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Pricing of digital goods and services

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Abstract. An appropriate pricing strategy is inevitable in achieving competitive advantage; however, firms have to be aware of the key resources needed for successful pricing and invest in developing the firm's pricing ability. Pricing of digital goods and services is especially challenging due to the high-volatility environments and the special characteristics that these offerings have as compared to other economic goods. Despite of its importance, the literature, to date, did not investigate the pricing of digital goods and services from the resource-based perspective (RBW) and the capability-based view (CBV). After conducting a multi-case study of five firms, this research provides an in-depth view on the pricing practices of digital goods and services through the theoretical lenses of RBV and CBV and proposes a model that captures the key activities and the key resources needed for pricing of digital goods and services.

Keywords: pricing, digital goods and services, resource-based view, capability-based view.

1. Introduction

Research into pricing of digital goods and services has grown significantly during the last decades. This literature covers important topics such as diverse pricing strategies [1], [2], different aspects determining the price [3], [4], and trade-off between licensing, renting, and pay-per-use models [2], [5], [6]. Overall, we have extensive knowledge on the different pricing aspects firms may consider, and what are the factors that shape the decision between different revenue models. However, what is less known in the literature, are the capabilities that these firms need for the pricing decision.

A firm's capability to set appropriate price for its products or services will largely determinate its success or failure in the market [7]–[9]. Hence, to survive in the market competition, firms should develop capabilities and resources that enable to find the most profitable price that customers are willing to pay [10], [11]. In this context, the resource-based view (RBV) serves as one of the theoretical foundations for understanding pricing decision (e.g., [12]). RBV conceptualizes a firm as a bundle of assets that are valuable, rare, inimitable, and non-substitutable [13]–[15]. These resources form competitive advantages over other firms in the market. Further, we apply the capability-based view (CBV) [12], [16]–[18] of the firm that is

largely based on RBV. In CBV, entrepreneurs possess capitals such as (i) human capital, (ii) systems capital, and (iii) social capital [16]. Utilizing these capitals, capabilities are developed through search for viable alternatives [17]. Hence, the pricing decision might be largely based on the resources and capitals that entrepreneurs possess.

In the field of information systems (IS), there have been revolutionary changes in last decades such as digitalization, servitization, and emergence of cloud computing. These changes have radically shaped industry structures, ecosystems, business models, and consequently challenged old pricing models in the field [2], [19], [20]. We have very meagre understanding of the resources and capabilities that are needed for pricing in this new landscape. Therefore, we are especially interested in resources and capabilities that the management team, aka digital entrepreneurs (cf. [21], [22]), should have when they set a price for digital goods and services that they develop and market.

To increase our understanding of above discussed conundrum, this study seeks to answer the following research questions: (1) *What are the key activities when pricing digital goods and services?* and (2) *What kind of resources entrepreneurs need for pricing of digital goods and services?* Due to the lack of explicit understanding of the phenomenon, we conducted 37 in-depth interviews with key decision-makers of 5 firms developing digital goods and services. The study aims to contribute to the existing pricing literature by providing an in-depth view on the pricing practices of digital goods and services and by identifying the key activities and the key resources through the theoretical lenses of RBV and CBV.

2. Related work

2.1. Pricing from the perspectives of RBV and CBV

The pricing capability of a firm can be defined as an *organizational capability* manifested through the pricing process that integrates and combines different resources [12]. An organizational capability is "a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular" ([23], p.983). That is, organizational capabilities include both routines that perform specific tasks and also activities that coordinate these necessary tasks for a well-defined goal [17]. In this view, pricing involves operational tasks such as analysis of customer needs, customer willingness-to-pay, competitive advantages, competitor price levels, and cost structures [24] as well as coordinating activities such as setting pricing strategy, translation from pricing strategy to price (e.g. [12]). In Table 1, the *pricing related activities* are presented based on various research work that investigate pricing from RBV and CBV perspectives in different industries.

Table 1. Pricing activities in the literature

Reference	Industry	Pricing activities
Dutta et al. [12]	Machinery industry	(1) Pricing capability within the firm include activities such as identifying competitor prices, setting pricing strategy, and translation from pricing strategy to price (2) Pricing capability vis-à-vis customers include tasks such as convincing customers on the price change logic, and negotiating price changes with major customers (3) Developing pricing process capabilities internally, vis-à-vis customers and value appropriation through pricing process capability
van der Rest et al. [25]	Hotel industry	(1) Developing pricing policy, approving pricing strategy and offering support (2) Determining and adjusting pricing strategy (3) Learning and fine-tuning prices (4) Negotiating and explaining prices
Hallberg [26]	European packaging industry	(1) Pricing policy development (2) Demand analysis (3) Cost and profitability analysis (4) Competitor intelligence (5) Communication and negotiation

The development of the firms' pricing capability is influenced by the presence of skilful employees as well as the ability to develop specific pricing related routines and assets [26]. First, pricing can be seen from microfoundational perspective; that is, as a decision made by individuals (i.e. entreprenerus) with different traits and behaviours that affect the organizational outcomes [27]. Second, besides investing into the human capital, the organizational processes and routines have to be developed as well [12], [26]. Finally, firms need investments into tangible resources such as IT systems and other tools [12]. Therefore, the key pricing resources can be categorized into skills and competences, relational resources, and tangible resources [12]. In Table 2, the key pricing resources found in the literature are summarized.

Table 2. Pricing resources

Skills and competences	Relational resources	Tangible resources
Knowledge • On the firm's inner processes, products and services[12,25] • On the customer's business and strategy[12,25] • On the competitors and market[12,25] Skills and expertise • Technical skills[12] • Data collection skills[12,25] • Soft skills[12,24,25] • Analytical skills[12,25] • Pricing skills and experience[12,24,25,26,28] • Management skills[25,26] • Creativity[24] Risk taking attitude and commitment[24,25]]	Internal relationships[25] External relationships[25] Reputation[25]	Materials • Pricing and revenues materials[25] • Firms' inner documents[25] • Market materials[25] Systems and tools • IT systems[12,25] • Revenue management system[25] • Diagrams and tools[25]

It has to be noted that while the works mentioned in Table 1 and Table 2 provide in-depth views on the pricing process and the needed resources in different industries, due to the differences in organizations' size as well as the characteristics of the goods and services, the findings cannot be generalized to the digital goods and services industry.

2.2. Pricing aspects of digital goods and services

Digital goods and services have special characteristics as compared to other economic goods [29]. First, they are indestructible, transmutable and reproducible; they have network effects, and they may cause lock-in [30]–[32]. Second, the cost structure of these goods and services are different as compared to cost of traditional goods: besides large development costs, the marginal cost of providing the good or service to new customers is low; however, additional variable costs can occur, such as hosting and maintenance costs [4], [33]. Thus, the special cost structure alters the customers' perception of the benefits of the service. Finally, digital goods and services often substitute traditional products and this has an impact also on their business models [29].

Pricing of digital goods and services has many different aspects. One important aspect that guides pricing decisions is the applied information base during price formation [4], [34]. Price determination may be *cost-based*, *value-based* or *competition-oriented*, *performance-based*, or a combination of these [35]– [39]. Due to the special cost structure of digital goods and services, pricing cannot be done *solely* based on its *cost*—the cost rather determines the volume of profitable operations and not the price [40], [41]. Value-based pricing takes into consideration the customer-perceived value of the service [40], [42]. Furthermore, the competitive forces might influence the providers' pricing decisions; thus, pricing can be competition-oriented [2], [43].

Finally, in performance-based pricing, the risks regarding the benefits that the service brings are shared between customers and suppliers and the customer pays only after the benefits have realized [24].

Another important aspect of pricing and revenue models is related to the length of time the user can use the offering [4], [34]. In software business, the traditional revenue model has been *software licensing*, where customers buy a perpetual license for software that gives them the rights to use the software on a specific number of computers or processors or with unlimited usage rights [44]–[46]. However, with the emergence of cloud computing technologies, the delivery mode of software enables providers to apply *subscription-based revenue model (renting)*, where customers buy the rights for software usage for a certain time period defined in the rental agreement [5], [6], [47], or *usage-based pricing, where* customers are charged based on the actual usage of the software.

Organizations often use *price discrimination* when the same product or service is offered to different customer segments at different prices [48]. When using *versioning* (or tiered pricing), the provider offers different product–price combinations to its customers [49]. Even though providers may achieve revenue increase due to versioning [50], a number of versions that is too high may be confusing for customers and may increase variable costs for providers [51].

In an offer, each unit can be priced separately, or in the case of *price bundling*, several items may be bound together with a predetermined price [4]. Items in the bundle can be of various types, such as software products, IT services, and human services (also called a hybrid bundle; [52]).

In some cases, customers may be involved in the pricing process as well [34]. Depending on the ability of buyers and sellers to *influence* the price, prices can be communicated through a *pricelist*; they may be the result of *negotiation* between the buyer and seller, or it may depend on some measurable *result* of the product or service [34].

3. Methodology

To gain an in-depth understanding of the topic, we applied an exploratory case study method [53]. This method was chosen because it is capable of encompassing empirically rich and detailed data related to a complex phenomenon that based on human actions and decision making [53]–[55]. The qualitative case study method helped us to capture possible cause-and-effect relationships [56]–[59] where entrepreneurs sought, developed, and combined different resources and capitals to develop their pricing capabilities for pricing decision.

3.1. Data selection

The research setting of the study consisted of five firms marketing and developing digital goods and related services. The case firms were selected using purposeful theoretical sampling as recommended by Eisenhardt [56], and by Eisenhardt and Graebner [58]. Hence, we applied multiple criteria for case firm selection. Firstly, we selected case firms that all developed digital

goods and services, but for different target industries. Hence, we aimed to include "polar types" of research sites. This was important as within studies applying only a small sample of firms it is important to include a wide variety of firms into the sample [56], [59]. Secondly, to expand the variety of the firms, we selected both recently established and relatively old firms. Thirdly, based on recommendations by Stake [60], we selected firms where we had good access and established personal contacts. This increased firms' willingness to participate to the study and share, in many cases, confidential information related to their pricing decisions. Table 3 gives an overview of the case firms.

3.2. Data collection

In the data collection, we used multiple sources of information. The main form of data collection was in-depth interviews. The initial interview(s) were fairly unstructured, and focused on collecting general information on the firm, its products and services, customers, business models, etc. In the second and subsequent interviews, more detailed questions about the pricing were asked based on the information gathered in the previous interview(s).

The data were collected primarily through in-depth, semi-structured interviews with various employees of the case firms that contributed to the firm's pricing activities. The roles of these interviewees were chief executive officers, vice presidents, sales managers, technical leads. The length of the interviews varied between 45-60 minutes and all of them was recorded and transcribed. In addition to face-to-face meetings, data were gathered through emails and phone calls. In addition, web pages, brochures and press releases provided secondary information about the case firms.

Table 3. Overview of the case firms

Firm	Year of establishment	Target customers	Number of interviews
A	1996	Banks	9
B	2012	Diverse sectors	2
C	2011	Museums	5
D	1998	Telecom operators, component manufacturers and service providers for telecom networks	8
E	2006	Furniture chains and furniture manufacturers	13

3.3. Data analysis

In the data analysis phase, we utilized content analysis. The case data analysis consisted of three concurrent flows of activity [61]: (i) data reduction, (ii) data displays and (iii) conclusion-

drawing/verification. In (i) data reduction phase, the data were given focus and simplified through compilation of a detailed case history of each firm. Then, on the basis of interviews and other material collected from the case firms, we used tables to identify and categorize the unique patterns of each case under subtopics derived from the research questions. In addition, we used checklists and event listings to identify critical factors related to the phenomena encountered [61]. In (ii) the data display phase, we arranged the relevant data drawn from the findings of the earlier phase into new tables. In (iii) the conclusion drawing and verification phase first we concentrated on identifying the aspects that appeared to have significance for this study. At this stage we noticed regularities, patterns, explanations and causalities related to the phenomena. After conclusion drawing, we verified the results and carried out discussions in order to avoid misunderstandings.

4. Findings

4.1. Case firms' value propositions and pricing models

The case firms diverged greatly related to their value propositions. Still, all the firms used subscription-based revenue model for their products and related services. This revenue model was complemented with variety pricing aspects that diverged based on the factors entrepreneurs applied to set the subscription fee. These factors were related to the functionalities of the service (firms B and E) and/or the size/number of the customers (firms A, B, C, and D). Besides the subscription fee, firms A, C and E charged a one-time initial project fee for scoping the customers' requirements, customization, deployment, and integration. This fee typically varied based on the workload required. In addition, all firms (excluding Firm C) bundled different software features with different levels of the digital service and offer these feature-price packages to their customers. Further, Firm E had different prices for its service for different geographies where the service was used. Table 4 provides an overview of the case firms' pricing strategies.

Table 4. Overview of the case firms' pricing strategies.

Firm	Value proposition	Revenue models	Pricing factor	The basis of pricing (cost-, value-, competition or performance)
A	Real-time intelligence solutions for banks	Initial project fee and subscription-based revenue model	the number of employees in asset and liability management team	value-based pricing; however, the cost and competitors' prices are also considered
B	Digital platform for indoor positioning and for location-based services	Different revenue model for different verticals, such as license-based revenue model, subscription-based revenue model and revenue share model	monthly active users, location based pricing, number of transactions	value-based pricing and in case of revenue share model, performance-based pricing
C	Digital platform to develop media guides	Initial project fee and subscription-based revenue model	number of annual visitors	the price is set based on all the three factors (competitors' prices, costs and the customers' ability to pay)
D	Planning and optimization software platform for telecom operators	Subscription-based pricing model	number of users	the price is set based on all of these: costs and risks, competitors' prices and customers' perceived benefits; the most influential factor is customer-specific
E	Real-time visualization platform	Initial project fee and subscription-based revenue model and usage-dependent hosting pricing component	number of customers' products, number of modules included, location of the customer.	value-based pricing

Overall, the case firms mainly based on their price on the customers' perceived value of the solution. That is, entrepreneurs have to understand the value that their service brings to the customers. When entrepreneurs converted the value-based pricing strategy to a pricing model at operational level, they had to identify the factors that the customers' perceived value depends on. These factors were not always easy to find and operationalize –the task needs understanding of

both the firm's value proposition and the customers' business. The entrepreneurs in the case firms revealed that defining the most influential pricing base is not always straightforward. There were several variables that entrepreneurs had to consider such as production costs, risks, competitors' prices, customers' value, etc.

Generally, the competitors' influence on the prices was rather small. There was either very few competitors or competitors used very different technology. The competitors might also affect the prices even in an unusual way. For example, Firm A had very large customers whose expenditures were of a different scale as compared to the prices demanded by Firm A. As a result, Firm A had to increase their prices in order to make their product to "sound" more reliable. Firms had to also estimate the customer's ability and willingness to pay.

4.2. Pricing process

In all the cases, pricing decisions were made within cross-functional teams including different sources of expertise. The team members were commonly the CEO, CTO, sales manager(s), and customer relationship manager(s) that had different knowledge and skills. Thus, a whole team was needed due to the heterogeneity in the needed competences and skills. Furthermore, the importance of pricing was underlined also by the fact that most of the decision makers involved on pricing decision were also the board members of the firm. Further, Firm E involved representatives of their partners (distributors, foreign vendors, etc.) in the pricing process because these partners had critical knowledge of the pricing in specific foreign markets. These teams applied very innovative pricing processes without any strict or formal rules. Still, the pricing was not an ad-hoc activity. It was rather a result of a flexible strategy involving lots of communication with customers and among decision makers of the firms.

In the beginning of the pricing process, the most difficult task, undoubtedly, was to develop a tentative pricing model. This was needed when a firm was established and later in the case if a firm launched a totally new service. Case firms A and C developed a tentative pricing model at the early phase of their history. This so called "price list" included the price of the basic service and additional modules and functions included to the service. The price list was used to communicate with new customers as it made easier to show customers how different functionalities impact on the final price. However, the list included a lot of flexibility and gave room to negotiate with alternative solutions with customers. Entrepreneurs in firms B, D and E applied a pricing model where they set the price more individually for each new customer.

Flexibility, adjustments and changes in pricing models became necessary due to several reasons. First, changes in customers' needs induced development of new functionalities or services that has to be priced separately or bound to already existing feature packages. Second, when entrepreneurs expanded their operations to new industries, they encountered a need to adjust or replace outdated pricing models. Finally, in some cases new regulations and new laws require changes to the service that implies revision of the existing pricing model. Because of these high-volatility markets with unpredictable changes, the pricing capability evolved also through trial and error and learning by doing strategies. For example, the revenues of Firm E in their

domestic market was too low because they did not dare to set high enough prices in for their first customers, and based on the contract, they were not able to increase these prices to a suitable level even today. Then, they expanded their business to foreign markets with higher prices as they learned from mistakes in the domestic market and today they are able to set appropriate prices when entering new countries. The CEO of the Firm E explained their change in the pricing strategy in foreign markets as follows:

"We try to find the maximum price that a customer is willing to pay. When we started, we were just happy if someone paid something. Our first license fees in Finland were around (x) euros. It was money, and we were happy. However, later we realized that our revenue in Finland was too small. Thereafter we expanded to Sweden, we added simply some digits in the end of the price. We checked whether it goes through… and it went through."

As another example, the entrepreneurs from Firm B had to develop new and more flexible pricing models in addition to the traditional license model. This was for the reason that the previous pricing logic was not proportional to the customers' benefits in some of the target vertical industries.

Pricing process of digital goods and services involved several activities that were interrelated and performed by different people with different expertise. These activities can be divided into the following three activities i) *Development of pricing model*, ii) *Quantifying the pricing model into price,* and iii) *Negotiation with the customers.* The development of pricing model included all the activities that lead to development of a pricing model at operational level, such as brainstorming sessions by the decision makers of the firm with different skills, cost and risk estimation, analysis of target customers' willingness-to-pay and perceived value. The outcome of these activities was the pricing logic describing how the price is calculated. Secondly, the different pricing aspects in the pricing model had to be quantified and converted into one monetary value in case of each customer. This was done partly by the firm or it was a part of the negotiation process with the customers. Thirdly, negotiation with the customers included the communication with customers to clarify their requirements and count how these requirements impact on the final price. The negotiations played an important role both in the pricing model development phase as well as through quantifying the pricing model into price.

The case firms differed in their level of pricing capability. First, case firms A and C developed their pricing logic once and after that, the predefined prices formed the base for the activities of pricing quantification and negotiation in case of new customers. Second, case firm D and E performed all three activities in case of new customers and the final price was decided case by case. Finally, case firm B focused mostly on the pricing model development activity due to the heterogeneity of the target industries and differences in customers' perceived benefits.

4.3. Resources needed for pricing

These resources can be categorized into three groups, "Skills and competences", "Relational resources" and "Tangible resources". The first group includes: i) technical skills and knowledge,

ii) negotiations skills, iii) market knowledge, and iv) analytical skills. Related to *technical skill and knowledge*, entrepreneurs acknowledged that pricing of digital goods and services is a complex activity that cannot be done without profound technological skills. Decision makers have to understand the technical details of the value proposition in order to detect its potential and identify new possible customers and customer segments. Besides, technical skills are needed because for every new customer or new functionality requirement, the needed work amount has to be estimated, the risks have to be identified, and the overall costs have to be calculated. Thus, one person with the firm's specific technical knowledge has to be involved in pricing.

Secondly, case firms acknowledge the important role of the *negotiation skill*. As discussed above, the most of the firms used pricing strategy that based on the created value rather than cost or competitors' prices. That is, the uniqueness of the value proposition of the firms brought great value to the customers that has to be captured through suitable prices. Thus, the pricing team needs exceptional negotiation skills and "poker eye" to close deals with the maximum price that the customer is willing to pay.

Thirdly, the *market knowledge* was an important competence that encompassed the knowledge of the target industry, the competitors' value propositions and, in some cases, also the understanding of foreign country and its culture. Decision makers should react fast to market changes and identify new customer segments. The importance of the market knowledge was explained by CEO of the Firm C as follows:

"One of the most important skills is the market sensitivity. You have to know the market. Even if you have a very good product, if the market expectations are different or the customers' ability to pay is different then you can't make a deal… Knowing the market, understanding it, that is essential."

Fourthly, besides understanding the market and the value created, *analytical skills* were needed for value quantification. For example, Firm E involved one additional employee in the pricing process who was able to quantify the value that the firm's value proposition brings for the customers. For this capability, system thinking was needed as well as a profound understanding of the customer business and the value proposition's benefits.

Relational resources were related to *business to business networks* (such as customers, possible customers, partners, and other actors from the ecosystems). Relational resources formed one of the most important source for information from the customers' itself. For example, for the Firm C, the direct feedback from the potential customers about their willingness-to-pay and the benefits that the service brings to them was a key determinant in the pricing decision. On the other hand, Firm B built an ecosystem around their technology and they had an opportunity to get feedback not only directly from their customers but also from the possible customers and other partners of the ecosystem. Firm B and E involve the partner firms in pricing especially because of their target industry knowledge or the market knowledge in foreign countries. The CEO of Firm B explained this as follows:

"The price comes from the value that the service brings to the customers but this is where the partner firms come into the picture, who really do the work. We do not necessarily understand all the verticals when we have so many."

Tangible resources were also important source of the pricing decision. First, *IS infrastructure* was vital for all the case firms in developing their own pricing tool. Second, in pricing model development as well as when quantifying the pricing model into price, the case firms overviewed the *market data* through public forecasts and reports of the target market. Finally, the firms' budget and business plans were needed to ensure that the prices correspond to the firms' strategy. It has to be noted that all the case firms accentuated the importance of transparency and proper documentation in pricing. That is, customers need to understand the different factors and their effect on the overall price to make an informed decision.

5. Discussion and conclusions

The findings suggest that digital goods and services have to be priced differently as compared to other economic goods due to their special characteristics. First, because of the *indestructible* nature of digital goods, a good pricing model, an emphasis on quality and good customer relationships may bring continuous revenue flaws for the firms. Second, since digital goods and services are *transmutable,* different customer segments can be targeted with different bundles of service and different price. Customers may choose the suitable service level and the needed functionalities; thus, these have to be priced separately. In many cases, there was a need for customization and configuration of the service that is visible also from the use of initial fees among case firms. Third, the *network effects* of digital goods and services might lower the price for individual customers and generate additional revenues for the service providers. This is visible from the low subscription fees of the case firms. Fourth, firms may achieve competitive advantage in the market through the *lock-in* that their service causes to the customers. Finally, digital goods and services may have *additional variable costs*, such as hosting and maintenance costs.

Among the case firms of this study, the most used pricing strategy is *value-based pricing*. The reasons for the dominance of value-based pricing strategy might be partly due to the emergence of digitalization and cloud computing that enables flexible means to offer services for customers. Further, there is relatively limited number of competitors whose value proposition contains the same set of features and who applies the same technology. Thus, it's not solely the price that these firms obtain as their competitive advantage, but also the features of underlying technology, such as the easiness-to-use, light installation requirements, low investment costs and high speed.

Digital goods and services function in high-velocity environments. In these markets, information is often unavailable, inaccurate or obsolete due to the fast changes in demand, technology, competitors, or regulation [62]. This study found that in the digital goods and services industry, even though there is no official process of pricing, firms invest in developing their pricing capability through trial and error, learning by doing and iterative cycles. This finding is in-line with [63] that state that processes in high-velocity markets are unstable, fragile and semi-

structured. However, as compared with other studies using RBV and CBV (e.g. [12], [25]), the pricing activities are simpler. That is, decisions on pricing do not include official procedures such as setting and approving the pricing strategy.

The findings of this study imply that one of the most important assets for pricing of digital goods and services are the employees with various *skills and competences*. Due to the special characteristics of digital goods and services, the technological skills play a vital role in pricing that is not accentuated enough in the current pricing literature. Technical understanding and know-how is needed especially in estimating the needed work amount and the costs as well as identifying the risks related to customers' requests. Besides the technical skills, analytical skills and market knowledge are also needed to convert customers' benefits into financial value. Finally, negotiation skills and "poker eye" is vital in identifying the customers' real intentions and getting deals done effectively. Good soft skills are especially needed in pricing of digital goods and services because they have to be priced with a value-based pricing strategy. That is, when pricing their offers, digital entrepreneurs have to estimate the maximum price that the customer is able and willing to pay and the interactions with the customers give them valuable hints on these.

As the case findings show, the successful pricing needs information on the evolution of the market, the customers, competitors and possible customer segments. Due to the technological details (such as logging capabilities), firms have the possibility to collect objective data on the customers' service usage. In addition, in some cases, firms that offer digital goods and services are able to build an ecosystem around their technology that helps in gathering feedback from the partner firms and the possible customers. Thus, the easiness of feedback collection and the closer relationship with the customers and the partner firms help entrepreneurs in making well-informed pricing decisions.

From a resource-based view perspective, entrepreneurs used superior resources to generate value and to achieve competitive advantage in the market. However, transforming value into income (i.e., value capturing) needs an additional ability: a good pricing strategy and suitable prices. This pricing capability cannot be bought or outsourced but has to be developed by investing in resources and processes. This finding – in line with Dutta et al. (2003) - is underlined by all the case firms, where pricing decisions need a team of people with different expertise and these decision makers on pricing are mainly the owners and the board members of the firm.

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References

[1] M. A. Cusumano, 'The changing labyrinth of software pricing', *Commun.ACM*, vol. 50, no. 7, pp. 19–22, Jul. 2007.

[2] A. Ojala, 'Adjusting Software Revenue and Pricing Strategies in the Era of Cloud Computing', *J. Syst. Softw.*, vol. 122, 2016.

[3] G. Laatikainen, A. Ojala, and O. Mazhelis, 'Cloud services pricing models', in *International Conference of Software Business*, 2013, pp. 117–129.

[4] S. Lehmann and P. Buxmann, 'Pricing Strategies of Software Vendors', *Bus. Inf. Syst. Eng.*, vol. 1, no. 6, pp. 452–462, 2009.

[5] A. Ojala, 'Software Renting in the Era of Cloud Computing', in *Cloud Computing (CLOUD), 2012 IEEE 5th International Conference on*, 2012, pp. 662–669.

[6] A. Ojala, 'Software-as-a-Service Revenue Models', *IT Prof.*, vol. 15, no. 3, pp. 54–59, 2013.

[7] A. Hinterhuber and S. M. Liozu, 'Is innovation in pricing your next source of competitive advantage?', *Bus. Horiz.*, vol. 57, no. 3, pp. 413–423, May 2014.

[8] T. T. Nagle and R. K. Holden, *The strategy and tactics of pricing: A guide to profitable decision making*. Prentice Hall Englewood Cliffs, NJ, 2002.

[9] N. F. Piercy, D. W. Cravens, and N. Lane, 'Thinking strategically about pricing decisions', *J. Bus. Strategy*, vol. 31, no. 5, pp. 38–48, 2010.

[10] M. Johansson, N. Hallberg, A. Hinterhuber, M. Zbaracki, and S. Liozu, 'Pricing strategies and pricing capabilities', *J. Revenue Pricing Manag.*, vol. 11, no. 1, pp. 4–11, Jan. 2012.

[11] R. Makadok and J. B. Barney, 'Strategic Factor Market Intelligence: An Application of Information Economics to Strategy Formulation and Competitor Intelligence', *Manag. Sci.*, vol. 47, no. 12, pp. 1621–1638, 2001.

[12] S. Dutta, M. J. Zbaracki, and M. Bergen, 'Pricing process as a capability: a resource-based perspective', *Strateg. Manag. J.*, vol. 24, no. 7, pp. 615–630, Jul. 2003.

[13] J. Barney, 'Firm resources and sustained competitive advantage', *J. Manag.*, vol. 17, no. 1, pp. 99–120, 1991.

[14] B. Wernerfelt, 'A resource-based view of the firm', *Strateg. Manag. J.*, vol. 5, no. 2, pp. 171–180, 1984.

[15] B. Wernerfelt, 'From critical resources to corporate strategy', *J. Gen. Manag.*, vol. 14, no. 3, pp. 4–12, 1989.

[16] S. Dutta, M. Bergen, D. Levy, M. Ritson, and M. Zbaracki, 'Pricing as a strategic capability', *MIT Sloan Manag. Rev. Camb.*, vol. 43, no. 3, pp. 61–66, Spring 2002.

[17] C. E. Helfat and M. A. Peteraf, 'The dynamic resource-based view: Capability lifecycles', *Strateg. Manag. J.*, vol. 24, no. 10, pp. 997–1010, 2003.

[18] D. J. Teece, G. Pisano, and A. Shuen, 'Dynamic capabilities and strategic management', *Strateg. Manag. J.*, pp. 509–533, 1997.

[19] D. S. Evans and R. Schmalensee, *Matchmakers: The new economics of multisided platforms*. Harvard Business Review Press, 2016.

[20] G. G. Parker, M. W. Van Alstyne, and S. P. Choudary, Platform Revolution: How Networked Markets Are Transforming the Economyand How to Make Them Work for You. WW Norton & Company, 2016.

[21] E. Davidson and E. Vaast, 'Digital entrepreneurship and its sociomaterial enactment', in *System Sciences (HICSS), 2010 43rd Hawaii International Conference on*, 2010, pp. 1–10.

[22] S. Nambisan, 'Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship', *Entrep. Theory Pract.*, vol. 41, no. 6, pp. 1029–1055, 2017.

[23] S. G. Winter, 'The Satisficing Principle in Capability Learning', *Strateg. Manag. J.*, vol. 21, no. 10/11, pp. 981–996, 2000.

[24] A. Hinterhuber, ‘Value quantification capabilities in industrial markets’, *J. Bus. Res.*, vol. 76, pp. 163–178, Jul. 2017.
[25] J.-P. van der Rest, A. Roper, and X. L. Wang, ‘Why is a change of company pricing policy so hard to implement?’, *Int. J. Hosp. Manag.*, vol. 69, no. Supplement C, pp. 30–40, Jan. 2018.
[26] N. L. Hallberg, ‘The micro-foundations of pricing strategy in industrial markets: A case study in the European packaging industry’, *J. Bus. Res.*, vol. 76, no. Supplement C, pp. 179–188, Jul. 2017.
[27] A. Hinterhuber and S. M. Liozu, ‘The micro-foundations of pricing’, *J. Bus. Res.*, vol. 76, no. Supplement C, pp. 159–162, Jul. 2017.
[28] H. Forman and J. M. Hunt, ‘Managing the influence of internal and external determinants on international industrial pricing strategies’, *Ind. Mark. Manag.*, vol. 34, no. 2, pp. 133–146, 2005.
[29] Cusumano Michael A., Kahl Steven J., and Suarez Fernando F., ‘Services, industry evolution, and the competitive strategies of product firms’, *Strateg. Manag. J.*, vol. 36, no. 4, pp. 559–575, Mar. 2015.
[30] H. K. Bhargava and V. Choudhary, ‘Information goods and vertical differentiation’, *J. Manag. Inf. Syst.*, vol. 18, no. 2, pp. 89–106, 2001.
[31] A. Valtakoski, ‘Initiation of buyer–seller relationships: The impact of intangibility, trust and mitigation strategies’, *Ind. Mark. Manag.*, vol. 44, pp. 107–118, 2015.
[32] H. R. Varian, ‘Buying, sharing and renting information goods’, *J. Ind. Econ.*, vol. 48, no. 4, pp. 473–488, 2000.
[33] F. Vendrell-Herrero, O. F. Bustinza, G. Parry, and N. Georgantzis, ‘Servitization, digitization and supply chain interdependency’, *Ind. Mark. Manag.*, vol. 60, pp. 69–81, Jan. 2017.
[34] E. Iveroth, A. Westelius, C.-J. Petri, N.-G. Olve, M. Cöster, and F. Nilsson, ‘How to differentiate by price: Proposal for a five-dimensional model’, *Eur. Manag. J.*, vol. 31, no. 2, pp. 109–123, Apr. 2013.
[35] S. Bonnemeier, F. Burianek, and R. Reichwald, ‘Revenue models for integrated customer solutions: Concept and organizational implementation’, *J. Revenue Pricing Manag.*, vol. 9, no. 3, pp. 228–238, 2010.
[36] R. Harmon, D. Raffo, and S. Faulk, ‘Value-based pricing for new software products: strategy insights for developers’, in *Proc. Portland Internat. Conf. on Management of Eng. and Technol.(PICMET’04)(Seoul, Kor., 2004)*, 2005.
[37] A. Hinterhuber, ‘Towards value-based pricing: An integrative framework for decision making’, *Ind. Mark. Manag.*, vol. 33, no. 8, pp. 765–778, 2004.
[38] D. Shipley and D. Jobber, ‘Integrative Pricing via the Pricing Wheel’, *Ind. Mark. Manag.*, vol. 30, no. 3, pp. 301–314, 2001.
[39] P. Töytäri, J. Keränen, and R. Rajala, ‘Barriers to implementing value-based pricing in industrial markets: A micro-foundations perspective’, *J. Bus. Res.*, vol. 76, no. Supplement C, pp. 237–246, Jul. 2017.
[40] A. W. Baur, A. C. Genova, J. Bühler, and M. Bick, ‘Customer is King? A Framework to Shift from Cost- to Value-Based Pricing in Software as a Service: The Case of Business Intelligence Software’, in *Digital Services and Information Intelligence*, 2014, pp. 1–13.
[41] P. Töytäri, R. Rajala, and T. B. Alejandro, ‘Organizational and institutional barriers to value-based pricing in industrial relationships’, *Ind. Mark. Manag.*, vol. 47, no. Supplement C, pp. 53–64, May 2015.
[42] R. Harmon, H. Demirkan, B. Hefley, and N. Auseklis, ‘Pricing Strategies for Information Technology Services: A Value-Based Approach’, in *System Sciences, 2009. HICSS ’09. 42nd Hawaii International Conference on*, 2009, pp. 1–10.
[43] M. E. Porter, Competitive Strategy: Techniques for Analyzing Industries and Competitors. Free Press, New York, 1980.

[44] N. Bontis and H. Chung, ‘The evolution of software pricing: from box licenses to application service provider models’, *Internet Res.*, vol. 10, no. 3, pp. 246–255, Aug. 2000.
[45] M. A. Cusumano, ‘Cloud computing and SaaS as new computing platforms’, *Commun. ACM*, vol. 53, no. 4, pp. 27–29, 2010.
[46] D. Ferrante, ‘Software Licensing Models: What’s Out There?’, *IT Prof.*, vol. 8, no. 6, pp. 24–29, 2006.
[47] V. Choudhary, ‘Comparison of software quality under perpetual licensing and software as a service’, *J. Manag. Inf. Syst.*, vol. 24, no. 2, pp. 141–165, 2007.
[48] V. Choudhary, A. Ghose, T. Mukhopadhyay, and U. Rajan, ‘Personalized pricing and quality differentiation’, *Manag. Sci.*, vol. 51, no. 7, pp. 1120–1130, 2005.
[49] H. R. Varian, ‘Versioning information goods’, *Univ. Calif. Berkeley*, 1997.
[50] H. K. Bhargava and V. Choudhary, ‘Second-degree price discrimination for information goods under nonlinear utility functions’, in *System Sciences, 2001. Proceedings of the 34th Annual Hawaii International Conference on*, 2001, pp. 6–pp.
[51] S. Viswanathan and G. Anandalingam, ‘Pricing strategies for information goods’, *Sadhana*, vol. 30, no. 2, pp. 257–274, 2005.
[52] D. Veit *et al.*, ‘Business Models’, *Bus. Inf. Syst. Eng.*, vol. 6, no. 1, pp. 45–53, Feb. 2014.
[53] R. K. Yin, *Case study research: Design and methods*. CA: SAGE Publications, 2009.
[54] I. Benbasat, D. K. Goldstein, and M. Mead, ‘The Case Research Strategy in Studies of Information Systems’, *MIS Q.*, vol. 11, no. 3, pp. 369–386, 1987.
[55] A. C. Edmondson and S. E. McManus, ‘Methodological fit in management field research’, *Acad. Manage. Rev.*, pp. 1155–1179, 2007.
[56] K. M. Eisenhardt, ‘Building theories from case study research’, *Acad. Manage. Rev.*, vol. 14, no. 4, pp. 532–550, 1989.
[57] P. Darke, G. Shanks, and M. Broadbent, ‘Successfully completing case study research: combining rigour, relevance and pragmatism’, *Inf. Syst. J.*, vol. 8, no. 4, pp. 273–289, 1998.
[58] K. M. Eisenhardt and M. E. Graebner, ‘Theory building from cases: Opportunities and challenges’, *Acad. Manage. J.*, vol. 50, no. 1, pp. 25–32, 2007.
[59] A. M. Pettigrew, ‘Longitudinal field research on change: theory and practice’, *Organ. Sci.*, vol. 1, no. 3, pp. 267–292, 1990.
[60] R. E. Stake, ‘The art of case study research’, 1995.
[61] M. B. Miles and A. M. Huberman, *Qualitative data analysis: An expanded sourcebook*. Sage, 1994.
[62] K. M. Eisenhardt and L. J. Bourgeois, ‘Politics of Strategic Decision Making in High-Velocity Environments: Toward a Midrange Theory’, *Acad. Manage. J.*, vol. 31, no. 4, pp. 737–770, 1988.
[63] K. M. Eisenhardt and J. A. Martin, ‘Dynamic capabilities: what are they?’, *Strateg. Manag. J.*, pp. 1105–1121, 2000.