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Abstract:

Previous literature on disruptive innovation has regarded the customer as a distinct entity in the value network, rather than as an organization which comprises several actors with different utility functions. This perspective may have concealed some important challenges. Therefore this article explores the effects a disruptive innovation has inside the customer's organization. It does so through two case studies which unlike other disruptive innovations did not initially prosper in a low end segment or in a new market. Instead, they were sold to a new actor in the customer's organization. The article therefore calls for an extension of the current typology into also including what can be called New Channel Disruptive Innovation. In doing so, it is argued that a more nuanced view of the customer is needed in order to understand how disruptive innovations emerge.

Keywords: disruptive; innovation; new channel; new market; low-end; value networks; case studies.

1 Introduction

The concept of disruptive innovation has had a profound impact on the way scholars and practitioners think about technological change. The work by Christensen [1] offered new explanations to why established companies are sometimes overthrown by entrant firms when technologies shift. Unlike previous research into entrant-incumbent dynamics and technological discontinuities [2][3][4] which looked inside established firms, Christensen drew upon value networks and resource dependency theory [5] in order to understand why successful firms sometimes loose market shares to entrant firms. Christensen [1] argued that those technologies which do not fit into the current value network of incumbents will not be developed by these firms. Established firms are thus "held captive" by their most profitable customers and therefore find it hard to develop innovations which are not addressing the needs explicated within a certain value network. Christensen refers to these technologies as disruptive whereas technologies that satisfy the needs of current customers are defined as sustaining.

However, while this framework has increased the understanding of how and why established firms encounter problems under conditions of discontinuous change, it can still be improved. One potential drawback may be that customers have primarily been

regarded as single entities in the value network, with one specific interest, rather than as organizations which comprise several actors with diverging utility functions. Many innovations are developed for industrial customers rather than individual consumers and hence innovations are often sold to organizations which can be regarded as a set of actors with different utility functions. By downplaying the heterogeneity of interests within the customer's organization, some of the difficulties and solutions related to succeeding with disruptive innovation may be overlooked.

This article explores what effects disruptive innovations have inside the customer's organization. Thus, it differs from previous perspectives since the customer is regarded as a set of interest groups rather than as one actor with one homogenous utility function. The article draws upon two case studies of innovations which have disruptive characteristics, i.e. initially a lower traditional performance according to what mainstream customers demand and ancillary performance attributes. Moreover, these two cases have in common that the disruptive innovations are sold to industrial customers where the benefits of the new products may occur on many levels in the customer's organization.

The remainder of this paper is organised as follows. The next section reviews literature on disruptive innovation. The subsequent section contains a description of the methods used in this paper. Then the case studies are presented in order to explore the effects a disruptive innovation has inside the customer's organization, whereas the following part analyzes these results. The final sections contain a discussion of the findings from the case studies and their implications for theory and practice.

2 Received theory

It is well documented today that many established firms find it hard to adapt to changes in the technologies they employ. Frequently, incumbent firms do not manage the shift to the new technology, they lose market shares and the successful firms are found among the new entrants [6][2][7][3].

Christensen [1] brought an intriguingly different perspective upon this issue by drawing upon the concept of value networks [8] and resource dependency theory [5]. This theory suggests that a firm's freedom of action is in fact controlled by actors outside the boundaries of the company, e.g. customers and investors. Since the customers and owners are the key stakeholders that provide the firm with resources, they also impose a great indirect control on what decisions are taken and how resources are allocated.

By making a distinction between sustaining and disruptive technologies, Christensen [1] explained this recurrent pattern of incumbent failure. Sustaining technologies have in common that they improve the performance of established products along the dimensions that mainstream customers value. Disruptive technologies on the other hand, initially underperform along these dimensions. The lower traditional performance and the ancillary performance attributes create a large market uncertainty around the disruptive innovation. At the same time established firms find it irrational to abandon their current, profitable customers in order to aim for a new, initially small market and an inferior technology. As the performance of the disruptive innovation increases it begins to attract customers from the sustaining technology and eventually displaces the old technology. Through his studies of the disk drive industry, Christensen showed that incumbents

usually win sustaining battles whereas entrants succeed in disruptive battles. Hence, incumbent firms encounter problems when a technology prospers in a new value network since they are “held captive” by their most profitable customers and therefore the winners are found among the entrant firms. Consequently, a key determinant of the probability of success for an innovation is the extent that it addresses the needs of actors in an incumbent firm’s current value network.

Christensen and Raynor [9] further developed the theory about disruptive innovation. One important enhancement of this framework is the distinction between low-end and new-market disruptions. Low-end disruptive innovations evolve in the lower segments of the market, typically by having a business model which enables the firm to offer cheaper products with a performance that is initially inferior. Steel minimills and discount retailing are both examples of this. New-market disruptive innovations prosper by approaching customers that have not been addressed previously. The personal computer and the first portable transistor radios are typical examples of new market disruptive innovations.

Thus, the literature regarding technological discontinuities has shifted over time, from looking primarily inside the firm [3][4] towards addressing the value network of it [1]. While the concept of value networks and the work by Christensen has contributed to an increased understanding of the challenges related to discontinuities, there are still many questions that remain unanswered. Some of the recent work on disruptive innovation has focused increasingly on the role of the market and the customer. Danneels [10] underlined the importance of developing a “customer competence” in order to manage disruptive innovation. Adner [11] pointed out that the structure of demand needs to be addressed in order to clarify the nature and effect of disruptive innovations. Moreover, Adner used the notion of thresholds, defined as critical performance levels that must be met. The functional threshold of a product is the minimum performance that the customer can accept whereas the net utility threshold also takes price into consideration. Slater and Mohr [12] identified parallels between the work by Christensen [1] and Moore’s book *Crossing the chasm* [13]. Several other scholars have developed Christensen’s theories further by looking into various aspects of the market and the customer, for instance how the diffusion of disruptive innovation can be forecasted [14], differentiating market strategies [15] and issues related to commercialization [16].

Though the above mentioned literature has improved the understanding of disruptive innovation it has with few exceptions maintained a somewhat simplified view of the customer. Previous research has primarily regarded customers as distinct entities in the value network, with one specific interest, rather than as organizations which comprise several actors with different utility functions. While such a simplification may be valid in some cases, it may also conceal some of the particular challenges related to disruptive innovation. Downplaying the heterogeneity of interests of a customer may not be a problem when innovations are sold to individual consumers. However, industrial customers can often be regarded as being comprised of several value networks of their own since they contain many different functions and units and therefore also many different interests. Under circumstances of high heterogeneity within a customer’s organization Christensen’s current framework may lead to over-simplifications which obscure some of the challenges and consequently also the managerial solutions related to succeeding with disruptive innovation.

There are several reasons to believe that a more nuanced view of the customer's organization may increase the understanding of disruptive innovation. Given that a disruptive innovation initially has lower traditional performance and ancillary performance attributes, it may have disruptive effects inside the customer's organization as well. A large firm can be considered a political economy where units differ in terms of power and interest [17]. In such organizations, a disruptive innovation can create value on various levels. If the customer is regarded as a one single entity, such disruptive effects within the organization will be overlooked.

Thus, instead of maintaining a homogenous view of the customer, this article looks into the organization in order to understand the effects of disruptive innovations. While still drawing upon resource dependency theory [5], the article differs from previous approaches to disruptive innovation in that it actually looks inside the customer's organization and seeks to identify how different actors are affected. In doing so, it has many similarities with stakeholder theory, with the notable difference that this perspective is applied inside the customer's organization and not to its environment.

3 Method and Research setting

This paper is based upon two case studies of product innovations which possess the characteristics of a disruptive innovation, i.e. a lower traditional performance according to what mainstream customers demand and some ancillary performance attributes. Those two product innovations were chosen since they are both sold to organizations and not to individual consumers. Given that the aim of this paper is to explore the effects disruptive innovations have inside the customer's organization these two cases seem to be suitable for such an investigation.

Since the cases concern technological innovations interviews were conducted with R&D managers, engineers and managers who have been involved in the commercialization phase. The interviews were semi-structured, asking the respondents to describe the key characteristics of the products, in what respects they were disruptive and how they have been received by the customer's organization. The same questions were asked to several interviewees and the case descriptions emerged after similarities in the answers had been received. In total, more than 30 hours of interviews were performed with eleven people. Follow-up interviews were also conducted in order to ensure an accurate interpretation of the gathered information. All interviews were recorded, transcribed and listened to afterwards.

Case studies impose constraints upon the generalizability of the findings [18]. However, as the work presented here is of an exploratory character, describing and seeking to understand the effects a disruptive innovation has inside the customer's organization, this method is deemed to be the most suitable one. Thus, the article does not attempt to provide an exhaustive set of answers, but rather to look into aspects of disruptive innovation that have not been addressed previously.

4 Results

This section contains descriptions of the two case studies which this article is based upon. It focuses on the key characteristics of the products, in what customer segments they are thriving and their effects within the customer's organization.

4.1 Case 1 – a new adult diaper

The studied product innovation is a diaper for adults, intended to take care of heavy incontinence among elderly people. The case company is a large incumbent with a dominant position in this industry. These products are primarily sold to retirement homes, mainly in Europe but also to other parts of the world.

Product characteristics

The main performance dimensions that have historically been valued by the retirement homes are related to their total product costs. The total product cost is a function of the price of the product and how many of them that has to be used. Over the last decades, the absorption capacity of incontinence diapers has been improved and thereby the total product cost has been lowered continuously.

The studied incontinence diaper was more expensive and did not result in a lower total product cost for the customer by reducing the amount of diapers that had to be used. However, it had other performance attributes that made it attractive for the customer in new ways. For instance, it was more ergonomic to put on for the caregivers and this implied less employee absence due to illness. Moreover, the product decreased the amount of leakages, thereby lowering the costs for laundry and skin treatments.

These properties of the new diaper implied that while being more expensive, it in fact removed up to 10 percent of the total cost for incontinence care. Since the cost of the incontinence products only summed to 1 percent of the total incontinence care cost, this reduction was indeed remarkable and would by far motivate a higher price.

Customer segments

Despite that the studied incontinence diaper differed significantly from previous incontinence products it was still sold to the same customers as the firm had been selling to previously, namely retirement homes. Since retirement homes are virtually the only actors on the market that demand these products the preferences in the market are rather homogenous. Moreover, it was obvious to the firm that retirement homes benefited from this new product innovation, though the advantages were different.

Shifts in the customer's organization

As was stated above, the product innovation created an increased economic value for the customer but did so in a different way. Though the innovation resulted in higher product costs, it lowered the total cost for incontinence care. Due to the higher price, it was hard to convince the purchasing department to buy the new product. The purchasers were not assigned to handle the total cost of incontinence care and thus, they had low incentives to buy the product, despite its superior performance. Therefore a barrier to innovation

adoption was created within the customer's organization and the product did not take off initially.

The studied firm solved this problem by targeting another actor in the retirement home. Since the product innovation created value on a systemic level, management was approached instead of the purchasing department. When doing so, the firm also changed its value proposition from having sold incontinence products to selling better incontinence care at a lower total cost. It turned out that managers at retirement homes were more easily convinced of the product's benefits and therefore sales are now growing steadily.

4.2 Case 2 – digital video surveillance

This case concerns digital, IP-based video surveillance cameras. Video surveillance has for a long time been film-based but the industry is currently undergoing a technological shift into digital video surveillance. Digital video surveillance uses sensors instead of film, so the material is stored as digital files and not on video tapes. Another difference is that digital cameras have an IP-number and are connected over the internet, instead of via cables. While the analog technology is still dominating the market, digital video surveillance is growing rapidly and the studied firm is an entrant and one of the actors driving the shift from analog to digital technology.

Product characteristics

Historically, video surveillance cameras have been valued according to several performance attributes. The most important ones have been video quality, price per camera and reliability.

While digital video surveillance has now reached a sufficient performance level in terms of video quality it has other drawbacks. The most notable one is that the cameras are more expensive than analog cameras. This, in combination with the fact that the security industry is quite conservative and has remained unchanged for several decades has created some barriers to adopting the innovation.

However, the total cost of owning a digital video surveillance system is lower. One important reason for this is that digital cameras have IP-numbers and are connected over the internet and thus they can be installed upon the current network. In addition to this, digital cameras can be made more intelligent through programming.

Customer segments

Digital video surveillance systems are sold to the same actors as the ones who used to buy analog surveillance systems. The customers can be found in many different parts of society, for instance in schools, supermarkets, airports, office landscapes etc. The new attributes of digital surveillance has not changed who the customer is, rather it has created new economic value for the current customers.

Shifts in the customer's organization

Given that digital video surveillance cameras can be connected on the existing internet in the customer's organization, the studied firm has chosen to approach the IT departments instead of the security departments. With the shift from analog to digital, surveillance has

become both an IT and a security issue. While the digital cameras are more expensive, the total cost of having such a system is often lower, particularly when they are installed on the current internet of the customer. It has turned out that IT departments are more easily convinced by this argument and that they are more willing to use digital cameras since they understand the technology in a better way. The studied firm seeks to communicate the benefits of IP-based surveillance by focusing on the total cost of ownership rather than the price of one single camera. The results so far have been very promising and the firm is currently experiencing remarkable growth rates.

5 Analysis

As can be seen in the previous section, both the studied innovations underperformed along the performance dimensions that mainstream customers have historically valued. The incontinence diaper offered the same traditional performance to a higher price and so did the digital surveillance camera. At the same time, both these products had ancillary attributes that still made them valuable. In the case of the adult diaper these were related to lower absence due to illness as well as reduced leakages and thereby decreasing the total cost of incontinence care. The surveillance camera had such new performance attributes as increased intelligence. Moreover, these cameras could be installed upon the existing internet at the company. Hence, both the studied products possessed those characteristics that would classify them as disruptive according to the terminology used by Christensen [1].

However, none of the studied products fit into the current framework of low-end and new-market disruptive innovations. Despite having disruptive characteristics, these two products were not sold to low-end segments or to markets that had not been addressed previously. Both these innovations were actually sold to mainstream customers, despite the fact that they underperformed along the dimensions that these customers have historically valued. This is an anomaly and it calls for an extension of previous typologies of disruptive innovation. If the studied products have disruptive characteristics but cannot be classified as low-end or new market disruptive innovations, then what kind of disruptive innovations are they?

When looking *into* the customer's organizations, it can be seen in the two case studies above that the studied products had disruptive effects there. They both have in common that they just like any other disruptive innovation prospered in a new value network. However, they differ from previous studies of disruptive innovation in the sense that this new value network has emerged *inside* the customer's organizations. The adult diaper's disruptive characteristics implied that it created value at another level in the customer's organization and therefore the sales channel was shifted from the individual purchaser towards the management of retirement homes since they were in charge of the total cost of incontinence care and not only the total product cost. The same holds for the digital surveillance camera. This product's ancillary attributes shifted the sales channel from the security department to the IT department, which turned out to be more easily convinced of the benefits of IP-based cameras. The two firms also have in common that their value propositions differ from what has been offered on the market previously. The diaper manufacturer changed its value proposition from having sold incontinence products into providing better incontinence care at a lower total cost. Digital video surveillance implied

that focus was shifted from the price parameter towards the total cost of ownership. This can be regarded as a further verification of the fact that these innovations prospered in a new value network, where other performance attributes were valued. Both these cases show that the net utility threshold [12] of a disruptive innovation is different depending upon which actor is targeted within the customer's organization. The thresholds were lower in the new sales channels and hence the disruptive innovations emerged in a new value network inside the customer's organization. Therefore, this form of disruptive innovation may be referred to as a *new channel disruptive innovation*.

6 Discussion

In suggesting a new form of the Innovator's dilemma, namely *new channel disruptive innovation*, this article has illustrated that previous research into this area has sometimes maintained an over-simplistic view of the customer. The customer has often been treated as one distinct actor rather than as an organization with many diverse interests and capabilities, where value can be created on many different levels. While such a simplification may be valid in some cases, for instance when a disruptive innovation concerns consumer goods, this article has illustrated that this may also conceal important aspects of what particular challenges these innovations present for firms. In doing so, this article calls for a more nuanced view of the customer in order to increase the understanding of disruptive innovation.

While the notions of value networks and resource dependency theory [5] turned out to shed new light upon technological discontinuities, it seems that these terms can also be applied on another level of analysis, namely inside the customer's organization. The two product innovations studied above illustrate that different value networks can exist within the same organization and that this needs to be taken into consideration when assessing the effects of disruptive innovations. Therefore, an incumbent may in fact be "held captive" by one particular actor in the customer's organization to whom there is no financial logic in buying the disruptive innovation. This was indeed one important reason why the adult diaper did not take off initially. To the purchasing department it did not make sense buying the new product since it was not assigned to take the ancillary attributes of it into consideration. The adult diaper did not become a success until the value network was shifted and the value proposition was changed to suit this network. Therefore, the firm was in fact initially held captive by one particular actor in the customer's organization. Interestingly, the firm that is currently driving the shift from analog to digital video surveillance is a company with no previous experience in this industry. The incumbent firms are still primarily selling analog video surveillance cameras. Whether the established firms will survive this disruptive technological change or not remains to be seen. According to respondents at the studied firm, one reason why the incumbent's have not moved into digital surveillance yet appears to be that they do not know how to approach customers with it. The logic of selling to IT departments is new to the industry and incumbent firms have no past experience in doing so. These observations are in line with some of the literature on innovation adoption. For instance, the diffusion model stipulated by Rogers [19] states that compatibility between a product and the adopting organization is one important factor determining the diffusion of an

innovation. This further underlines the importance of maintaining a more heterogeneous view of the customer in the field of disruptive innovation.

The same kind of patterns may also be found on the level of an entire supply chain. Given that supply chains extend across several functions in many firms and that a firm can only impose direct control over itself, the challenges related to disruptive innovation are likely to become even greater in such a setting.

There are several managerial implications related to the findings in the article. Firstly, a firm aiming to sell an innovation with disruptive characteristics to an industrial customer needs to identify which actors that are affected and in what way. In this article, both innovations turned out to create value for new actors. Given that value creation is distinct from value appropriation [20] it becomes imperative to find a business model that is consistent with the new value creation that the disruptive innovation implies. When developing such a business model, issues related to political power in the customer's organization also need to be addressed. If value is created on a different level and the disruptive innovation prospers in another part of the organization, some actors may lose their influence at the expense of others. For instance, when video surveillance is becoming an issue for the IT department, this reduces the status of the security department and therefore a political barrier to adoption may occur. Finding a business model that aligns different incentives within the customer's organization therefore seems to be a key success factor when commercializing new channel disruptive innovations.

7 Concluding remarks

This article has explored what effects a disruptive innovation has inside the customer's organization. This approach differs from previous perspectives on disruptive innovation which have primarily regarded the customer as one distinct entity with one homogenous utility function.

In doing so, the article identified a form of disruptive innovation which does not prosper in the low-end segment nor in a new market, but rather in a new channel into the customer's organization. This calls for an extension of previous typologies into also including what is here referred to as *new channel disruptive innovation*.

This conclusion suggests that applying a more nuanced view of the customer can shed new light upon the challenges and managerial solutions related to disruptive innovation. More detailed studies of what effects disruptive innovations have in the customer's organization may therefore be one way forward for future research into this area. This can be done by performing more case studies and by developing models and new frameworks. Simulations can also be conducted in order to find out what actually happens inside the customer's organization when a disruptive innovation is introduced.

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