

The modern banking industry business essay

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Innovation in an industry changes it in several aspects. Amongst these are the products, processes, services, technologies, and organization of the industry. Technological innovation, in particular, may alter the dynamics which regulate cost leadership within such industry. Innovation will thus affect the mechanisms that regulate competitive advantage within an industry, both on the Cost leadership and the differentiation dimension. Technological innovation will affect both the relation between volume and cost of production and the rate at which experience is accumulated. Therefore, whenever a technological innovation occurs in an industry, the dynamics which had led to an established cost leadership by some firm are overturned. Other firms might find themselves in a more favorable position by either possessing a cost-to-volume advantage over to their competitors or by being able to accumulate experience more quickly, thus reducing costs over time. For instance, the effect of technological innovation on the learning curve is shown in Figure 2. 2Figure 2. 2: Impact of Innovation on the learning curveValue innovation enables firms to render competition irrelevant. Through value innovation firms can in fact offer superior value to their customers than their competitors. Innovation can thus help firms to achieve competitive advantage by either increasing the value of existing products or services that a firm supplies or by creating the opportunity to substitute those.

3 Drivers of Innovations

This section will seek to understand the main drivers of innovation. The key questions that will be answered are: Why is innovation so important in

industries? How does innovation fit into the industry's dynamics? What are the sources of Innovation?

3. 1 Sources of Innovation

3. 1. 1Technology-pushed and Demand-pulled Innovation

As discussed, previously technology is a key source of innovation in industries. Still, it is not the only process which leads to innovation. The end purpose of innovation is to solve a problem and to satisfy un-fulfilled needs. However, industry players are not always aware that such problem exists. The source of innovations may thus be situated upstream or downstream of the supply chain [Ref: TIM Course], as shown in Figure 3. 1. Figure 3. 1: Technology-push and Demand-pull

Technology-pushed innovation originates upstream in the supply chain. New technologies that rise from previously acquired knowledge may offer the opportunity to improve one's business by reducing costs, improving efficiency, offering improved outputs, etc.

Demand-pulled Innovation, on the other hand, originates downstream in the supply chain. This kind of innovation is not based on technological developments but rather generates from the effort of solving practical problems. Innovation is at its basis an economic activity, and as such is influenced by the market dynamics. Therefore, a market which exhibits higher opportunities for rewards, which depend on the volume of sales, will see a greater number of resources invested in it. Therefore the innovative activity will also be denser in those markets. Demand can thus be seen as a source of incentives for innovations.

3. 1. 2 Technological discontinuities

Technological discontinuities are a particular type of technological innovation. They represent a major shift in a technology's performance [Ref: SM course] , as shown in Figure 3. 2. Figure 3. 2: Technological Discontinuity

As discussed previously, the impact of technological innovation is to improve the performance of a technology. As shown in Figure x, there is a relation between research and the performance of a technology. Technical performance usually starts-off slowly with research efforts, it then moves on to a significant improvement until it reaches a saturation point. The R&D productivity of a given technology can be measured as the ratio between the change in performance and the increase in research efforts. As previously stated, R&D productivity shows decreasing returns to scale as the saturation point is approached. However, once a new technology arises, the R&D productivity increases significantly once again, as show in Figure 3. 3. Figure 3. 3: Increase in productivity with technology

Innovation can thus greatly impact a firm's performance, technological discontinuities can in fact represent a great challenge to the firm [Ref: SM course]. These discontinuities are detectable through a series of warning bells that need to be correctly identified as such by a firm. Amongst these are: Decline in R&D productivity, Missed R&D deadlines, etc. New technologies, arising from innovation, always present the firm with a fundamental dilemma, whether or not to invest on such technology. This topic will be covered in more details in Section 2. 6. The choice however, is not as straightforward as it may appear when the type of innovation involved is disruptive.

3. 1. 3 Research and Development

As discussed thus far, innovation might originate from a research process undertaken by an individual, or a group of individual. Such process is known as Research and development, in a firm. Research and Development consists in creative work undertaken on a systematic basis in order to increase the stock of knowledge used to devise new applications [Ref: TIM Course]. This process is at the very base of the innovating process and can be subdivided in three distinct sets of activities [Ref: TIM Course]. These are basic research, applied research and experimental development. Basic research occurs with no particular applications in view. Applied research is undertaken towards a specific objective. Experimental development aims to use existing knowledge to produce new material or processes, or to improve existing ones. Once again the two poles which lead to innovation are present. On one side the R&D activity can be undertaken in order to solve a particular problem such as providing customers with a product or process which fulfills their needs. On the other side R&D activity occurs with no particular objective in mind. The results of such activity, such as an improved technology, can then push innovation forward. The two processes centered around Research and Development are Exploration and Exploitation [Ref: TIM Course]. Exploration constitutes the first step of the process, in which experimentation takes place. During the exploration phase, new resources are investigated. This process yields uncertain returns and has to be viewed from a long-term perspective- The following step, the exploitation phase, builds around the outcomes of the exploration phase. Its aim is to refine the new processes (or products, etc.) which have been discovered previously. Exploitation is reflected in an augmented productivity, refinement of

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processes, and increase in efficiency, etc. The returns of exploitation will depend on the context in which the process occurs. A firm may thus increase its returns on innovation by investing resources in the research process, through exploring and, subsequently exploit, new alternatives. However, the sources of innovation may be located outside the firm's boundaries. Innovation may in fact occur outside the boundaries of a given industry.

3. 1. 4 Open Innovation

The concept of Open Innovation is directly opposed to the one of Closed Innovation. In closed innovation the firm generates, develops and commercializes its own innovations [Ref: SM Course]. The research projects which are undertaken by the firm are transformed into outputs which are introduced into the market. The boundaries of the firm are closed to the exterior and, as such, innovations are originated only within such boundaries. On the other hand, in Open Innovation, the boundaries of the firm are permeable. Innovations will thus not only originate within the firm's boundaries but will also come from the external environment. The firm will then benefit from innovations which occurred in other firms or even in a different industry. The open innovation process is depicted in Figure 3. 4 below. http://www.janspruijt.nl/downloads/open_innovation_small.jpg Figure 3. 4: Open Innovation <http://www.openinnovation.eu/>

3. 1. 5 User innovation

Source of innovation might not be situated upstream of the supply chain. Innovation might, as previously discussed, result from a firm's efforts to solve a particular customer's need. Similarly, knowledge might also lie with the customer. In the case of User Innovation, the innovative activity is <https://assignbuster.com/the-modern-banking-industry-business-essay/>

undertaken by the receiver of a given process, product, or other output [Ref: Von Hippel]. In his book on " The Sources of Innovation", Von Hippel introduces the term Functional User of an innovation. The Functional Users are subdivided in three categories: Suppliers, Manufacturers, and Customers, depending on the type of benefit the user would get from it. The author argues that one can categorize individuals, and firms, according to the " functional relationship through which they derive benefit from a given product, process, or service innovation".

4 Diffusion of innovations

This chapter will discuss the key elements that regulate the diffusion of Innovations. Each of these elements will be presented to the reader and analyzed. The purpose of this chapter is to provide a framework of the environment in which an innovation originates. This framework will serve as a basis on which the adoption process of innovations will be analyzed. These elements presented in this chapter are obtained from the book " Diffusion of Innovations" written by E. Rogers [Ref: " diffusion of Innovations"] which provides a model describing the processes behind the diffusion of innovations. The diffusion of innovation is defined as the as the process by which an innovation is communicated through certain channels, over time among the members of a social system [Ref: " diffusion of Innovations"]

4. 1 Innovation

The meaning of innovation is, in this case, an idea or practice which is perceived as new by the individual. There are various types of innovation, which will be discussed in more detail further in this chapter, amongst these one can identify two dimensions: The degree of " newness" and the value

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with respect to the competitive advantage of the firm [Ref: Inn and the FP Bank]. These two dimensions are key to understanding the impact of the innovation on a company and, more importantly, on the industry in which the company is evolving. This first dimension, relating to the degree of uniqueness of an innovation encompasses the following types of innovation: Radical and Incremental. One can further distinguish the former type into Breakthrough and Revolutionary. This classification is of course subjective to a certain degree and the classification of an innovation will vary accordingly from one person to another. However, there are a series of characteristics for each type of innovation that will provide the reader with an more detailed understanding of these concepts. As of now it is important to note the main difference between Radical and Incremental innovation: Radical innovations are innovations which do not build on any previous innovation, and thus change the market in a significant way. On the other hand Incremental innovations are developed based on previous innovations and provide the users with a better version of a previously existing process or product. The other dimension, comprehends sustaining and disruptive innovations. The former represents an innovation which provides the user with an increased value compared to what he possessed before. Opposite to this, disruptive innovations start as innovations that do not provide the user with superior value. However, they have some characteristics, amongst which a lower cost, which might make them attractive to a small portion of users. These innovations evolve in time and start providing their users with increasing value until the point where they become more attractive to the other users as well. The difference between sustaining and disruptive innovation was discussed in the book " The Innovator's Dilemma" by C. Christensen,. The <https://assignbuster.com/the-modern-banking-industry-business-essay/>

title of Christensen's book refers to the incumbent's dilemma between continuing with their current path and the long-term benefits deriving from disruptive innovations. This topic will be covered in more detail further in this chapter.

4. 2 Communication and communication channels

Communication plays a central role in the diffusion of an innovation. The term "communication" describes the process through which a group of individuals gain and share knowledge with each other by exchanging information. A key element in the diffusion of information and in our case in the diffusion of an innovation is thus played by the so called communication channels [Ref: "diffusion of Innovations"]. Communication channels are defined by Rogers as the mean by which a message gets from an individual to another. Communication and Communication channels will indirectly determine whether an innovation will be accepted or not by an individual or a firm. It is important to note that communication is not only important to present the decision-making component, be it a single individual or an institution, with a potentially useful innovation, it also will influence the changes in perception of such innovation over time as the individual (or firm) will seek to gather more knowledge on such opportunity.

4. 3 Time

The time-dimension in the diffusion process will influence the adoption of an innovation along three dimensions: the innovation-adoption-process, the type of adopter and the rate of adoption. The innovation-adoption-process of an individual encompasses the various stages of decision that an individual undergoes once he is presented with a possible innovation. The length of <https://assignbuster.com/the-modern-banking-industry-business-essay/>

such process is highly subjective and therefore one cannot predict how long it will take for a given individual to go through each of these subsequent stages which are: Knowledge, Persuasion, Decision, Implementation and Confirmation. The type of adopter refers to the different segments of adopters of a given innovation with respect to time. These are subdivided in Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. As the respective names indicate, these various segments are defined by the period in which each segment decides to adopt a successful innovation over time. Finally, the rate of adoption measures the velocity at which a given innovation is adopted by the system. The graph that is obtained by plotting the cumulative number of adopters over time is the characteristic S-curve which shows that, at first, the innovation is adopted by a relatively small number of individuals, it then proceeds to being adopted by an increasing number of individuals until the point where the adoption rate is again slower, as the number of adopter reaches a saturation point.

4. 4 Social system

The fourth, and last, dimension of the diffusion of innovations is represented by the social system. The diffusion process occurs within the social system which is the network of the various units (individuals, organizations, etc.) that act together to pursue a common interest [Ref: " diffusion of Innovations"]. The manner in which the social system is structured will thus, influence the adoption process. The various elements of a social system, according to the research by E. Rogers, are: Norms, Opinion leaders, type of decision, Consequences of innovation.

4. 4. 1 Norms

Norms, which are a set of behavioral rules to which a system adheres, will determine the activities of the individuals within that system. Norms can therefore determine the presence (or absence) of adoption barriers.

4. 4. 2 Opinion Leaders

Opinion leaders play a significant role in the adoption process. They constitute the group of individuals towards which one turns to for further knowledge when faced with a potential innovation. As the name indicates they constitute the group of experts in the field of the innovation. Opinion leaders have gained substantial knowledge and reputation in a given field through their skills and competencies, and thus possess a position of influence within the communication network. However, this does not implicate that a given Opinion leader will positively influence the adoption of a new innovation as he may in fact oppose change. The behavior of opinion leaders with respect to change will be linked to the norms of the system, where a system that exhibits a positive attitude towards change will include Opinion Leaders with a similar attitude towards the latter.

4. 4. 3 Type of Decision

The decision of whether or not to adopt a certain innovation will not always rest on the same units of a system. Such decision can be taken by a single individual as it can be taken by a group of individuals such as a firm.

Although both an individual and a company go through a decision process when they must decide whether or not to adopt, the two processes differ somehow. Three types of innovation-decision are presented in Rogers' book: Optional innovation-decisions, Collective innovation-decisions, and Authority

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innovation-decisions. The characteristics of such types of decision will vary according to the unit which takes it and with the influences to which such unit is subjected. The optional-innovation decision refers to a decision in which a single individual will choose whether or not to adopt a given innovation. Collective innovation-decisions, as the name indicates, are choices which are made through a collective decision-making process. Finally Authority-based decisions will be made by an unit, be it a single agent or a group of individuals, which possesses influence over the other members of the system. When considering innovations in banks this distinction is particularly important as the final decision usually rests on individuals which might not necessarily possess a full picture of the innovation. Innovation teams can in fact bring a possible innovation in front of the individuals which will take the final decision. However, they will not be the ones deciding if the innovation will be implemented, even though they are the ones which possess a more in-depth knowledge of such innovation [Ref: Futureproof bank].

4. 4. 4 Consequences of Innovation

Finally, each innovation will have determined consequences on the system, once it is implemented. The nature of such consequences varies according to three classifications according to Rogers' research: degree of Desirability, degree of Directness, and degree of Anticipation. The first category listed in Rogers' book subdivides the outcomes of innovation into desirable and undesirable. The second category distinguishes between Direct outcomes and Indirect outcomes. The third and last division is between Anticipated and Unanticipated outcomes. Each innovation, once it has been implemented,

can thus have any of the above outcomes on the social system it is introduced into. Usually one would expect the innovation to have direct, anticipated outcomes which have a desirable outcome on the system. However this is not always the case as innovations can have unexpected effects (which are not necessarily undesirable) on the system both in a direct and indirect manner. As stated previously, innovations differ from inventions by the fact that the former are introduced into the market. It will thus be possible, in the following chapters, to devise a method in order to assess the consequences of innovations in banks according to the categories listed above. In the article "Integrating Models of Diffusion of Innovations" [Ref: Barbara Wejnert], the author states that the consequences of Innovations can be analyzed according to two further categories. The outcomes of innovation are discussed according to Public versus Private consequences and according to Benefits versus Costs. The first category allows differentiating between the parties that might be affected by a given innovation. Innovations with public consequences will affect a wider range of individuals that might not be directly involved with the innovation itself. Private consequences will affect smaller groups of agents, such as individual companies. The Benefits versus Costs dimension seeks to measure the Net benefits resulting from an innovation which arise from both direct and indirect effects. The costs of an innovation will not only be related to the resources invested for its implementation and to the monetary expenses. These also include the risks which an innovation can bring to the system and the social costs it can have. These two additional dimensions offer an interesting analysis regarding innovations in banks. The concepts of shareholders and stakeholders reflect the differentiation between private

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and public agents affected by an innovation. Shareholders, or stockholders, of a company are individuals which own, through shares and other means, a part of the company. The concept of stakeholder is very broad, as it is defined as any individual, or institution, which is affected by the company in a direct or indirect way. It is therefore worth investigating how much, and in which manner, stakeholders and stockholders of a bank are affected by its innovations, and what the social value of innovations in banks is. This topic will be discussed in more detail in the following chapters.

5 Adoption process

In order to understand the mechanisms that lie behind the success or failure of a potential innovation one must analyze the processes that an individual undergoes when faced with such innovation. In this section the main models that analyze such dynamics are presented to the reader. The stages regulating the adoption process from the perspective of a single individual are discussed. Such models are the results of a series of studies on the argument undertaken by various researchers. This section builds on the various elements presented in the previous chapter. The adoption process is analyzed according to various models which have been obtained from literature. These models seek to show the adoption process an individual undergoes from the moment he is presented with a possible useful innovation. It analyzes the various categories of individuals and the dynamics that characterize each step of the adoption process.

5.1 Adoption process: Individuals

Model by Ryan and Gross 1943 - page 40
The decision process that an individual undergoes once he is presented with a potential innovation is
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subdivided in five subsequent stages. In each stage information is gathered concerning the potential innovation and the individual gathers new knowledge from various sources. The five stages are: Knowledge, Persuasion, Decision, Implementation, and Confirmation. The duration for such process is highly dependent on the individual and on the context in which this individual evolves. Many inputs will come through communication with other individuals. Therefore, the process is not instantaneous.

5. 1. 1 Knowledge

The first step in the individual's adoption process is known as the Knowledge phase. This phase marks the beginning of the whole adoption process. It is characterized by the initial introduction of the possible innovation to the individual undergoing this process. Such individual can become aware of the innovation as the result of an applied research process, aimed at solving a particular problem, as he can stumble upon it by chance. The individual will, at that point in time, possess only a rudimentary concept of what the innovation is. He will thus seek to gather more data on the innovation. The three questions that possible adopter will seek an answer to are: " What?", " How?", and " Why?" [Ref: Futureproof and Diffusion]." What" a potential innovation can do is the first question asked. It seeks to examine the problem or need that the innovation will solve. Once the purpose of an innovation is found the potential adopter will try to determine " how" to use such innovation. This question is particularly important as the answer is not as straightforward as the previous one. Failure to understand how to operate a particular innovation will most certainly result in a rejection of the latter. Finally, the last question that needs to be answered is " why". Why does the

innovation work? This question seeks to determine the mechanisms behind the innovation and aims to explain how the innovation will solve the problem. Communication channels will play a central role in providing the potential user with the information he may require prior to moving to the next stage of the adoption process. If knowledge about the innovation is easily accumulated the process will be facilitated and its length will be greatly reduced. It is thus highly recommended that an innovation is accompanied with sufficient information that will allow its potential users to answer the three questions described above.

5. 1. 2 Persuasion

Persuasion represents the second stage in the adoption process. Being aware that an innovation exists, and knowing what the innovation provides, and how it provides, is not enough. An individual will then seek to gather additional knowledge, and possibly reassurances, regarding such innovation. Individuals are at this point somewhat involved with the potential innovation. They will thus actively seek to understand how such innovation may, or may not, benefit them. During this process they will seek advice from their colleagues or other peers which may have come in contact with such innovation previously. Of course, the input they will receive will be highly subjective. As previously discussed, Opinion leaders, constitute a group of people that are regarded as experts in a particular field and, as such, have gained significant influence in that field. Opinion leaders can thus greatly influence an individual's choice during the persuasion process.

5. 1. 3 Decision

The Decision phase constitutes the point in the adoption process in which an individual decides whether or not to adopt an innovation. According to the type of adopter this stage is reached after a varying amount of time since the adoption process started. The two types of decision that can be reached are the adoption or rejection of the innovation. The decision will depend on the previous stages. If the individual has been persuaded that an innovation can benefit him he will opt for adopting such innovation. On the other hand, if an individual is convinced that such innovation will not benefit him he will discard it. The option to try-out an innovation before reaching a Decision can be greatly beneficial during this phase. Trialability, as will be discussed in the following chapter, is a characteristic of innovations which determines whether or not it is possible for an individual to try the innovation in order to weight the benefits and disadvantages it may have. An innovation which offers a trial phase will be adopted much faster than the same innovation without such option.

5. 1. 4 Implementation

Once the decision to adopt has been made, the innovation is put to use by the individual. An innovation which is easily integrated in the routine of an individual will be in general more successful than one which requires considerable changes to the individual's habits. In general, individuals' habits are always resilient to change. When an innovation affects a single individual the process is somewhat easier than when a group of individuals is involved, such as in a company. During the implementation phase the consequences of an innovation will be discovered. If the innovation behaves

as expected and there are no unwanted consequences the implementation will likely be successful. However, some unanticipated, both direct and indirect, consequences might arise. If such consequences are undesirable the user will weight-out the positive and negative effects and decide on whether or not to continue using the innovation. Furthermore, an individual might realize that the information obtained during the knowledge phase is insufficient or, even, wrong. An innovation might be more difficult to use than expected, or the benefits of such innovation might not match those that had been anticipated. All these factors will contribute towards the final decision of the individual. A phenomenon, known as re-invention, can also take place during the implementation phase [Ref: Diffusion of innovation]. An innovation might vary as it diffuses, through changes made by the individuals using it. Individuals may add, or alter, features of an innovation to better suit their needs. This activity is connected to the concept of user innovation that has been discussed in the previous chapters.

5. 1. 5 Confirmation

According to Rogers' research, the last step during an individual's adoption process is the Confirmation phase. An individual that has previously adopted an innovation might decide to dis-adopt. Dis-adoption takes place when an individual receives negative feedbacks on an innovation. Depending on the type of adopter, the probability of occurrence of dis-adoption varies. Early adopter will be less likely to dis-adopt than late adopters [Ref: Futureproof bank]. The concept of Discontinuance is introduced to better describe the dis-adoption process. Dis-adoption of an innovation is the decision to " reject an innovation after having previously adopted it" [Ref: Diffusion of

innovations pag 123]. Discontinuance is divided in two categories:

Replacement and Disenchantment. Replacement occurs whenever an innovation that had been previously adopted is rejected in order to adopt a, better, innovation which replaces it. Disenchantment consists in the rejection of an innovation, due to a failed performance compared to expectations.

5. 2 Type of adopters

5. 2. 1 Classes of Adopters

How an individual moves through the various stages of the adoption process will depend on the type of individual undergoing such process. The category to which an individual belongs will be dependent on the relationship between such individual and innovations. An individual who is more open towards innovation will adopt in a shorter time than one which is more conservative. Individuals that have adopted an innovation can thus be subdivided into various groups depending on the duration of their respective adoption process. The resulting graph is a (near) normal distribution, as shown in Figure 5. 1 below, with the following categories: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards [Ref: Diffusion of Innovations].

Figure 5. 1: Roger's Bell Curve of Potential Adopters (adapted from E. M. Rogers, 1995)The different categories are obtained by plotting the non-cumulative number of individuals against the time in which they adopt an innovation. Each category will react differently to an innovation and, similarly, will respond in a different way to the various influences received during the adoption process. Innovators are part of the group of individuals which first adopts an innovation. These are risk-prone individuals which will be responsible for introducing an innovation into the social system they

belong to. Innovators represent roughly 2.5% of the adopting population. Early Adopters are, in comparison to Innovators, better integrated into the social system. Early adopters represent the category of individuals who will quickly adopt an innovation. Opinion leaders are numerous in this group. Their presence makes early adopter very important in the diffusion process as they will be the source of information and influence for individuals that will adopt the innovation subsequently. Early adopters correspond to approximately 14% of the social system. The Early Majority category, which encompasses 34% of the population, follows the early majority in the adoption process. As stated above, this category is highly influenced by the presence of Opinion leaders which have already gone through the adoption process. Individuals belonging to this group will go turn to those opinion leaders during the Knowledge and Persuasion phase in order to gather more data on the innovation. Such individuals are generally less risk-prone than individuals belonging to the previous categories. Such category is important as it contains a large portion of the adopting population. It will thus serve as a link, connecting the early adopters to the later categories. Late Majority includes individuals which succeed the average adopter. These individuals present a rather distrustful behavior towards innovations. Their adoption will thus result from the pressure coming from those individuals which have already adopted. Such pressure might be in the form of a necessity to adopt if a lock-in effect results from the innovation. The late majority accounts for 34% of the population. Laggards constitute the last adopting category over time Laggards include the most conservative individuals which are resistant to change. Laggards exhibit a risk-averse behavior and will only adopt once they are entirely convinced of the benefits of an innovation. Such group

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accounts for roughly 16% of the market. Individuals who fall into the first categories are of much greater value to the adoption process than those who belong to the late categories. Research has shown that early adopters are worth significantly more of their successors. For online banking, the first 2.5% of customers (or adopters of a given innovation) are worth 80% more than those who adopt relatively late [Ref: Futureproof pag 38], as a consequence of their ability to influence the late adopters. The value of early adopters with respect to later ones will, of course, be dependent on the type of innovation and the market in which it is introduced.

5. 2. 2 The S-Curve of innovation

As discussed previously, the cumulative number of adopters, plotted against the time in which the innovation has been adopted results in an S-Curve which is characteristic of the diffusion process. Such curve is depicted in Figure 5. 2. Figure 5. 2: The S-Curve of Adoption (adapted from E. M. Rogers, 1995)The S-Curve is also known as the logistic function in mathematics. Its characteristics are an initial exponential growth which is followed by a saturation effect in which growth decreases progressively until it stops completely. The " S" shape of the cumulative adoption is a direct result of the dynamics which regulate the adoption process an individual goes through, and which have been discussed beforehand. As previously discussed, a social system will exhibit individuals with different attitudes towards innovation. Initially, the diffusion process starts-off slowly. Only innovators, and subsequently, early adopters will go through the adoption process. The cumulative number of adopters will thus grow at a slow rate. However, once a critical mass point has been reached, the process will

become self-sustaining [Ref: Futureproof] and the growth rate will increase exponentially as relatively early adopters integrate the innovation. Later adopters will then embrace the innovation, as a result of the increasing pressure received, and their numbers will be added to the total. As the number of adopters grows the growth rate will start to drop as a result of the diminishing number of individuals which are left within the system.

Communication and Communication Channels play a central role in pushing the innovation forward. Through communication individuals within the social system are made aware of the innovation's existence and purposes (knowledge phase), and are then persuaded to adopt such innovation (Persuasion and Decision phases). Opinion leaders which are concentrated mainly in the Early Adopters category will greatly influence the elements of the social system. Their influence is the main driver of the exponential growth which characterizes the S-Curve.

5. 2. 3 The Bass innovation model

Knowing the amount of adopters of a potential innovation is of great value to innovating firms as it allows them to devise their strategies accordingly. The Bass innovation model seeks to forecast the number of adopters of a given product at any point in time. It is a predictive model which is based on the assumption that adoption can result from both internal and external influences. Internal influences refer to interpersonal communication whilst external influences refer to the communication of the message through mass media. Adoption due to external influences decreases over time. On the other hand, adoption due to internal influences increases over time until it reaches a maximum level, after which it progressively decreases. The

underlying equation of the Bass model of innovation is based on three parameters: the coefficient of imitation, the coefficient of innovation, and the size of the market. Based on these parameters it is then possible to forecast the level of adoption over time. In the case of innovating firms, such as banks, this equation is of particular importance as it allows forecasting the number of adopters of a given innovation at a certain point in time and, based on this, to calculate the expected revenues and impacts that such innovation could have. However, in order to do so it is necessary to assign values to the parameters listed above. Such parameters can be estimated by extrapolating the values from the data of the early stages of an innovation. This however, requires for the innovation to be implemented beforehand. Another method would be to obtain an estimate for such parameters by analyzing the data of a previously-implemented innovation which is as similar as possible to the current one.

5. 2. 4 Critical mass

The concept of critical mass, introduced previously in this chapter, describes one of the key factors in the diffusion dynamics. As stated previously the critical mass point is given by the point in time in which the number of adopters is sufficient for the adoption process to become self-sustaining [Ref: Diffusion of innovations: p205]. As the number of adopters increases so does their influence on other individuals which might adopt the innovation. Once enough individuals have adopted a new innovation their ability to influence others, through communication channels, allows the innovation to spread successfully. Another key element, which explains the existence of the critical mass concept, is given by the perceived value of an innovation by

individuals. In the case of an interactive innovation, which is characterized by the interaction that occurs between users, the perceived value for each user is dependent on the number of users itself. Each additional user will thus increase the overall value of the innovation both for him and for the other existing users. This phenomenon is described by the well-known Metcalfe's law [Reference: literature], which is depicted in Figure 5. 3. Metcalfe Law Network Effect Figure 5. 3: Metcalfe's law <http://www.mkbergman.com/837/the-law-of-linked-data/> As the value increases, the more likely an individual will adopt the innovation. Past a certain point, once the critical mass has been reached, the value of the innovation is such that the adoption process becomes self-sustaining.

5. 3 Adoption process: Firms

Similarly to the previous one, this chapter will examine the adoption process but from the perspective of the firms. The various stages a company goes through when faced with a possibly helpful innovation will be analyzed in order to understand the dynamics that regulate the adoption or rejection of innovations within a company. An overview on the characteristics which define an organization will be given and their link to the innovation adoption will be discussed.

5. 3. 1 Characteristics of an Organization

An organization is " an established social system that exists to serve particular goals" [Ref: Futureproof 51] According to the Author of " Innovation and the Futureproof bank", J. Gardner, an organization can be subdivided into five main elements, which are interconnected: Goals, Roles, Authority Structures, Rules and Regulations, and Informal Patterns [Ref: Futureproof <https://assignbuster.com/the-modern-banking-industry-business-essay/>

51]. Such element, will influence the adoption process within the institution and its innovativeness in general. The goals of an institution vary depending on the type of organization and on the business strategy that it follows. In general, an organization will seek to create value. Such value can be in the form of private, financial, returns to the shareholders as it can be the creation of a public service. Roles within an organization are defined by the set of tasks which are performed and their subdivision throughout the various blocks of the organization. Such roles are thus performed by specific individuals, or group of individuals which belong to the various offices within the company. The authority structure defines the relation between superiors and subordinates. The authority structure (and the Role division) is usually represented graphically through an organizational chart. The authority structure can have a variety of forms, such as Simple structure, Unitary, Multidivisional, as shown in Figure 5. 4. Figure 5. 4: Example of Authority Structure

Rules and Regulations are the formal guidelines which need to be followed by the members of an organization. They represent the set of procedures to which both managers and employees must abide when working within the organization. These rules might regulate a variety of processes such as the hiring of employees. Informal patterns are rooted at the core of well-established organizations. They represent the values which are held by the organization. The term " culture" of an organization is often used when discussing this phenomenon. In summary, the culture of an organization is the philosophy of the firm which is carried on by its employees. These five characteristics of an organization affect its degree of innovativeness, which is the probability that such organization might undergo an innovation adoption process. Organizations which display a rigid

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set of rules and regulations are, for example, less likely to innovate than others in which rules are less strict.

5. 3. 2 Phases of the adoption process

The adoption process that a company undergoes when faced with a potentially useful innovation is similar, yet not equal, to the one through which an individual goes through. Such differences arise from the increased amount of complexity caused by the interaction between agents within the firm [Ref: Futureproof page 53]. The adoption process within a firm is subdivided in five stages: Agenda setting, Matching, Redefining/Restructuring, Clarifying, and Routinizing.

Agenda Setting

The so-called Agenda Setting constitutes the first stage of the adoption process within a firm. The firm is faced with an organizational problem which must be dealt with. An example of a typical organizational problem is a performance gap. An incumbent firm might be faced with a performance gap once the value that it offers to its customers is lower than the one offered by a competitor. It is not always the case, however, that a problem is found prior to the innovation that might solve it. It can occur for an innovation's existence to trigger the agenda setting process within the firm.

Matching

The second step of the adoption process is defined as the matching process. In this phase, the firm is seeking to find an innovation that could potentially solve the organizational problem that has been discovered. The search for such innovation can occur on many dimensions. The source of the innovation

might in fact be situated within the firm itself and originate from its R&D. However, as discussed in the previous chapters, the source of innovation can also be situated outside the boundaries of the firm or even outside the boundaries of the industry. At this stage, rejection occurs if the potential innovation is found to be inadequate to solve a particular organizational problem.

Redefining/Restructuring

Once an innovation has been selected, it is introduced into the organization. However, the innovation will inevitably be subject to modifications to match it to the structure and dynamics of the organization. As the innovation is integrated it, in turn, affects the company. During this phase the innovation and the organization both change through a series of feedback loops. Once equilibrium is reached, the effects of the innovation can be examined and the decision on whether or not to continue with its implementation can be made. The length of the process will depend on the impact of the innovation on the system. An innovation which changes the system significantly will require more time to be successfully integrated.

Clarifying

During the clarifying phase the innovation, which had previously been introduced into the organization, begins to be used throughout the whole institution in a more intensified manner. At such point, the innovation which was previously an experiment of the sort is being used on a daily basis as part of the operations of the firm. During such phase the whole ramifications and consequences of the innovation are discovered by the organization. The clarifying phase thus provides the organization with an in-depth view on the

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consequences of an innovation. The decision to reject such innovation will be made based on the perceived net benefits that arise from it.

Routinizing

During the routinizing phase the changes which have been decided and examined in the previous phases are embedded into the operation of an organization. Such change will thus have a large impact on the employees of a firm as it might significantly affect their habits. The routinizing phase will last for an amount of time dependent on the amount of people involved and on the effects on such people habits. As discussed previously, changes within an organization are often met with a certain degree of resistance. Such resistance needs time and measures in order to eventually be bypassed. Therefore the firm will have to take a series of measure in order to facilitate the transition to a new organizational setting. Rejection can occur if the changes to which the organization is subject are too many and if the company has not prepared its employees to face such changes.

6 Rate of Adoption

The rate of adoption defines the speed at which an innovation is adopted by users within a system, be it individuals or firms, over time. There are a variety of factors which influence the rate of adoption. This section will analyze these factors in order to determine their influence on the speed of adoption. The rate of adoption is related to the success of the innovation itself as it is a measure of how well the innovation is integrated within the system. This chapter thus provides a framework on the characteristics that an innovation should have in order to facilitate the adoption process.

6. 1 Characteristics of Innovations

The rate of adoption is affected by a wide series of factors which are dependent on the innovation itself. Such factors can be subdivided in five main categories: Perceived attributes, Type of Decision, Communication channels, Social system, and Efforts of change agents.

6. 1. 1 Perceived attributes

The perceived attributes of innovations are the attributes which characterize an innovation and that define how such innovation is dealt-with and perceived by its potential adopters. Such characteristics are: Relative advantage, Compatibility, Observability, Trialability, and Complexity [Ref: Diffusion p140]. Each of these attributes will affect the amount of adopters at any given point in time by shifting the S-curve either to the left, for a faster rate of adoption, or to the right, for a slower rate of adoption. Relative advantage refers to the increase in efficiency, performance, etc. that can be achieved by adopting an innovation. Such advantage is not only measurable from the economic perspective but is rather subjective to the individual, or firm which is going through the adoption process. An innovation which shows a relative advantage will shift the adoption curve to the left. Compatibility of an innovation measures how well an innovation fits the needs of an individual or organization. Furthermore each individual or organization follows a set of values and routines. An innovation which is easily integrated in the habits of the user will thus increase the speed of adoption. An innovation is observable when the results of such innovation are easily discernible and understandable by the potential users. An innovation which can be observed when used by people who have already adopted it will thus

be easier to understand by potential adopters. Higher observability will therefore facilitate the diffusion process. The trialability attribute of an innovation consists in the possibility to try-out such innovation without having to face real consequences. The possibility to experiment with an innovation without risks greatly reduces the uncertainty that might otherwise surround an innovation. Therefore, an innovation which offers an experimentation phase will shift the adoption curve to the left. Complexity refers to the ease-of-use of an innovation. An innovation which is complex will require greater efforts from the potential users in order to be operated efficiently and effectively. Therefore, an innovation which requires a lower learning time and understanding will facilitate the adoption process.

6. 1. 2 Other factors

Perceived attributes play a significant role in the speed of the adoption rate. However, they are not the only factors to take into consideration. The other factors which have been listed previously also affect the speed at which an innovation is adopted. As previously stated, there are various types of decision which can be taken during the adoption process. The type of decision will influence the adoption rate of an innovation. An individual's optional-decision will generally be easier to reach than a collective decision or that of an authority decision. Therefore, the adoption rate of an innovation within a firm will depend on both the type of decision itself and the number of individuals taking part in the decision process. A collective innovation-decision in which a consensus between many individuals has to be reached will require a greater time than one which is made by an authority unit within the firm. Communication channels influence the speed of adoption. An

innovation is diffused through such communication channels, which can be both interpersonal and mass media channels. The way the information regarding the possible innovation is passed through these channels will determine the speed at which potential users will become aware of such innovation, will gather information regarding the innovation, and will finally come to a decision. The structure of the social system will also influence the speed of adoption. A social system which exhibits a strict set of norms and regulations will slow down the adoption process. Furthermore, the structure of communication networks within the system, and how well those are connected will also affect the speed of adoption. Change agents are those individual within a system, such as opinion leaders, with the ability to influence the other members of the system. Change agents can affect the speed of innovation depending on the efforts that they may place in communicating the possible advantages or disadvantages of a given innovation to others.

7 Types of Innovations

The previous chapters have discussed the various sources from which innovations originate, the dynamics that regulate their diffusion through a social system, and the adoption process undergone by individuals and firms when faced with a potentially useful innovation. This chapter will focus on the innovation itself, and more specifically on the various types of innovation that can take place. The previous chapters have already, briefly, covered some of the topic which will be analyzed with greater detail in the following pages. The nature of an innovation can be of many sorts and affect many aspects of an industry. An innovation can change the products as it can

change the organization or processes within an industry. Furthermore each innovation can be subdivided in two separate dimensions which are characterized by the degree of newness, and the value with respect to the competitive advantage of the firm.

7. 1 First dimension of Innovations: Degree of newness

The first dimension which characterizes innovations relates to the degree of newness that such innovation creates. For example, an innovation might simply improve an existing process thus improving the efficiency within an industry without however, radically changing it. Another innovation might however, implement a completely different process from the existing ones. The latter innovation will therefore, affect the industry in a completely different manner than the former one. As a first step, innovations can be subdivided according to a varying degree of newness into Breakthrough, Revolutionary, and Incremental innovation. The concept behind such division is that each innovation relates in its own way to the antecedent state of the system in which it is introduced. The first two categories, Breakthrough and Revolutionary innovation, both belong to the category of Radical innovation. Breakthrough and Revolutionary innovation vary according to several aspects but both are linked by a common denominator: they introduce something new into the system. On the other hand, Incremental innovation, as the name indicates, consists of an improvement of something which already exists.

7. 1. 1 Radical Innovation

Radical innovation encompasses those innovations which introduce something new into the system such as Breakthrough and Revolutionary
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innovation. The distinction between each category varies according to literature and is therefore subjective to a certain degree. There are however, a series of aspects which characterize each of these two categories.

Breakthrough innovation consists of innovations whose contribution to the system in which they are introduced is unprecedented. Such category of innovations is characterized by a high degree of uniqueness, a game-changing impact on the system, and a high level of uncertainty involved [Ref: Futureproof page3]. Revolutionary innovation, on the other hand, does show a slightly reduced degree of newness. A revolutionary innovation does not revolutionize the market completely, once it is integrated in it, but rather changes the hierarchies that were in place beforehand. Revolutionary innovation offer a much greater value to the users compared to what they are replacing. Such type of innovation shows lower uncertainty but also lower returns [Ref: Futureproof page4].

7. 1. 2 Incremental Innovation

The second category is represented by Incremental innovations. As the name indicates, such innovations build on previously existing structures. Therefore, the impact of incremental innovations is generally less noticeable than the one of radical innovations. Incremental innovations offer less risk than their counterpart as the system in which they are introduced has already integrated the features which are only being improved by the innovation. Furthermore, the acceptance process is facilitated by the understanding that individuals or firms may already have on that topic. Incremental innovation does not alter significantly the environment in which a firm evolves. Therefore, when such innovation occurs, the strategy of the innovating firm

is not overturned but rather adjusted slightly to better exploit the changes. This kind of innovation thus aims to exploit the, already existing, concepts which define a given industry. Incumbent firms are usually the beneficiary of such type of innovation as their position as leaders within the industry is reinforced [Ref: Architectural innovation - page 0].

7. 1. 3 Other models

A model in which innovations are categorized as being either radical or incremental does not reflect the full scale of the characteristics which distinguish each innovation. Further studies on innovations have in fact claimed that such model is too simplistic and does not encompass all the different categories of innovations. A paper from Henderson and Clark [Ref: Architectural innov.], claims that Architectural innovation constitutes an additional category of innovations. Furthermore, opposite to Architectural innovation, Modular innovation replaces the components of a product with others which perform the same function, therefore leaving the architecture of the product untouched. Although it only touches the topic of this research on a marginal way, it is worth spending a paragraph to understand what this other kind of innovation represents. Architectural innovation consists of changes in the architecture of the product without changing the components of the latter. In such type of innovation, the previously existing relationship between each component of a product is modified and reorganized whilst the core design of the components is left untouched. [Ref: Architectural innov page 1].

7. 2 Second dimension of Innovations: Relationship to Competitive Advantage

The second dimension of innovation is related to the effect that an innovation has over the competitive standing of innovating firms within an industry. The concept of competitive advantage has been analyzed in the preceding chapters and, as previously stated, represents a value creating strategy of a firm, not being implemented by its competitors. Not all innovations provide firms with immediate competitive advantage. One can distinguish innovations into two categories: Sustaining and Disruptive. These two categories have very different impacts in terms of competitive advantage of a firm. Moreover, disruptive innovation can in fact lead to the failure of previously well-established firms in an industry.

7. 2. 1 Sustaining and disruptive innovation

Sustaining innovation positively affects innovating firms by enhancing the products or services which were previously being offered [Ref: Futureproof page 6]. Such type of innovation constitutes the vast majority of those taking place in the market. Sustaining innovation can be either radical or incremental. Sustaining innovation can thus improve the performance of a product by either improving already existing technologies (in the case of a technological innovation), through incremental innovation, as it can introduce a new set of technologies which replace the previously used ones [Ref: Innovator's dilemma page 1]. On the other hand, there can occasionally be an innovation which does not apparently increase the product's performance of the innovating firm. In fact, such innovation seems to initially offer lower performance. This second type of innovation, the so-called

disruptive innovation as it has been named in a famous work by author C. Christensen, has however, a very important impact on the dynamics that regulate competitive advantage in the long run within a firm. Although an innovation which offers inferior value, to whomever chooses to adopt it, sounds rather counterintuitive, disruptive innovation does in fact provide its users with a series of positive effects which might just tilt the scale in its favor. Disruptive innovation does in fact offer an inferior value which, however, also implies lower costs to the users. This characteristic is enough to make it initially attractive to a restricted number of potential users which constitute what is known as a niche segment of the market. The potential revenues of such niche segment are so low that it is strategically irrational for an incumbent firm to invest in that segment. The fact that in this early stage of the innovation the rational choice for an incumbent is not to invest in the disruptive innovation constitutes the key characteristic that causes disruptive innovations to have such an important impact on the market. As time goes by, the innovation starts to become increasingly more attractive as it offers increasingly superior value, at lower cost, and begins to attract customers from outside the niche segment. Figure 7. 1 shows how the performance of a disruptive innovation is initially lower than the performance of a sustaining one but is able, over time, to offer greater value in comparison, whilst sustaining technologies overshoot customer's demands. Figure 7. 1: Sustaining vs Disruptive innovation (Adapted from C. Christensen, 1997)

7.3 Impact on the Organization

Since there are a broad variety of innovations, each with its own particular characteristic, innovating firms will devise their strategies, build their knowledge, and develop their capabilities accordingly. It is, therefore, crucial to understand the different implications that each type of innovation has on the environment in which it is introduced. Furthermore, an innovation does not only impact the firm which uses it but it affects the whole industry of such firm and can reach even further, beyond the boundaries of a single industry. When dealing with financial innovations, the concept remains unvaried. Innovations will affect the characteristics of the organizations and, in turn, will be affected by them. Once again, it is important to distinguish between the two dimensions which characterize innovations: the degree of newness involved, and the impact on competitive advantage.

7.3.1 Impact related to degree of newness

Innovations can change several aspects of an industry depending on what, and how much, an innovation transforms the environment in which it is introduced. As discussed earlier in this chapter, incremental innovation will only slightly modify the existing processes and products whilst radical innovation will cause important changes to the industry's dynamics. Moreover, architectural innovation will affect the linkage between a product's components. Firms build their organization, develop their skills and knowledge, and shape their capabilities around the industry in which they evolve. One can distinguish between the two opposite extremes in innovation. On one side, incremental innovation constitutes the "conservative" end of innovation. On the other side, radical innovation

constitutes the "destructive" end. Incremental innovation enhances a firm's existing competences. Products designs are improved, existing processes are perfected and made more efficient, customer's experiences is improved and made more comfortable, etc. In summary, such type of innovation reinforces the existing mechanisms within an industry as it is centered on existing competences, skills and knowledge. Incumbent firms find their position reinforced whilst barriers of entry are raised, and the threat of substitutes or new entrants is reduced [Ref: mapping the winds of...page 6]. Although the single impact of incremental innovation is often small compared to the one of other innovations, the cumulative effect of reiterated innovations often has a greater impact than the original innovation. Radical innovation changes the mechanisms that previously regulated a given industry. Existing competences, knowledge and skills are made obsolete as new ones need to be developed around the new products, processes, etc. Therefore, firms which previously dominated the industry through superior knowledge and skills may now find themselves lagging behind firms which have built their organization around the radical innovation. The concept of the destruction of an established setting to reach a new environment is encompassed in the theory put forward by Schumpeter on what has since been known as Creative Destruction [Ref: the theory of economic development]. An important consequence of innovation is the appearance of a so-called "dominant design". The term "Dominant design", as the name indicates, describes the emergence over time of a product design which is adopted over other alternatives [Ref: Mastering the dynamics of innovation]. The end result of innovation is the acceptance of a dominant design around which the capabilities, knowledge, and organizational strategies of the

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industry will be centered. Once a dominant design is in place, the standardization of the industry's products will allow for economies of scale to be exploited. Another implication of Incremental innovation is the resulting reinforcement of the dominant design in the industry, following a period of sustained incremental innovation [Ref: mapping the winds of...page 18].

Dominant design first appears as the result of radical innovation, as a certain is adopted over its alternatives. Once such design has been integrated within an industry, incremental innovation takes place as the refinement process occurs. Therefore, incremental innovation reinforces the market's preference for the dominant design by improving its performance, efficiency, etc. In summary, different categories of innovation will imply a different managerial approach. Incremental innovation requires a well-thought approach that allows to exploit the resulting improvements in performance and to exploit the resulting economies of scale that arise from such kind of innovation. Radical innovation is, on the other hand, arises from technology-push effect. Therefore, the organization must be able to recognize the potential of such innovation and to plan its strategy, skills and capabilities around it.

7. 3. 2 Impact related to competitive advantage

The dimension which pertains to the effect on competitive advantage encompasses two types of innovation. On one end of the scale is sustaining innovation. On the other end is disruptive innovation. The strategic implications linked to such types of innovation, and in particular to disruptive innovation have been of much interest for researchers in this field. The most preeminent research on this topic has perhaps been conducted, and published, by author C. Christensen in his book entitled " The innovator's

dilemma". Sustaining innovation occurs when an emerging technology improves the current product performance. Specifically, sustaining innovation occurs through an improvement along the dimensions of performance which are valued by the main customer segments within an industry [Ref: Innovator's dilemma...page 11]. The greater amounts of innovations which occur over time within an industry are of sustaining nature and, in turn, can be either incremental or radical. The performance of a sustaining technology over time is depicted in Figure 7. 2. Figure 7. 2: Performance S-curve for sustaining technologies(Adapted from C. Christensen, 1997)Changes in performance created by sustaining innovation occur within the same value (performance) measurement. This implies that whatever impact the innovation may have, it can still be measured by using the same indicators that were used previously. Therefore, the effects of this type of innovation are measurable by firms and customers alike and the possible benefits which may occur are recognizable and measurable. Managing such type of innovation requires for firms to focus their approach to a few core markets which can be exploited and on following the emergence of new technologies without the necessity of being first movers with emerging technologies. As the vast majority of innovations are sustaining in nature the core capabilities and the knowledge of the firm are still useful. However, firms must recognize whenever an innovation is of disruptive nature as the strategic approach to such types of innovations deeply differs from the one for sustaining innovations. Disruptive innovation constitutes the minority amongst the innovations which occur within an industry. Nonetheless, such type of innovation can be the cause of serious upturns in the dynamics that regulate the leadership of an industry. As <https://assignbuster.com/the-modern-banking-industry-business-essay/>

managers are often confronted with sustaining innovations, it is crucial for them to be able to recognize whenever an innovation is of disruptive nature. Failure to do so may cause the firm to take the wrong decision and lead to the loss of their leadership or even to failure. Disruptive innovations differ from their counterpart as, initially, their value proposition is directed to a small portion of the market. The changes brought by such type of innovation are valued, in the initial stage of the adoption process, only by a small part of the social system by those which constitutes a niche segment within the market. This also implies that the current indicators through which value is measured are inapplicable to measure how such innovations impact the market. Initially the innovation can only satisfy the value requirements of its niche segment. However, over time the value proposition with respect to the rest of the market is such that the innovation begins to attract an increasing number of customers as it expands throughout the whole market. Figure 7. 3; shows the evolution of performance of a disruptive innovation over time. Figure 7. 3: Performance S-curve for disruptive technologies(Adapted from C. Christensen, 1997)The disruptive " technology 2" initially has characteristics which make it attractive only in " market B". However, the performance of such technology improves over time until its value proposition in " market A" is higher than the one of the sustaining " technology 1". At this point the disruptive technology will replace the previous technology in that market. In his research on the causes for failure of established firms due to the appearance of disruptive innovation, Christensen argues that failure is the result of three elements which are discussed in his book: the existence of sustaining and disruptive innovations, the increasingly fast technological progress which often precedes market's demands, and the way in which

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customers' demands often shapes the strategies of a firm. The first point, which has already been discussed in the preceding chapters, explains how on occasion technologies which offer different value propositions arise within an industry. The second element, relating to the fast technological progress has two relevant implications concerning the dynamics which lead to the failure of established firms. First, sustaining technologies which are introduced onto the market may overshoot customers' demands. Customers using such technology will therefore have to pay more than what they value such technology. Secondly, fast technological progress also implies that disruptive technologies, which initially underperform will quickly improve and offer increasingly superior value. The third point listed above, the fact that a firm's strategy is often shaped by the market's demands has three significant implications when discussing the causes for an established firm's failure. First, disruptive technologies initially offer lower profit margins as such technologies are cheaper than their sustaining counterparts. This means that established firms will often ignore them to concentrate on technologies which offer greater returns. Second, disruptive technologies are initially valued by a very small portion of the total market. Therefore, the profits which could result from investing in such technologies are almost insignificant to established firms. The third factor is that as these technologies offer a different value proposition than sustaining technologies they underperform when measured along what is valued by the majority of the customers. Such big segment of the market demands a higher value to be provided by the firms, thus rendering disruptive innovations unattractive to established firms. The elements presented above are the reason for which good management can lead to making the wrong decision. When confronted

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with a possible innovation managers need to recognize whether or not such innovation is of disruptive nature. Failing to do so will result in the wrong decisions being made and for the innovation to be ignored. Established companies will focus their decision process and resource allocation process on technologies which are important for the customers they serve. Therefore, disruptive innovations will be discarded in favor of other technologies which, apparently, offer greater returns and address the need of the big customers' segments. These wrong decisions are the result of the following principles, listed in Christensen's book [Ref: innovator's dilemma page 88], upon which companies base their strategies. How companies deal with such principles when confronted with disruptive innovations will determine its failure or success. The five principles are as follows: Resource dependence: Resource allocation within companies is heavily linked to customer's demands. Therefore technologies which do not initially satisfy such demands are overlooked. Importance of small markets: Small markets are often overlooked by established companies as they do not represent a viable solution for growth. Uncertainty about final application of technology: The full range of applications for disruptive technologies is often unknown in the initial stages of the innovation's life. Therefore decisions are made without knowing the full possibilities of an innovation. Intrinsic capabilities of firms: Firm's capabilities and specifically those which are deeply rooted within the culture of the organization are the drivers for success in the current markets. However, such capabilities are often clashing with the capabilities needed when dealing with emerging disruptive technologies. Technology supply versus market's demands: Unattractive technologies in established markets may in fact have characteristics that make them

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attractive in unexploited markets. Based on such principles, the strategies which established firms need to undertake when confronted with disruptive technologies need to differ from the usual strategies used with sustaining innovations. According to Christensen, the current knowledge and capabilities of the firm still constitute a crucial element when confronted with innovations. However, firms must be able to discern when such innovations are potentially disruptive and act accordingly. Firms must be able to analyze the impact an innovation may have on the long run. As stated previously, the final applications of an emerging technology is usually unknown in the earlier stages. Being able to recognize whether or not any innovation has the possibility to meet future customer's demands therefore plays an important role when devising strategies. Current customer's demands and the corresponding market trends should not be the basis for decision when confronted with such type of innovation. Disruptive technologies start off by only being attractive to a small part of the market but quickly reach more and more importance. Decisions regarding disruptive innovations have to be made by people who are able to gain a different perspective which also accounts for the different value attributes of such innovation. In other words, people who take decisions concerning sustaining innovations do so by considering those attributes which are considered as being of value. However, disruptive innovations usually have other sets of attributes which can render them unattractive if such attributes are not deemed relevant. Based on that last point, finding a market which values the attributes of a disruptive innovation is of crucial importance to its success. Therefore, a firm's strategy should include devising a marketing approach to successfully attract customers for disruptive technologies by creating awareness of their

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valuable attributes. The above paragraph provides a general guideline on which established firms can base their strategies when confronted with disruptive innovations. Ultimately however, the dilemma for established firms still remains. Organizations which require fast growth and high returns on investments will find great difficulties in managing such innovations. Learning through experimentation, and potentially failure, is an inherent prerogative of disruptive technologies which often cannot be accepted by large organizations. Furthermore first-mover advantage is of more importance for disruptive technologies than for sustaining ones. However, established companies cannot disperse their resources on any innovation which could, or could not, potentially become of some importance. The ability to differentiate between sustaining and disruptive innovations is therefore of crucial importance to the survival of an organization as its strategy must be devised accordingly.

7. 4 Innovation Categories

Innovation can impact a broad range of factors within a firm. It is therefore useful to distinguish between all the different aspects of innovation by understanding the main categorizations that it can have. Amongst these are: Product innovation, Process innovation, Market innovation, Design innovation, etc. Product and Process innovation constitute perhaps the two most common categories. Product innovation occurs whenever an innovation improves the value offered by a firm's product. Such improvement can be in terms of costs, technological performance, etc. Process innovation affects the organization of a firm by improving the overall organization's

performance. For instance this can occur through improved efficiency of the assembly line by using a new technology.