in the long run. This shows that the absolute basis for cost savings through automation is very low and almostal ready exploited. Thus it can be stated that the share of logistic costs is declining and simultaneously the significance of logistic. This impression certifies by the fact that 28% of surveyed industrial companies do not know their logistic costs in detail (Straube and Pfohl 2008).This finding emphasizes that the management attention on creating value has clearly shifted away from logistic activities. The

costs of logistic activities are primarily driven by increasing cost of energy, fuel and transport prices as well as rising personnel expenses. Figure 8 shows the detailed composition of the logistic costs (proportion of total cost).

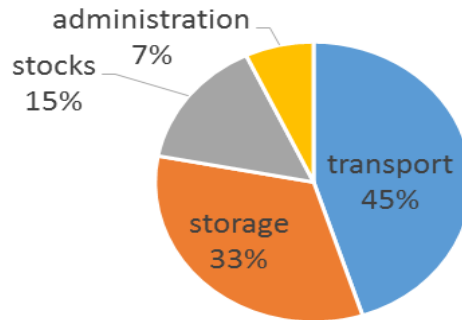


Figure 8: Components of logistic costs. (Source: own graph, based on Fraunhofer 2015).

Figure 8 displays different kinds of activities with the corresponding percentage of cost. This statistics states that no value generating stake can be identified. The possible build-up of stocks due to increasing bottlenecks in the road transport sector and the increasing environmental protection and safety requirements could lead to an increase in logistic costs in the future. The decoupling of transports resulting from the construction of higher inventories follows the demand for reliability in the logistic systems (Straube and Pfohl 2008). In the sense of creating value these additional activities represent needless operating expenses as described above.

On the basis of the *qualitative* and *quantitative* argumentation, which is based on empirical data, the statement can be evolved that logistic activities have small-scale impact on value creation. Because of these reasons it is evident to eliminate the logistic activities from the primary activities. This leads to the answer of the first research question of this paper, which is to examine the value creating potential of logistic activities. Supporting activities should be characterized as such. So it can be stated that logistic activities should be reclassified as secondary activity

5. Secondary activities

Besides the primary activities there are secondary activities that all businesses must include to some extent. The supporting activities are mandatory prerequisites for the fulfillment of the primary activities and the completion of the value chain process. Support activities assist the execution of all primary activities and the realization of each other by providing resources in terms of employees (HR) or money (finance), transport inside and outside the firm (logistic and SCM) or providing the basic infrastructure of the company. The support activities facilitate the primary functions and comprise the following: logistics and supply chain management, quality management, human resources, finance and controlling as well as organization, infrastructure, process management, support and IT.

Logistics & Supply Chain

In Porter's original value chain, inbound and outbound logistics were classified as primary activities. All those processes associated with collecting, storing and physically distributing the product were included (Porter 2004). This covers all activities from inbound logistics to production logistics and outbound logistics. The revised value chain of this article includes all the activities necessary to transport both the products and their components, but as support activities. As explained above, these activities do not add value to the product. Therefore, logistics should be considered as necessary but as a supportive activity. The dotted line in figure 9 reflects the fact, that logistics and supply chain management support the entire chain and also single primary activities.

Quality Management

Porter also classifies quality management as a supporting activity within the company infrastructure. In consideration of the fact that quality management has evolved in its importance, a peculiar regard has been taken here. Outstanding quality, however, is an indispensable competitive advantage in many industries, coupled with increased customer price propensity. Quality management means to assure the quality and functionality required by the customers at reasonable prices. Another issue is longevity and traceability. It is proven that higher quality is ever related to higher profitability (Hofbauer and Sangl 2018, p. 155). The responsibility about quality should be extended to all domains within the company. For this reason, quality management should be regarded as an independent, supportive activity and should receive appropriate attention. Quality management includes the following tasks (Hofbauer and Sangl 2018, p. 157): quality planning, quality control, quality assurance and quality assistance.

Human Resource Management

Human resource management includes the activities involved in hiring and retaining the appropriate employees to design, build and market the product. Human resources management includes all employee-related activities such as recruitment, training, education and payroll. Human resources management is not only linked to primary but also to other supporting activities, such as hiring engineers for supply chain or IT management. The problem is that in many companies the importance of HR management on competitive advantages is not sufficiently realized. However, especially service and high-tech companies benefit from a successful selection of candidates and employee training (Oehlich 2010). Hence human resource management consists of all activities involved in recruiting, hiring, training, developing, compensating and (if necessary) dismissing or laying off personnel.

Finance & Controlling

Finance and Controlling is a modern function and inevitable for all companies. This is why this function is mentioned in a separate way here. It refers to basic questions where the money comes

from (finance) and where the money will be allocated (investment). It is essential to keep the company balanced in respect to money inflow (order-to-cash) and money outflow (operational spendings and investment) (Hofbauer and Hellwig 2016, pp.299-319). Important management ratios are profitability, efficiency and liquidity. Further on the organization's accounting and control mechanisms have to be organized. Proper management of payments, cash flows and investments plays a vital role in all industries. Especially in the capital-intensive industrial businesses these functions are essential (Hofbauer and Bergmann 2013). In Porter's Value Chain, accounting and finance topics are part of the company's infrastructure.

Organization, Infrastructure, Process Management, Support & IT

Infrastructure serves the company's needs and ties its various parts together. It consists of functions or departments such as legal, process planning, IT, public affairs, government relations and general management. The corporate infrastructure includes all activities that are not related to individual activities but to the entire value chain of the company. However, depending on whether the organization requires decentralized or centralized decisions, the corporate infrastructure can be a single entity or split into separate organizational areas. Porter points out that the corporate infrastructure could be viewed as a pure overhead in a cost-accounting perspective. He argues that this activity can also be a source of competitive advantages (Oehlich 2010). The integrated product management process (Hofbauer and Sangl 2018) shows how important a structured approach to innovation and product management is. Especially a stable working IT landscape is an essential precondition for digitalization of processes.

6. Solution statement and proposal for a new arrangement

Summarizing all outlined arguments and observing all aspects a new proposal is made for the reviewed value chain. The principle of Porter's original value chain is not changed; some activities are newly arranged according to the outcome of chapters 4.1, 4.2 and 4.3. Figure 9 shows the composition, where the support activities are stated below as a supporting basis where the primary activities are based on.

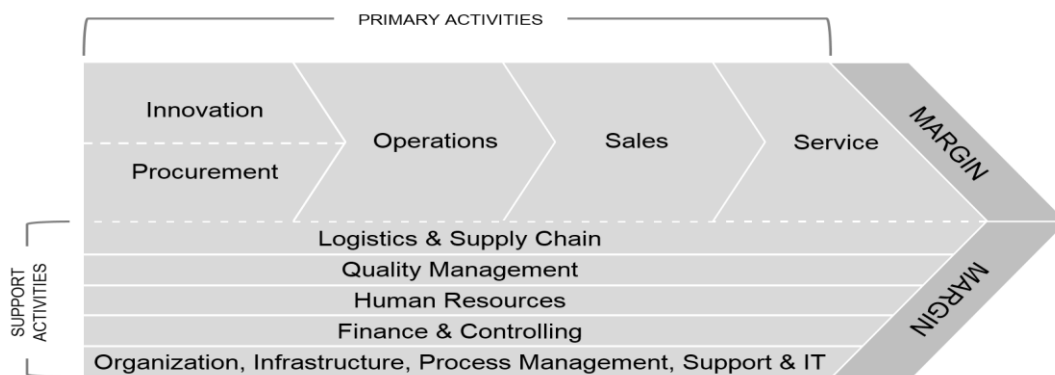


Figure 9: New proposal of the reviewed value chain (own work)

7. Conclusion

The initial point of consideration was about innovation. Innovation on itself bears a high potential of creating value. New products with higher value attract existing and new customers, who are willing to pay more for more value. This is the prerequisite that sales figures as well as turnover increase. In order to increase the margin, the cost position should be kept at least fixed. But to hold available high development resources means a high cost position. With each technology change this cost position will increase, too. One possibility to overcome this cost pool is to open the company for innovation from sources outside the company and pay only for use. Thus it is mandatory for the management to balance these variables in the right way to create value.

The second consideration was the changing role of procurement, which was previously classified as a support activity (Porter 1985). During the last two decades the role of procurement has changed considerably (Hofbauer 2017; Hofbauer/Bauer 2004). In addition to that, more and more innovations have been provided from the supplier side. The procurement activity has to manage the outside-in transaction. This is why procurement and innovation management are strongly related. Products, their performance and particularly cost are mainly determined by procurement and innovation activities combined with the adequate level of successful vertical supplier integration (Hofbauer/Mashhour/Fischer 2016).

In the third analysis it was assessed that logistic activities do not create a significant value added any more. In times of automated and sensor controlled supply, reduced inventory through just in time and just in sequence procedures, premanufactured modules and systems and supply chains across companies, there is hardly to find some value to add to the value of the product by logistic activities. This is why inbound and outbound logistic activities should be characterized as supporting activities. Nevertheless these activities are important enablers.

In chapter 5 the support activities were completed and arranged in an adequate way, according to their relevance.

Figure 9 displays the new proposal considering all qualitative and quantitative arguments.

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