



Constructing a Joint Product Portfolio to Support Commercial Cooperation

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This study aimed to find a method to construct a customer-oriented joint commercial product portfolio for several independent companies to enable more effective market operations. The study also aimed to identify any related challenges. The findings indicate that a customer-oriented joint commercial product portfolio can be constructed through a five-step approach. The challenges of construction include those related to productisation, understanding the customer value of independent products, as well as understanding the necessary viewpoint. Earlier literature on product portfolio management has focused on independent product portfolios. This study is the first one to introduce a construction to productise a joint commercial product portfolio.

Keywords: productisation, product management, product portfolio management, business-to-business marketing, co-marketing

Introduction

Technological development and increasing customer requirements are challenging companies to develop their products and production processes to remain competitive. Especially in high technology industries, small and middle-sized companies (SMEs) have a particular role in bigger companies' technology acquisitions (Tavčar & Dermol, 2012; Rossi, Tarba, & Raviv, 2013), and cooperation in this early stage of the value chain is valuable (Park & Lee, 2018).

As big companies may not necessarily have enough resources, or competences, to develop all technologies internally and to undertake the related risks, the assistance of SMEs may be needed. However, due to their comparatively small base of resources and capabilities, smaller companies may have difficulties in standing out in the crowd of their larger competitors (Knight, 2001). Brand awareness and credibility, in turn, influence the com-

pany's financial performance (Anees-ur-Rehman, Wong, Sultan, & Merrilees, 2018).

To raise awareness of their products, independent SMEs could cooperate with each other by constructing a joint commercial product portfolio to be able to provide wider and more comprehensive solutions and products. Earlier research and current literature do not provide many insights into commercial cooperation of several companies through a joint commercial product portfolio. Some scholars have studied co-marketing alliances, a form of commercial cooperation in which two or more companies combine some of their marketing resources and activities. However, the emphasis of the research has been mainly on the managerial and organisational aspects (Bucklin & Sengupta, 1993; Robson & Dunk, 1999; Venkatesh, Mahajan, & Muller, 2000; Yi, Lee, & Dubinsky, 2010) or on the effects of such alliances (Rao & Ruekert, 1994; Das, Sen, & Sengupta, 2003; Ahn, Kim, & Forney, 2009; Gammoh, Voss, & Fang, 2010). In the product portfolio management (PPM) literature, the emphasis has been on the analysis, development, and management of independent companies' product portfolios (Cooper, Edgett, & Kleinschmidt, 1999; Cooper, 2008; Tolonen, 2016). The current literature does discuss some instances of customer-centric re-structuring of product portfolios by differentiating the products on the basis of product features due to merger situations (Rao, 2009). However, the aspect of constructing a joint commercial product portfolio by the means of productisation and product management in cooperation by a cluster of companies is still missing. Productisation deals with how products are defined (Danson, Helinska-Hughes, Hughes, & Whittam, 2005). Here, product structures and product types are considered to be an important part of that.

This study aims to find a method to construct a joint commercial product portfolio to allow smaller companies to operate more effectively on the market. This is realised by combining the viewpoints of productisation, product management (PM), product portfolio management (PPM), co-marketing, and customer value creation to approach commercial cooperation by several independent companies. The study investigates a cluster of seven geographically concentrated small companies that are delivering new solutions and products to big global companies in the steel industry.

The core research objective of this study can be summarized in two research questions:

- RQ1 *How to construct a customer-oriented joint commercial product portfolio?*
- RQ2 *What are the challenges of constructing the joint commercial product portfolio?*

The paper is structured as follows: The earlier research and literature

on relevant topics are presented first, after which the research process is described. Then, the construction of the joint commercial product portfolio and related challenges are described in the results section. In the end, the results, theoretical contribution, managerial implications, and limitations of the study are discussed and concluded. In addition, some ideas for future research are proposed.

Literature Review

Productisation and Product Portfolios

Products have a particular role in the company's success as a source of the company's sales. Poor products cannot keep the company alive for long but well-performing ones can. However, despite the importance of products that surely everyone is aware of, the definition of product and related terms still varies. Products are suitable combinations of elements that can be tangible or intangible (Harkonen, Haapasalo, & Hanninen, 2015). Tangible elements include physical goods, such as devices and machines, while intangible elements include software, services and other elements that cannot be touched. Saaksvuori and Immonen (2008) separate services from intangible products to form its own type. Instead of seeing products simply as physical goods, or outputs of service processes, outputs that are being just produced and sold, Vargo and Lusch (2008) suggest seeing them as co-creating processes to assist customers in their own value-creation processes. Harkonen, Tolonen, and Haapasalo (2017), however, distinguish between the product and the process that creates it.

When discussing a company's products as a whole, they can be referred to as the company's commercial product portfolio. The commercial product portfolio represents all the company's products that can be sold, delivered and invoiced (Tolonen, 2016; Harkonen et al., 2017). Overall, the company's product portfolio should reflect the company's business strategy (Cooper et al., 1999). However, the need to manage the product portfolio accordingly is not always understood, or followed through, in the companies (Tolonen, Shahmarichatghieh, Harkonen, & Haapasalo, 2015). In addition, technology generations, materials, product types (hardware, software, service, document) or product lifecycle status are among the examples of different viewpoints to the product portfolio (Kropsu-Vehkaperä & Haapasalo, 2011). According to Haines (2014), a product portfolio can be divided hierarchically into solutions, product lines, products, product elements and product platforms. Tolonen, Harkonen, and Haapasalo (2014) divide product portfolio into commercial product portfolio and technical product portfolio. They divide commercial product portfolio (product offering) further into solutions, product families, sub-product families, product configurations and individual hardware (HW), software (SW), service and a document type of sales items

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that can be offered, ordered, delivered and invoiced. Sales items are on the lowest level in the commercial product portfolio creating the base for the whole commercial product offering. The sales items have unique characteristics, functionalities, and price. For the higher-level product offering, the product configurations consist of one or more sales items. The technical product portfolio is connected to the commercial product portfolio by the link of commercial sales item and its technical version item. The technical version items on the highest level of the technical product portfolio consist of main assemblies, sub-assemblies, and components for HW and SW products and service processes for service products (Tolonen, Harkonen, & Haapasalo, 2014). Despite many productisation and product portfolio concepts being available in the literature, they are not necessarily clearly defined and commonly agreed in companies (Kropsu-Vehkaperä, Haapasalo, Harkonen, & Silvola, 2009; Tolonen, Kropsu-Vehkaperä, & Haapasalo, 2014a).

Customer Value Creation

As Porter (1985) in his book *Competitive Advantage* states, a company can create customer value by providing products that bring benefits for the customer's primary (inbound logistics, operations, outbound logistics, marketing & sales, service) or supportive (firm infrastructure, human resource management, technology development, procurement) activities. Customer value and competitive advantage can be created through differentiation. Differentiation can be created through generic, expected, augmented and potential product levels, which are built upon the core benefit the product offers (Kotler & Keller, 2015). Core benefit is the solution to the customer's problem or need, and the fundamental reason for the purchase (e.g. mobility is the core benefit of a car). The core benefit is realised in the generic product (for example, the car itself). The expected product is formed by the functions and features the customer can usually expect to be included in the product (e.g. car radio, electric windows). If the product has only the expected elements, it competes on price (Narver, Slater, & MacLachlan, 2004). The augmented product includes features that respond to a latent need (Slater & Narver, 1999) or, in other words, exceeds the customer's expectations of the product (e.g. GPS navigation system, four-wheel drive). The potential product includes all the potential features that attract customers to stay with the product (e.g. a new version of the car). So the value perceived by the customer does not only depend on the price versus derived benefits of the product but on the whole customer-supplier relationship value including aspects of product quality, service support, delivery, supplier know-how, time-to-market, personal interaction, direct product costs and process costs (Ulaga, 2003).

Products are related to transactions between the buyer and the seller.

The seller gets financial value in return for customer value created for the buyer's own value-creation process (Vargo & Lusch, 2008). Customer value realises as the price paid by the customer (Porter, 1985). Since the perceived benefits vary between different customers, the same product may be more valuable to some than to others. The interaction between the buyer and the seller is not only present at the time of purchasing, but also, as Tolonen (2016) notes, at the time of developing, selling, delivering and caring of the product. In conclusion, the product can be seen as any interaction in which customer value and financial value are transferred between the buyer and the seller, and to which certain terms and conditions, agreed by the buyer and the seller, regarding this transfer, apply.

Co-Marketing

Multiple companies can utilise their resources for mutual benefit through strategic agreements. Such cooperative agreements may for instance be joint ventures, buyer-supplier partnerships, technological alliances or marketing alliances (Das et al., 2003). Common terms for commercial cooperation topics in the literature include brand-alliance (Rao & Ruekert, 1994; Gammoh et al., 2010; Thompson & Strutton, 2012; Fang, Gammoh, & Voss 2013; Mishra, Singh, Fang, & Yin, 2017) and co-marketing alliance (Bucklin & Sengupta, 1993; Robson & Dunk, 1999; Venkatesh et al., 2000; Ahn et al., 2009; Yi et al., 2010).

Bucklin and Sengupta (1993, p. 32) define co-marketing alliances as 'contractual relationships undertaken by firms whose respective products are complements in the marketplace. They are intended to amplify and/or build user awareness of benefits derived from these complementarities.' Other reasons for such alliances may involve trying to gain cost-reductions or an access to intellectual capital, new markets or technologies, or to enhance the company's image, or its products' image (Rao & Ruekert, 1994, Robson & Dunk, 1999, Das et al., 2003). Complementary products are such whose demands are positively correlated. The correlation may be unidirectional (B's demand is affected by A's demand but not the other way) or bidirectional (both products have an effect on the other's demand) (Dass & Kumar, 2014). Sengupta (1998) defines a complementary product as 'one that enhances the value of a primary product when the two are used together by end-users.' By primary product, he means a product which value is then added to complementary add-on products (e.g. a PC's value is added with a mouse). A company may use direct or indirect complementary product strategies to increase the number of complementary products (Nambisan 2002). In the direct complementary product strategy, the company tries to affect the development of complementary products so that they will be compatible with the primary product. In the indirect strategy, the company

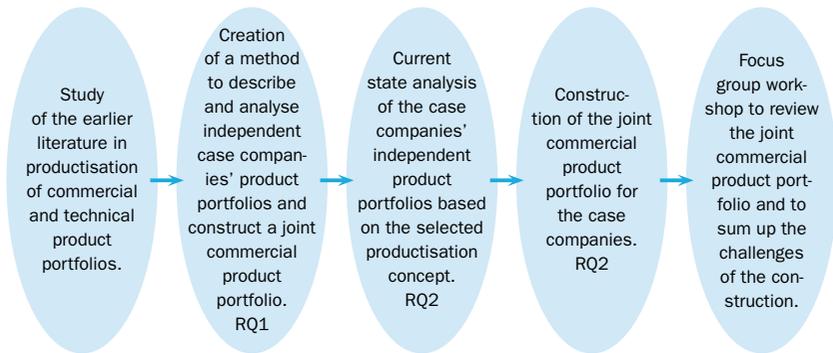


Figure 1 The Research Process

modifies its own product so that it will be compatible with complementary products available in the market.

Cooperation in marketing can occur vertically or horizontally, i.e. between the buyer and the supplier or between companies at the same level in the value chain (Felzensztein, Gimmon, & Aqueveque, 2012). Forms of marketing cooperation studied in earlier research include, for example, a jointly marketed product with a composite brand (Park, Jun, & Shocker, 1996; Teng & Das, 2008; Ahn et al., 2009), a new product with branded components (Venkatesh & Mahajan, 1997), or using multiple brands under the same product category (Robson & Dunk, 1999). Co-marketing in this study is considered as offering and selling the companies' current independent products jointly as a joint commercial product portfolio.

Research Process

An inductive and qualitative research method has been utilised in this research. The research process is shown in Figure 1.

At first, the earlier literature covering productisation and creating commercial product portfolios were studied. The related PPM literature was focused to find a uniform concept to describe the case companies' current independent commercial product portfolios. Literature related to customer value creation provided viewpoints for the construction of the joint commercial product portfolio. In addition, the literature on co-marketing alliances was studied to search for any earlier research on the topic and to gain insights over such cooperation. The method to describe and analyse independent case companies' product portfolios and to construct the joint commercial product portfolio was created based on the current literature.

Current commercial product portfolios of the case companies were described in advance in the way they were depicted on their public websites.

Table 1 Description of the Companies and the Workshops

(1)	(2)	(3)	(4)	(5)	(6)
A	10	Refractory materials for ladles and tundishes	1	2	CEO Sales director
B	6	Blast-cleaning robots	3	4	CEO Sales director R&D director New business development director
C	0.1	Measurement of real-time melting conditions inside an EAF	1	1	CEO
D	0.3	Waste stream reduction and recovery of valuable components	1	2	CEO R&D engineer
E	0.1	Steel quality and refractory wear monitoring	1	1	CEO
F	0.1	Industrial dryer	2	1	CEO
G	1	Steel strip surface quality measurement	2	2	CEO Product manager

Notes Column headings are as follows: (1) company, (2) turnover (million €), (3) general description of the portfolio for steel industry, (4) number of workshops, (5) number of informants, (6) roles of the informants.

Then, the descriptions were aligned according to a product portfolio modelling concept (Tolonen, Harkonen, & Haapasalo, 2014). This model was utilised because it includes the productisation possibility for different types of products: those consisting of HW, SW and/or services. The portfolio descriptions were corrected further by arranging workshops with the case companies and interviewing their representatives. The portfolio descriptions were distilled by recognising the commercial product portfolio structures from the highest solutions to individual sales items. Description of the companies and the workshops are presented in Table 1.

After the current independent commercial product portfolios of the case companies were described, each products' value for the customer was discussed with the companies' representatives. Finally, the researchers constructed the joint commercial product portfolio. The portfolio was constructed by taking product complementarities, generic product types and customer value creation into account. The first version of the joint commercial product portfolio was presented to the focus group consisting of representatives from the analysed companies. Based on the discussions within the focus group meeting, a second version of the joint commercial product portfolio was created and the challenges of the construction were summed up.

The study includes seven business-to-business SMEs in Finland. The companies' products for steel industry are related to process development,

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quality control, and environmental aspects. Earlier, the case companies have developed and delivered their individual solutions to the same customers independently.

Company A produces high-quality refractory materials and components that are needed in steel foundry processes characterised by molten metals. Company B produces advanced robotic blast-cleaning systems for casting products. Company C produces advanced control systems that allow real-time measurement directly from the high-temperature metallurgical process, which are also sold as services. Company D produces solutions for water and waste treatment. Company E produces solutions for process tracking and quality assessment in high-temperature processes. The products are also sold as a service. Company F produces solutions for drying of by-products. Despite offering similar solutions (sludge drying) to company D's product portfolio, they are not direct competitors since the latter focuses on wetter sludge. Company G produces solutions for improving steel on-line inspection and quality measurement.

Steelmaking processes vary depending on the company and steel types. The production process can be divided into four stages: melting and casting, hot rolling, cold rolling, and final processing. Recycled steel is melted in an electric arc furnace (EAF) after which its carbon content is reduced in a converter. Another option is to use iron ore as raw material and melt it in a blast furnace. After the melting process, the molten steel is poured into a ladle and transferred to a casting machine. The molten steel is tapped into a tundish and further into a mould after which it is cooled to achieve the desired shape. The glowing casting product can be hot-rolled, and further annealed and pickled to remove the mill scale. Hot-rolled steel is cold-rolled to modify its profile and flatness. Cold-rolled steel is again annealed and pickled to restore its material properties and to remove the mill scale. The steel can be temper rolled to improve its properties. In the final processing stage, steel is processed using one or more finishing processes, such as levelling, edge trimming, cutting, slitting or surface preparation.

Results

Constructing the Joint Commercial Product Portfolio

The customer-oriented joint commercial product portfolio can be constructed based on the independent company-specific product portfolios (Figure 2) through a five-step approach.

The five-step approach consists of the following phases:

1. Describing the case companies' independent current commercial product portfolios similarly according to the selected productisation concept.

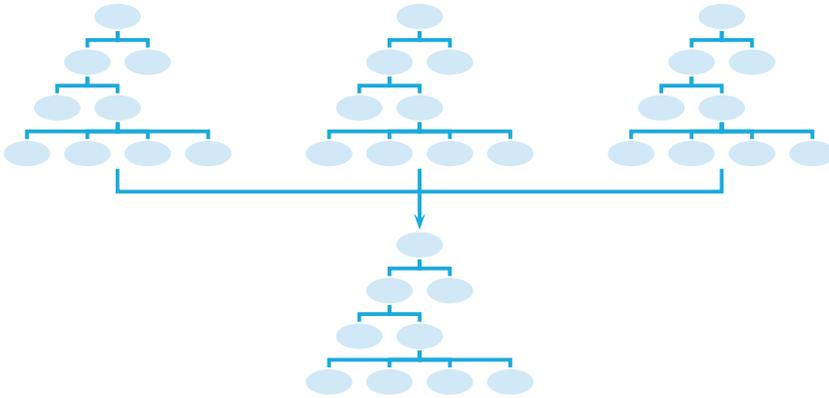


Figure 2 Constructing the Joint Commercial Product Portfolio

2. Identifying complementarities between the companies' independent product portfolios.
3. Identifying the generic solutions, product families and product types and related customer's core benefits.
4. Constructing the joint commercial product portfolio and sub-portfolios.
5. Validating the constructed product portfolio.

The Current Independent Commercial Product Portfolios of the Case Companies

The case companies' current independent commercial product portfolios by the number of items on different product portfolio levels are described in Table 2.

Company A's current commercial product portfolio for steel industry consists of one solution providing refractory materials and components. It includes all the materials and equipment needed to install and construct a tundish and to line and insulate steel and blast furnace ladles.

Company B's commercial product portfolio for steel industry is formed by one solution providing blast-cleaning robots. The robots can be used to make a high-quality surface for casting products before painting and coating processes.

Company C's commercial product portfolio is formed by one solution providing control systems for processes taking place at high temperatures. It includes EAF conditions and temperature measurement devices to measure real-time melting conditions and temperatures inside EAFs. The company offers also maintenance and research subcontracting.

Company D's commercial product portfolio for steel industry is formed by one solution providing services for water and waste treatment. The com-

Table 2 Items on the Case Companies' Commercial Product Portfolio Levels

Item	Company						
	A	B	C	D	E	F	G
Solutions	1	1	1	1	1	1	1
Product families	3	2	1	4	1	2	2
Sub-product families	8	–	–	6	3	–	7
2nd-level sub-product families	23	–	–	12	–	–	–
Configurable products	40	7	8	30	12	4	17
Sales items	56	37	19	48	11	42	119

pany's products for steel industry focus especially on treatment services of cutting liquids, EAF gas cleaning waters, EAF dust and cooling waters of the hot rolling, and also regeneration services of pickling acids.

Company E's commercial product portfolio has one solution providing monitoring and quality assessment devices. The tapping device monitors the flow of molten steel and slag bringing information to operators about the tapping process' quality. The casting device monitors the surface of casting and hot rolling products to reveal quality defects. The refractory wear device provides inner surface monitoring of ladles, converters, and furnaces to reveal the wear of refractory lining enabling their accurate and resource-saving renewal. Data produced by the devices are shown on a common cloud platform.

Company F's commercial product portfolio for steel industry consists of one solution providing an industrial dryer. For steel producers, the dryer enables efficient drying of raw materials, flue-gas scrubber sludge, and mill scale. A waste heat recovery concept in development enables exploitation of waste heat coming from slag and other hot materials to be used in the dryer.

Company G's commercial product portfolio for steel industry consists of one solution providing optical quality assurance devices. It is formed by pinhole and roll mark devices. The pinhole devices monitor surface imperfections by detecting pinholes, holes and edge cracks of the cold rolling strips, and measure the width of the strip. The roll mark devices detect roll marks caused by rolling mills.

The Complementarities of the Independent Product Portfolios Based on Their Customers' Steel Making Process Stages

Complementarities of the current products must be analysed to construct a joint product portfolio from which the customer can get more extensive value-creating solutions than by buying them separately. The division into groups in which the content complement each other is done by classifying

Table 3 The Case Companies' Current Commercial Product Portfolios

Company	Mining	Melting and casting	Hot rolling	Cold rolling	Final processing
A		Refractory materials and components			
B					Blast-cleaning robots
C		EAF conditions measurement device EAF temperature measurement device			
D		EAF dust treatment EAF gas cleaning water treatment	Rolling cooling water treatment Pickling acid re-generation	Pickling acid re-generation	Cutting liquid treatment
E		Tapping device Casting device Refractory wear device	Casting device		
F	Dryer	Flue gas scrubber sludge dryer	Mill scale dryer	Mill scale dryer	
G				Pinhole detection device Roll mark device	

the current products based on the steelmaking process stages they operate in. Table 3 illustrates the case companies' independent portfolios with their content and indicate how they are positioned in their customers' steelmaking process.

Generic Product Type and Customer's Core Benefit of Each Product

To be able to classify the current products further based on the customer's need underlying the buying decision, and to understand how the products create value, each product's generic product type and the core benefit they offer must be identified. The identification is based on the discussions with the companies' representatives. The results can be seen in Table 4.

Construction of the Joint Commercial Product Portfolio and Sub-Portfolios

As the products have now been categorised from the customer value aspect, they must be compared to each other to form the joint commercial

Table 4 Current Products' Core Benefits and Generic Product Types

(1) Product	Generic product type	Core benefit
A Refractory materials and components	Refractory materials and components	Energy efficiency
B Blast-cleaning robots	Surface treatment robots	High-quality steelmaking
C EAF conditions measurement device	Measurement and monitoring device	High-quality steelmaking
EAF temperature measurement device	Measurement and monitoring device	High-quality steelmaking
D Cutting liquid treatment	Waste and side stream treatment & recycling	Eco-efficiency
EAF gas cleaning water treatment	Waste and side stream treatment & recycling	Eco-efficiency
Rolling cooling water treatment	Waste and side stream treatment & recycling	Eco-efficiency
Pickling acid regeneration	Waste and side stream treatment & recycling	Eco-efficiency
EAF dust treatment	Waste and side stream treatment & recycling	Eco-efficiency
E Tapping device	Measurement and monitoring device	High-quality steelmaking
Casting device	Measurement and monitoring device	High-quality steelmaking
Refractory wear device	Measurement and monitoring device	Energy efficiency
F Waste heat recovery & dryer	Waste and side stream treatment & recycling	Eco-efficiency
G Pinhole detection device	Measurement and monitoring device	High-quality steelmaking
Roll mark device	Measurement and monitoring device	High-quality steelmaking

Notes (1) company.

product portfolio. The principle for classifying the current independent commercial product portfolios into new commercial product sub-portfolios involves considering how the products are complementary to each other. Those products that create the same kind of customer value should be included in the same sub-portfolios. Therefore, the solution level needs to be divided based on the core benefits the products offer. Each customer segment (following the steelmaking process stages) can be offered their respective part of the product portfolio. This division enables the customers to instantly find the right portfolio of products that meet their core needs. Thus, the constructed joint commercial product portfolio is as follows: The portfolio consists of four solution level sub-portfolios, namely *Refractory So-*

lutions, Steel Quality Control Solutions, Sustainable Value Recovery Solutions and Surface Treatment Solutions. The core benefits of the sub-portfolios are energy efficiency, high-quality steelmaking, eco-efficiency, and high-quality steelmaking, respectively. The sub-portfolios are illustrated in Table 5. The intention is to offer the companies' know-how through services to the possible extent. This enables the customer to focus on performing its core competence: steelmaking. Delivering the products as services reduces the customer's financial risk making the portfolio more attractive.

The Refractory Solutions portfolio offers smelters and foundries solutions for molten steel transfer and handling. Company A brings customer value through ladle and tundish lining maintenance and repair services. The additional value of the portfolio brings refractory wear monitoring service provided by company E, including rental and maintenance of the devices and maintenance of the cloud platform.

The Steel Quality Control Solutions portfolio offers steel quality and process monitoring and control for melting and casting as well as hot rolling and cold-rolling process stages. Products in the portfolio are carried out as services including rental and maintenance of the devices. The whole portfolio is established on company E's cloud platform. This direct complementary product strategy facilitates the addition of new technological devices in the portfolio, attracts other technology suppliers to join the cooperation, and makes the portfolio more attractive. The devices by company C are used to create two services: EAF process optimisation service to control the process automatically, and EAF process measuring service to measure and present relevant data to the operators. The tapping device by company E is used to create a molten steel tapping monitoring service. The casting device by company E creates two services: casting products' surface quality monitoring service and hot strip surface quality monitoring service. The pinhole and roll mark devices by company G form four services: cold strip pinhole, hole and edge crack detection service, cold strip roll mark detection service, and hot strip and cold strip width measurement services. Additional proposals are hot-rolled strip and cold-rolled strip thickness measuring services, which could be developed in cooperation between company E and company G.

The Sustainable Value Recovery Solutions portfolio offers the customers eco-efficient solutions for the treatment of waste and side streams, recovery of value components and their reuse. The waste heat recovery concept and industrial dryer by company F are used to create services to exploit the waste heat of slag and other hot materials and use it to dry raw materials, flue gas scrubber sludge and mill scale. Company D offers treatment services for EAF dust, flue gas scrubber waters, cooling waters, pickling acids, and cutting liquids. In cooperation, the companies could create a complete

Table 5 The Joint Commercial Product Portfolio

Sub-portfolio	Mining	Melting and casting	Hot rolling	Cold rolling	Final processing
Refractory Solutions		Blast furnace ladle lining maintenance and repair service Steel ladle lining maintenance and repair service Tundish lining maintenance and repair service Lining wear reveal service			
Steel Quality Control Solutions		EAF process optimisation service EAF process measurement service Molten steel tapping monitoring service Casting products' surface quality monitoring service	Hot strip surface quality monitoring service Hot strip width measurement service Hot strip thickness measurement service	Cold strip pinhole, hole, and edge crack detection service Cold strip roll mark detection service Cold strip width measurement service Cold strip thickness measurement service	
Sustainable Value Recovery Solutions	Raw material drying service	Scrubbing liquid treatment service Scrubbing sludge drying service EAF dust treatment service	Mill scale drying service Pickling acid regeneration & mill scale recovery service Rolling cooling water recirculation service	Mill scale drying service Pickling acid regeneration & mill scale recovery service	Cutting liquid recirculation service
Surface Treatment Solutions					Blast-cleaning service

service in which the pickling acids would be regenerated, as the mill scale would be recovered and dried for reuse. Another possibility is a complete flue gas scrubber liquid treatment service covering scrubbing water treatment and scrubbing sludge drying using waste heat of the flue gas.

The Surface Treatment Solutions portfolio offers surface treatment so-

lutions for final processing stage. Blast cleaning robots by company B are used to prepare casting products for painting and other surface treatment processes. Despite having the same core benefit as the products in the Steel Quality Control Solutions portfolio, the blast cleaning service forms its own portfolio since its generic product type differs so much.

The Challenges of Constructing the Joint Commercial Product Portfolio

Challenges of constructing the joint product portfolio include companies' individual product portfolios not necessarily being described in a uniform way. Different, ambiguous or absent productisation concepts such as product structures, understanding of the commercial and technical product portfolios and different product types can also form challenges. Different product structure concepts can make the description of independent product portfolios and their comparison difficult. Companies may not even have any defined product structure for their products, but are operating in a less structured manner. Companies may question the adaptability of the chosen product portfolio model and related product structure levels in case of describing of their product portfolios. A potential challenge in describing an independent company's product portfolio may occur if the company has not defined its products, or is hesitating about what products it actually is offering, and whether some products have been or should be terminated. Also, description is difficult if the company's website is not aligned with the actual product offering. Another productisation-related challenge includes different productisation terminology and product types. For example, companies' own productisation terminology, such as dividing the company's offering into products, devices, and services, can hinder describing and understanding its product portfolio. Companies may not necessarily understand that selling a device both as a hardware and as a service are two separate products. Also, the concept of configurable products and sales items may not be easily understood. Another challenge includes the lack of understanding the customer value of independent products to analyse, compare and categorise, and further to construct the joint product portfolio and related sub-portfolios. The consideration of how, and from which viewpoint the joint product portfolio should be constructed can also result in some challenges.

Conclusions

This study investigated a cluster of seven SMEs aiming to develop commercial cooperation by constructing a joint commercial product portfolio. The aim of the study was to find a method to construct a customer-oriented joint commercial product portfolio and to identify the related challenges. The study introduces a new construction based on a five-step approach to

productising a joint commercial product portfolio from a customer-centric viewpoint.

Theoretical Contribution

A five-step approach was constructed to productise a joint commercial product portfolio from a customer-centric viewpoint by: (1) describing the companies' independent current commercial product portfolios in accordance with a common product portfolio structure; (2) identifying complementarities between the independent product portfolios based on customers' process phases; (3) identifying the generic product types and related customer's core benefits; (4) constructing the joint commercial product portfolio taking the complementarities, generic product types and core benefits into account; and (5) validating the constructed portfolio. The current literature in product portfolio management and productisation have focused on analysis, development, and management of the independent product portfolios of the companies (Cooper et al., 1999; Cooper, 2008; Tolonen, 2016). To the authors' knowledge, Rao (2009) has been the closest to the subject. Hence, the current study provides a new contribution and extends the previous literature from the viewpoint of constructing a joint commercial product portfolio for independent companies that serve the same and much bigger customer. The customer value creation literature is contributed by applying the product level concept (Kotler & Keller, 2015) to product portfolio scope. The study also complements the previous co-marketing literature (Park et al., 1996; Venkatesh & Mahajan, 1997; Robson & Dunk, 1999; Teng & Das, 2008; Ahn et al., 2009) by providing a practical viewpoint of enhancing marketing by constructing a joint commercial product portfolio for several companies. The construct provides an interface to link product portfolio management with marketing literature.

This study also identifies challenges related to constructing a joint commercial product portfolio. Different, ambiguous or absent productisation concepts, lack of understanding over the value of independent products, and over the viewpoint from which to construct the joint portfolio can lead to challenges. The results related to productisation are in line with Kropsu-Vehkapera et al. (2009) and Tolonen, Kropsu-Vehkapera, and Haapasalo (2014), and indicate the lack of understanding over the significance of the topic. The study also complements previous studies on productisation (Harkonen et al., 2015, 2017) by providing practical evidence. If a company has not defined its products and product structures, it cannot completely describe its own product offering. And, if a company cannot describe its offering it cannot effectively market its products. On the other hand, if a company cannot describe its offering it cannot analyse its products. This may, in turn, lead to a situation in which the company cannot define or

is not sure what products to develop, sell and terminate. Difficulties and hesitation in defining the company's offering not only shows the lack of productisation and product structure concepts but also indicates the absence of strategic product portfolio management. Hence, this study supports the findings of Tolonen et al. (2015) by emphasising the importance of a defined product and product structure concept to enable decisions on what products to develop, sell, and terminate, as well as to maintain a strategic and profitable product portfolio. The viewpoint of the customer needs may seem to be the natural choice to productise a customer-centric joint product portfolio. However, the viewpoint may change depending on the case. In addition, the target of constructing the joint product portfolio may have some influence, as different viewpoints, such as customer, technology or market segments, can be used as the principle to construct the joint product portfolio and related sub-portfolios. This study hence supports previous studies emphasising the importance of addressing various viewpoints for different stakeholders, e.g. product development or manufacturing, when necessary (Kropsu-Vehkaperä & Haapasalo, 2011).

Managerial Implications

The managerial implications include the potential of the constructed method to be used as a guiding principle to merge two or more independent commercial product portfolios into one joint portfolio to enable offering wider and more competitive product portfolio. A joint portfolio can support cooperation by SME companies in serving much bigger customers. The joint commercial product portfolio may enable better credibility and negotiation power due to the synergies and higher value. The joint commercial product portfolios could be realised for example in case of company mergers and the establishment of a joint sales company. An independent company could use the created approach to restructure its commercial product portfolio. Joint portfolio also has the potential to be used to look for cooperation opportunities both in commercial and technical portfolios. The identified challenges can support company managers in assessing and developing the state of productisation, product management and product portfolio management in their companies.

Limitations

As all studies, also this one has its limitations. The study analysed only one business cluster operating in a certain business environment, in which members have the same customers. In addition, the study does not take into account how the cooperation is carried out after creating the joint portfolio (e.g. a new sales company, a strategic alliance, etc.). Different business environments and ways of implementation may set their boundaries

to the usability of the method. The products in this study did not really include explicit substitute products nor does this study provide any advice what should be done in case of substitute products. The depth of analysing the complementarities between the products has its limitations as it was based on associations. In addition, the identification of the core benefits of every product was based on the discussion between the authors and companies' representatives. Understanding the customer's core needs requires experience and knowledge of the industry and steel products.

Future Research

The future research topics could involve examining how the joint product portfolio affects the sales of individual companies' products included in the portfolio, and whether it also affects the sales of products excluded from the portfolio. The developed method of constructing a joint commercial product portfolio could be advanced further by including more insights from the marketing literature to analyse and productise the portfolios. During the study, a question was raised about how the joint commercial product portfolio should be managed. Hence, constructing a governance model and management process for the cooperation could provide a topic for research.

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