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Stakeholders' Responses to Disruptive Technologies

Ruksana Ashraf[1], D Mavoothu[2]
[1]Research Scholar, School of Management Studies,
Cochin University of Science and Technology, Kochi – 22
[2]Professor and Director, School of Management Studies,
Cochin University of Science and Technology, Kochi – 22

ABSTRACT

As the term disruptive technologies itself signifies, these are technologies capable of fundamentally disrupting the way things are done in the present. The impact of disruptive technologies provokes various kinds of responses in different stakeholders. Moving beyond the scope of the primary stakeholders comprised of the customers, complementary innovators, suppliers, and investors, these technologies can also create impact and provoke responses from a secondary set of stakeholders, namely, the competitors, activists, governments, media, public interest groups, local community and trade associations. This study was conceived with the belief that mapping the response trends in the environment of disruptive technologies can aid in a better understanding of how disruptive technologies serve the stakeholders. The earlier studies in the area were predominantly on the incumbent's response to disruptive technologies. Other rare studies that have attempted to analyze multiple stakeholders have done so from the perspective of a single technology. In this study, we attempt to analyze multiple stakeholder responses to various disruptive technologies in order to glean the existence of a pattern in these responses. This paper is a conceptual one, and the methodology followed is qualitative.

Keywords: Disruptive Technologies, Stakeholders, Response

1. INTRODUCTION

It is common knowledge that no organization can exist in isolation. It needs to interact with the environment around it to derive various resources. This need was the basis for the propositions of the Resource Dependency Theory (Pfeffer and Salancik, 1978), which stated that an organization depends on its environment comprised of capital markets, customers, donors and labour markets.

These resources ultimately determine what an organization can do or be. It is not just about drawing resources; the actions of the firm also create certain repercussions in its environment. Therefore, it can be said that this interaction between the firm and its environment is a two-way process with both the parties being affected or benefited. Commenting on the influence of technology in the environment, Utterback and Afuah (1995) argued that the local environment is a function of process of technological innovation and that certain initial and prevailing conditions, the type of innovation, chance events etc influence the process of uncertainty resolution, capabilities building and survivor selection – essential characteristics of technological evolution.

This idea of how firms and technology influence and are influenced by the environment brings out the necessity for stakeholder analysis. 'Any group or individual who can affect or is affected by the achievement of the firm's objectives' are called the stakeholders of a firm (Freeman, 1984). Speaking in the context of R&D project management Coombs et al (1998) stated that

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identifying key stakeholder's issues was necessary while formulating benchmarking tools for R & D project management.

Every technology follows a growth trajectory. The mapping of this trajectory can show the distinct influence of the technology on stakeholders and also the contribution of the latter to the technology. If so, it must be assumed that disruptive technologies also follow the same pattern. With the publication of Clayton M Christensen's "Innovator's Dilemma" (1997), considerable interest has been generated on this phenomenon of disruptive technologies. Alluding to the resource dependence theory (Pfeffer and Salancik, 1978), Christensen and Bower (1996) posited that it is the firm's dependency on its customers for the provision of resources that ultimately prevents the incumbent from channeling its resources to pursuing disruptive technologies.

The theory of disruptive innovation has faced a lot of criticism over its inability to provide knowledge on how to predict successful disruptive technologies (Danneels 2004, Christensen 2018). To address this weakness in the theory, and to understand factors influencing the growth of disruptive technologies, careful mapping of the growth trajectory of these technologies are required. Such an exercise would mean mapping the environment in which the technology emerges and thrives. Such an input can aid in improving the predictive quality of the theory. This, coupled with Christensen's (2018) call to enrich the study of the theory by exploring response strategies, have prompted us to analyze the response patterns of various stakeholders to disruptive technologies.

2. DEFINITIONS

DISRUPTIVE TECHNOLOGIES

The main attributes of disruptive technologies that can be gleaned from Christensen's (1997) book are, (i) they initially underperform in the dimensions valued by mainstream customers (ii) disruptive technologies distinguish themselves from the existing technologies or products by way of being cheaper, simpler, smaller and convenient. Their features appeal more to a group of fringe customers (iii) the mainstream markets or customers of the incumbents initially would not find any use of these products based on disruptive technologies, and hence they are commercialized in emerging or insignificant markets. The incumbents will not see the rationale in investing in such technologies, (iv) however, these technologies go on to improve steadily and would eventually meet expectations of the primary market (v) once the technology has improved and attains a space in the mainstream market, it topples the dominant incumbents from its market position.

Danneels (2004) pointed out that the lack of a proper definition was hindering the progress of research in this area. He attempted to fill the space by defining disruptive technologies as those technologies, "that changes the bases of competition by changing the performance metrics along which firms compete."

To enable progressive research in the area of disruptive technologies, Govindarajan and Kopalle (2006) developed a scale to measure the disruptiveness of innovations. According to them disruptive innovations should satisfy four criteria of (i) being inferior with regard to the attributes that the mainstream market values, (ii) offering new customer segments or the mainstream market sensitive to price new value propositions, (iii) a lower price (iv) penetrating the market from the fringe to mainstream.

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STAKEHOLDERS

The concept of stakeholders originated in 1963 when the Stanford Research Institute first used the term in an international memorandum (Freeman, 1984). According to this, stakeholders are 'those groups without whose support the organization would cease to exist'. Freeman's (1984) own definition of the concept has been discussed in the introduction part of this paper. He chose to classify stakeholders into two groups – primary stakeholders having a direct impact on the firm and secondary stakeholders who indirectly influence the firm through the primary stakeholders. Phillips (2003) classified stakeholders of a firm as normative stakeholders and derivative stakeholders. Stakeholders to whom the organization has a direct moral obligation are called normative stakeholders. They include the customers, financiers, employees, local communities, and suppliers. Stakeholders to whom the organization does not have a direct moral obligation are called derivative stakeholders. However, these stakeholders wield power over the organization as they can harm or benefit the organization. They include competitors, media, activists, terrorists, etc.

PRIMARY STAKEHOLDERS

According to Freeman (1984), primary stakeholders are groups or individuals on which the organization depends for its survival. They include stockholders, employees, customers, suppliers, and key government agencies.

SECONDARY STAKEHOLDERS

Secondary stakeholders consist of individuals or groups which can affect or be affected by the performance of the organization in terms of its policies, products, and work processes. They include the local community, activists, public interest groups, government agencies, trade associations, competitors, and media.

STAKEHOLDERS' RESPONSES

Alluding to Darwin's Theory of Natural Selection and Herbert Spencer's famous phrase "survival of the fittest," Megginson (1963), affirmed that it is not the most intellectual or strongest of the species that survives, but the one that can adapt the best to the changes in its environment. He was speaking in the context of the lessons American businesses could learn from Europe. The Cambridge Business English Dictionary defines response as "a reaction to something that has happened." According to the Merriam-Webster dictionary, a response may be a "quick or spontaneous reaction to a person or thing that serves as a stimulus." All stakeholders are part of an ecological system that is governed by the natural order of responding to stimuli. For this study, we have borrowed from this idea of natural order to define stakeholders' responses as "the strategy, mechanism, or plan adopted by the stakeholder to respond to the stimuli he perceives in his environment. His choice of not responding will also be considered as his response to the stimuli". Please note the term stakeholder's response is used as a noun, and the term respond in the definition is the verb.

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STAKEHOLDERS' RESPONSES TO DISRUPTIVE TECHNOLOGIES

An individual /organization/stakeholder's choice of response is the thing that dictates its survival, continued existence in the status quo, or its ability to capitalize on the situation and thrive. For this study, we have chosen to examine the response patterns of the secondary stakeholders.

INCUMBENTS

Though disruptive technologies initially gain acceptance in fringe markets that are traditionally neglected by the large firms, these technologies gradually grow and encroach upon the main markets of the incumbents, essentially making them their competitors. According to Christensen (2018), the major response strategies adopted by incumbent firms are:

- **Extend Current Performance – Improvement Strategies**: Adner and Kapoor (2016) studied the transitions in the semiconductor lithography equipment industry and observed that incumbents responded to the onslaught of new technologies by focusing on improving the current performance. Utterback (1994) points out an example of how some incumbents responded to the coming of refrigerated-ice manufacturing technology by making dramatic improvements in pond ice harvesting technology.
- **Proactively Repositioning**: Some incumbents respond to disruptive technologies by repositioning their products in the market. Adner and Snow (2010) cite the examples of how Linjett, makers of sailboats, managed to successfully continue manufacturing the same even after the rise of engine power. They also point out that companies like Pelikan and Waterman successfully carried on with fountain pen business even after the coming of ball pens by effectively repositioning their offerings.
- **Organizational Ambidexterity**: O'Reilly and Tushman (2016) in their book Lead and Disrupt: How to Solve the Innovator's Dilemma mentions promoting organizational ambidexterity as a response to disruptive innovations. IBM was one of the first organizations to adopt this approach of simultaneously pursuing exploratory and exploitative strategies in an organization. The continued relevance of IBM despite having been disrupted at various occasions, may be attributed to this two-pronged strategy.
- **Co-opting with Disruptors**: Incumbents may respond to disrupters by choosing to work along with them in a co-operative manner. Pointing out instances from the automated speech recognition industry, (Marx, Hsu, and Gans, 2014) show that incumbents may enter into licensing agreements with disrupters to promote a technology. According to Christensen (2011), disruptive innovations are capable of dramatically increasing the share values of an organization. Hence, incumbents also show a tendency to acquire firms championing disruptive technologies. An example is the acquisition of VMware, who developed the software to enable multiple virtual software in IT departments by EMC. When the latter acquired VMware in 2004, its revenues stood at $218 million. But soon, the disruptive technology caught the wind, and the revenues of VMware jumped to $2.6 billion in 2010, and as of 2018, its revenue stood at $7.9 billion. Sandström et al., (2009)'s account of how Hasselblad, one of the leading manufacturers of professional cameras, saved itself from the brink of bankruptcy by employing collaborative and acquisition strategies also shows the viability of co-opting strategies to adapt to disruptive technologies.

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- **Technology Reemergence**: Citing examples from the Swiss Mechanical Watch Making process, Rafaelli (2018) shows that certain technologies need not always have to succumb to disruptive technologies. Though initially, they faced a demand slump on account of the mass manufacturing of quartz watches, the Swiss watchmakers were able to regain a sizeable demand on account of the reemergence of the legacy technology.

GOVERNMENTS

The Governments of the countries where the disruptive technologies emanate and those of the countries to which the technologies diffuse into are essentially an integral part of the secondary stakeholder system. They may respond to disruptive innovations in myriad ways. But, there are two major ones:

- **Regulations:** The first association that comes to our mind between governments and disruptive technologies is that of a regulator that dictates the course of diffusion of the technology. The response of the UAE government to VoIP is an excellent example. According to UAE, the security situation in the present Arab world is not conducive to technology. Therefore, the blanket ban. History is replete with several instances wherein the government has stepped in the course of proliferation of technologies. The ban of the printing press by the Ottoman Emperor is an example. Similarly, Economists of the London School of Economics have pointed out that move by the French Government to ban Calico cloth affected the French economy greatly and thwarted its ambition of becoming the global leader in textiles.
- **Legislations:** Disruptive technologies bring forth new challenges never envisioned before. Therefore, the onus is on the governments to bring out legislation to ensure that the rights of its citizens are protected with the emergence of such technologies. The response of the Californian lawmakers to Uber's ride-hailing business is an example. They have introduced a gig-work bill that would make the drivers employees of Uber and hence eligible for benefits and bargaining rights. However, Uber considers them as independent contractors or freelancers enabled to find work by the technology platform provided by them. Internet, social media, Genetically Modified Organisms (GMO), Cryptocurrency, Big Data, etc. are some of the technologies that are plaguing the current lawmakers. The fact that these technologies are still in a transitory phase, and the repercussions of these are yet to be understood makes legislation a difficult task.
- **Promotion:** It is easier to see the government as a regulator or legislator than a promoter of disruptive technologies. However, the fact remains that enablers for disruptive technologies emerged within government-funded labs and projects. The classic example is the internet, which was born out of contributions from the US Department of Defense, the CERN, and the National Physics Laboratory, UK, etc. Services like Google Earth and Maps function on the GPS, which was the result of the Cold War-era need of the USA and USSR to keep tab on each other. Therefore, one can say that some of the disruptive technologies emerged in response to the technological advancements made in the state-funded projects. This resembles the ambidextrous method adopted by incumbents with the two pronged strategy of exploration and exploitation. Similar to this, the Governments are also seen to be donning the roles of both a promotor and regulator.

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ACTIVISTS AND PUBLIC INTEREST GROUPS

Activists and Public Interest Groups are important stakeholders in the dissemination of disruptive technologies as they are capable of influencing public opinion regarding these technologies. They also help address the societal uncertainties and fears regarding these new developments. Some of the common forms of response displayed by these stakeholders are as follows:

- **Protests:** Protests are a major form of response from the end of these stakeholders. However, these criticisms do have a brighter side. It helps to channelize attention towards mitigating the risks associated with the technology and also helps bring in better legislation for their control. It also helps in the democratization of the proliferation of the technology. Hall and Martin (2005) describe how environmental pressure groups, anti-globalization advocates, etc. influenced the course of the introduction and marketing of Genetically Modified Organisms by the company name Monsanto.
- **Hacktivism:** With the advancement in technology, the type of activisms has also changed. At times layman cannot understand how certain new technologies, especially those in the digital space, are going to affect him. This has led to the emergence of concepts like hacktivism, where people with sound technical knowledge and those who understand the disparities caused by technologies coming forward in protests to set things right. The root of this sort of activity lies in hacker culture and ethics. For example, the author of the widely used email encryption software - Pretty Good Privacy (PGP), distributed it first to the peace movement. Most of the hacktivist activities are directed towards issues like free speech, human rights, or freedom of information movements over the internet.
- **Whistleblowing:** Off late, whistleblowers have been playing a notable role in bringing out injustice and disparity in the technological domain. The Cambridge Analytica – Facebook scandal, which involved the misuse of data of Facebook users to influence election outcomes, was exposed by Christopher Wylie, a former employee of Cambridge Analytica. Lawmakers are still struggling to create legislation to ensure fair usage of data of billions of people now accessible to corporations like Facebook.

The fact that these hacktivists and whistleblowers are experts in these technologies reflects the ambidexterity in the nature of their response to disruptive technologies. On the one hand they are early adopters of these technologies and it is their expertise in these areas that helps them to react to the problems associated with these technologies.

MEDIA

- **Dissemination**: A significant role of media lies in the dissemination of disruptive technologies. Over the years, the content of traditional media like newspapers and television has grown to accommodate technology-related content in their offerings. It is difficult to think of any newspaper or television that does not carry a segment of technology. The rise of social media is the other significant change in the media industry. Blogs, podcasts, webinars offering in-depth analysis of the latest technological trends help democratize the knowledge and access to these technologies. Another significant trend in media is the rise of the MOOCs, offering the ability to any person living on any part of the globe to learn the latest courses from some of the premier institutes around the globe. MOOCs are a disruption themselves in the field of education.

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- **Reception / Adaptation:** Though the media has been the active disseminators of disruptive innovations, they are also one of the largest groups affected by disruptive technologies. However, the media has responded to disruptive technologies by way of adaptation quite remarkably. With the internet growing in popularity, most of the media houses found their traditional business models of print and television broadcast growing irrelevant. This necessitated a digital transformation which most of the media houses were able to pull-off rather remarkably. The rise of social media platforms like WhatsApp and Twitter was also a great challenge that the traditional media has adapted too. Here again, one can see that media as a stakeholder has taken an ambidextrous approach to adapt to disruptive technologies as well as to become an advocate of the disruptor.

CHALLENGES IN MANAGING STAKEHOLDERS' RESPONSES TO DISRUPTIVE TECHNOLOGIES

- Sometimes some stakeholders are not expressing or revealing their responses, i.e., they are suppressing their responses. So it is beyond the understanding of the disruptors.
- All stakeholders are not equally aware of the presence of disruptive technologies.
- No systematic efforts are taken by the disruptors or the key stakeholders to collect or understand the responses of the different stakeholders.
- The unintended usage of disruptive technologies is suppressing the intended usage of the same — for example, the internet, Whatsapp, nuclear technology.
- Many disruptive technologies are not coming under the legal purview immediately. They are getting lesser acceptance due to a lack of legal acceptance.
- Whenever there is a disruptive technology, the government must play the role of key stakeholder or stakeholder by default. Nevertheless, usually, governments are very slow to respond — for example, Uber, Cryptocurrency, Blockchain, etc. are some of the latest technologies that need better legislation. Another significant area would be the ethical dilemmas associated with Artificial Intelligence algorithms.
- Responding to disruptive technologies requires a systematic effort and therefore incurs a high cost.
- The responses are not culturally neutral, and hence standardized forms are not possible.
- Infrastructure not sufficient to capture, organize, analyze, and to make meaningful conclusions or pattern out of stakeholder responses.

3. CONCLUSION AND IMPLICATIONS

The understanding of stakeholders' responses gathers relevance because these act as feedback loops without which course correction is not possible. They essentially dictate the trajectory of growth, diffusion, and assimilation of these technologies. Pliny the Elder's work – 'Natural History' mentions the invention of flexible glass by a glass-maker during the time of Emperor Tiberius Caesar. However, the glass-maker was forced to shut down his workshop for the emperor feared that this technology had repercussions that might even bring down the value of gold, silver, and other precious metals. It is hard to confirm whether this legend of the lost technology is true, but it does show how much power a stakeholder can wield over a technology. The story of FM radio is no different. The technology could not flourish initially due to the lobbying of the incumbent companies in the AM radio business, which drove the inventor to suicide. However, the technology surfaced back several decades later, leading to the flourishing FM business that we see today. Most of the disruptive technologies that we see today, like mobile phones, personal computers, etc. are its better versions today due to the changes these technologies underwent based

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on feedback from its environment comprised of stakeholders. The patterns of response of the stakeholders seem to suggest that the ambidexterity theory of innovation can be an effective tool to reckon with adapt to disruptive technologies.

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