

Internet of Things and Competitive Advantage

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Abstract: *The study aimed at finding out how internet of things (IoT) affects competitive advantage of a firm. In this study, the Porter's Five Forces of Competitive Position Analysis model and the model of technology, Organization and environment (TOE) were reviewed. TOE framework was reviewed because the three elements in the framework explain both constraints and opportunities that organization face in technological innovation. Therefore the three elements influence the way a firm sees the need for, searches for, and adopts new technology. This study is exploratory and adopted theoretical analysis of the relevant studies. From the analysis, the study revealed the following: the IoT has the potential to grow global corporate profits by 21% in 2022; The IoT is advancing exponentially that its potential uses are beyond the reach of speculation; Internet of Things or IoT promises to make consumers' lives more efficient, more convenient, and more enjoyable, and to transform industries by enabling new services, new business models, and new experiences hence giving firms a competitive edge; Strong data privacy and security practices are a potential source of competitive advantage.*

Keywords: Internet of things (IoT), Competitive advantage, big data, Radio frequency identification (RFID)

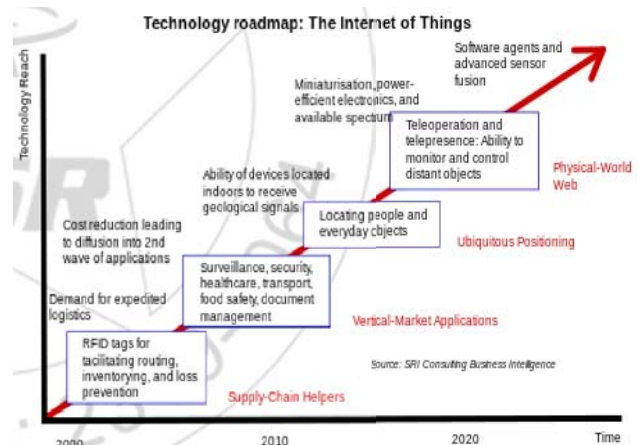
1. Introduction

According to Michael Porter [17], Competitive advantage is a function of either providing comparable buyer value more efficiently than competitors (low cost), or performing activities at comparable cost but in unique ways that create more buyer value than competitors and, hence, command a premium price (differentiation). A firm can only win either by being cheaper or by being different (which means being perceived by the customer as better or more relevant).

A firm can be viewed as a series of activities which link together into a value chain. Each of the links in the chain adds value, that is, something that a customer is prepared to pay for. Any firm's objective is to be a leader in the industry. 'Internet of things' is an emerging technology that promises to help firms in all industries to provide quality products and services efficiently at low costs hence giving those firms an edge in the industry.

The Internet of Things is a huge network of sensors and smart devices, combined with advanced analytics and cloud services to make sense of all the data. It promises to augment and disrupt products and services across industries. The Internet of Things (IoT) is the next frontier in the digital revolution. It can help companies increase productivity, cut costs, offer new products and services and deploy new business models hence enhancing competitive advantage of an organization. There will be nearly 26 billion devices on the internet of things by 2020 [7]. This growth has been attributed to the fact that devices that are used every day (for example refrigerators, GPS, cars, lights) and operational technologies are becoming connected entities across the globe. This world of interconnected things where the humans are interacting with the machines and machines are talking with other machines (M2M) is here and it is here to stay. As per a survey and study done by Pew Research Internet Project in 2014, a large majority of the technology experts and engaged Internet users who responded; 83 % agreed with the notion that the Internet of Things, embedded and wearable computing devices will have widespread and beneficial effects by 2025 [8]. The IoT allows objects to be sensed and/or controlled remotely across existing network

infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. The IoT has the potential to grow global corporate profits by 21% in 2022 [4]. The IoT is advancing exponentially that its potential uses are beyond the reach of speculation.



2. Statement of the Problem

Countries in Latin America and Sub-Saharan Africa are facing a challenge of enormous economic growth slowdown. Creating a more dynamic environment going forward looks much more challenging, because these countries lack non-resource dynamic export industries that can generate the dynamism that the resource sector no longer can. Knowledge is a fundamental component of economic growth and welfare [6].

Fraud increases the cost of doing business, places businesses at risk and is a leading cause of insurance company insolvencies [14]. Insurance premiums in Kenya could be around 20 per cent lower if it were not for fraud [11]. The fraud in insurance is due to insurance companies' failure to innovate in controlling costs, keeping tabs on their agents and, most importantly, getting to know their customers [11].

Volume 5 Issue 11, November 2016

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General insurance business is facing two major challenges. The first challenge is to come up with a solution for companies whose viability is threatened by their inability to meet policy holder claims. The second major challenge is how to generate growth for an industry that has significant potential for growing as a percentage of GDP but has been stagnant [16]

The IoT has the potential to grow global corporate profits by 21% in 2022 [4]. For insurers and other industries already facing growth and profitability issues, long-term signs are pointing to accelerated change and new challenges that will require new strategies to address changing customer behavior and view of risk. Organizations looking to cut costs, improve business practices, and better assess clients' risk levels, will increasingly invest in the Internet of Things (IoT). Consumers are already demanding that their various devices connect and sync seamlessly from their fitness trackers to cars to home security cameras [20].

Despite the bright future offered by internet of things integration there are also challenges; Privacy and Security concerns surrounding IoT will be particularly important for organizations connecting to networks. Hence, network-aware intelligence and end-to-end physical security for video and all networked sensors must be at the heart of any IoT solution. The IoT demands an extensive range of new technologies and skills that many organizations have yet to master [15]. In many technology areas, lack of skills will also pose significant challenges.

Therefore this study aims at finding out how internet of things affects organization's competitive advantage.

Objectives of the Study

- 1) To explore how connectivity affect Customer experience
- 2) To explore how big data affect competitive advantage
- 3) To find out how privacy affect competitive advantage
- 4) To find out how information security affect competitive advantage

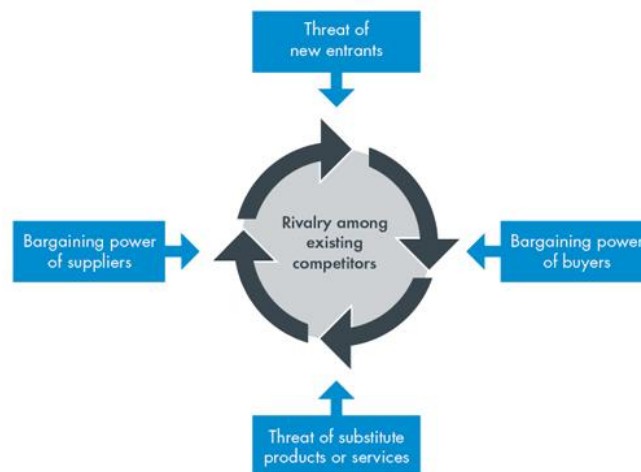
3. Theoretical Review

Today, information technology (IT) is universally regarded as an essential tool in enhancing the competitiveness of the economy of a country. There is consensus that IT has significant effects on the productivity of firms. These effects will only be realized if, and when, IT are widely spread and used. It is essential to understand the determinants of IT integration. Consequently it is necessary to know the theoretical models that explain how firms can gain competitive advantage. In this study the model of Porter's Five Forces of Competitive Position Analysis and model of technology, organization, and environment (TOE) have been reviewed.

Porter's five Forces of Competitive Position Analysis

Porter's Five Forces of Competitive Position Analysis were developed in 1979 by Michael E Porter of Harvard Business School as a simple framework for assessing and evaluating the competitive strength and position of a business organization. This theory is based on the concept that there are five forces that determine the competitive intensity and

attractiveness of a market. Porter's five forces help to identify where power lies in a business situation. This is useful both in understanding the strength of an organisation's current competitive position, and the strength of a position that an organisation may look to move into [10]. By understanding where power lies, the theory can also be used to identify areas of strength, to improve weaknesses and to avoid mistakes.



Supplier power: This is an assessment of how easy it is for suppliers to drive up prices. This is driven by the: number of suppliers of each essential input; uniqueness of their product or service; relative size and strength of the supplier; and cost of switching from one supplier to another.

Buyer power: This is an assessment of how easy it is for buyers to drive prices down. This is driven by the number of buyers in the market; importance of each individual buyer to the organization; and cost to the buyer of switching from one supplier to another. If a business has just a few powerful buyers, they are often able to dictate terms.

Competitive rivalry: This is concerned with the number and capability of competitors in the market. Many competitors, offering undifferentiated products and services, will reduce market attractiveness.

Threat of substitution: Where close substitute products exist in a market, it increases the likelihood of customers switching to alternatives in response to price increases. This reduces both the power of suppliers and the attractiveness of the market.

Threat of new entry: Profitable markets attract new entrants, which erodes profitability. Unless incumbents have strong and durable barriers to entry, for example, patents, economies of scale, capital requirements or government policies, then profitability will decline to a competitive rate.

The Five Forces model was applied to the emerging Indian business environment in comparison with more developed markets. The analysis found that factors such as state protectionism and a lack of infrastructure are greater barriers to entry in India than they are in more developed nations, where market forces are more powerful. The analysis highlighted many issues affecting competition in emerging

economies and compared them to those that are more prevalent in more developed markets.

TOE Framework

In this study, the model of technology, organization, and environment (TOE) framework have been reviewed. This framework was first developed in 1990 by Tornatzky and Fleischer. It identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation. These aspects include the technological context, organizational context and environmental context.

Technological Context

The technological context includes the internal and external technologies that are relevant to the firm. Technologies may include both equipment as well as processes.

Organizational Context

A range of descriptive measures characterize the "organizational context": firm size; the centralization, formalization, and complexity of its managerial structure; the quality of its human resources; and the amount of slack resources available internally; formal and informal linkages within and outside the firm; decision making and internal communication methods; and boundary spanning mechanisms to communicate with the external environment. The concept of the "organic" versus the "mechanistic" organizational system is also relevant here. Frequent lateral communication, decentralization of leadership and control, and active networking both within and outside the firm are hallmarks of the "organic" system. Building inter organizational collaboration mechanisms is fundamental in meeting the needs of electronic coordination linkages enabling supply chain partnerships. According to M. Tushman and D. Nadler (1986), top executives can energize major organizational changes by sending consistent signals both within and outside the firm about the value of the innovation; developing and communicating a clear image of the firm's strategy, core values, and role of technology in meeting this strategy; and creating a team responsible for crafting a vision relevant to the innovation.

Environmental Context

The environmental context is the arena surrounding a firm, consisting of multiple stakeholders such as industry members, competitors, suppliers, customers, the government, the community, etc. They can influence how a firm interprets the need for innovation, its ability to acquire the resources for pursuing innovation, and its capability for actually deploying it. These stakeholders could either support or block technological innovation. Changing market and competitive conditions prod firms to use various forms of innovation. Government regulation is also another powerful tool for constraining a firm's operational activities, increasing costs of production, and instigating an investigation of technologies that must meet specified mandatory criteria. Finally, dominant customer firms could exert their power to shift their suppliers' production

activities and/or business processes to comply with its requirements.

These three elements present both constraints and opportunities for technological innovation. Thus, these three elements influence the way a firm sees the need for, searches for, and adopts new technology. Moreover, The TOE framework as originally presented, and later adapted in IT adoption studies, provides a useful analytical framework that can be used for studying the adoption and assimilation of different types of IT innovation.

4. Discussion

How connectivity affect Customer experience

With ever-increasing competition, service providers seek to develop loyalty by aggressively designing, continuously innovating, and managing their customer experiences. When companies connect with customers' emotions, the payoff can be huge [13]. In the search for profitable organic growth, more and more companies are making major investments in optimizing the end-to-end customer experience; every aspect of how customers interact with the company's brand, products, promotions, and service offerings, on and offline.

New trends and advancement in technology (ICT) is forcing companies to think in different way about value creation and to be more responsive to consumer experiences. The balance of power in value creation is tipping in favor of consumers [5]. Spurred by the consumer-centric culture of the Internet with its emphasis on interactivity, speed, individuality, and openness the consumer's influence on value creation has never been greater, and it is spreading to all points in the value chain. Without integration, firms will never be able to unleash the full potential of digital technologies. Digital disruption may be messy, unpredictable and at times, overwhelming. However, it is also inescapable, powerful and incredibly motivating. Any firm must plan on how to leverage digital disruption to enhance the customer experience and by extension competitive advantage and drive business value.

How big data affect competitive advantage

Competitive advantage is dependent on superior access to information [19]. Information is the oxygen of the modern age. The use of Big Data is becoming a crucial way for leading companies to outperform their peers. In most industries, established competitors and new entrants alike will leverage data-driven strategies to innovate, compete, and capture value [19]. Big data promises to be transformative. As computing resources have evolved, advancing to better handle data size and complexity, companies stand to reap many more benefits from big data and analytics. According to a 2013 A.T. Kearney IT innovation study, more than 45 percent of companies have implemented a business-intelligence or big data initiative in the past two years [1]. Further studies estimate more than 90 percent of Fortune 500 companies will have at least one big data initiative underway within a year. The effective use of this tidal wave can deliver substantial benefits. Building capabilities in this area will not only improve performance in traditional segments and functions, but also create opportunities to expand product and service offerings.

The use of Big Data (large pools of data) that can be brought together and analyzed to discern patterns and make better decisions will become the basis of competition and growth for individual firms, enhancing productivity and creating significant value for the world economy by reducing waste and increasing the quality of products and services. All companies need to take Big Data and its potential to create value seriously if they want to compete. For example, some retailers embracing big data see the potential to increase their operating margins by 60 per cent [1]. Big data analytics enable marketers to send customer communications that are more relevant, personalized and targeted than ever before. By using data-driving marketing, marketers can learn how to optimize their appeal to individual customers [12]. According to a 2014 study by Accenture and General Electric, 84% of the companies surveyed believe that big data analytics could "shift the competitive landscape" for their industry by 2016 and 89% believe companies that fail to adopt a big data analytics strategy could lose both market share and momentum.

There are five ways a firms can leverage on big data which include: Big Data can unlock significant value by making information transparent; Big Data allows ever-narrower segmentation of customers and therefore much more precisely tailored products or services; Sophisticated analytics can substantially improve decision-making, minimize risks, and unearth valuable insights that would otherwise remain hidden; Big Data can be used to develop the next generation of products and services.

How privacy affect competitive advantage

Strong data privacy and security practices are not just about risk mitigation, but also a potential source of competitive advantage [16]. There is a clear connection between consumers' perceptions of data privacy and security practices and commercial success. Half of the consumers surveyed consider the privacy and security of their personal information when choosing an online retailer, and 80 percent say they are more likely to purchase from consumer product companies that they believe protect their personal information [16]. A growing awareness about companies' use of consumer data will lead consumers to expect simpler, more graphical privacy policies. Misuse and abuse of data will impact profitability as a result of fines and lost consumer trust. Privacy is "the next green movement." Companies should respond by "stress-testing" their data operations, and turn privacy policies into a marketing opportunity. Firms should consider viewing data privacy and security not just as a risk management issue, but as a potential source of competitive advantage that may be a central component of brand-building and corporate reputation [6]. A research from Forrester and C. Holcomb in 2015, states that strong privacy policies gives businesses competitive edge. Companies that approach data privacy the right way can use it to differentiate themselves [9]

How information security affect competitive advantage

In today's high technology environment, organisations are becoming more and more dependent on their information systems. It is vital to be worried about information security because much of the value of a business is concentrated in the value of its information. Information is the basis of

competitive advantage [9]. Without information, neither businesses nor the not-for-profit sector could function. Valuing and protecting information are crucial tasks for the modern organization.

The public is increasingly concerned about the proper use of information, particularly personal data. The threats to information systems from criminals and terrorists are increasing. According to the Business Insider Intelligence Survey conducted in the last quarter of 2014, 39% of the respondents said that security is the biggest concern in adopting internet-of-things technology. Building and keeping customers' trust is the cornerstone of this potential competitive advantage. Consumers crave information about how their data are being used [9] Companies can build trust if they give consumers this information on how their data are being used. Some companies even give customers the opportunity to decide which information about them can be shared.

5. Conclusion

The Porter's Five Forces of Competitive Position Analysis and TOE framework has been a useful tool in explaining "internet of things" deployments in Firms in order to gain a competitive advantage. Firms are in the midst of a new technology shift in which billions of devices and objects from cars to wearable to drones are becoming intelligently connected. Referred to as the Internet of Things or IoT it promises to make consumers' lives more efficient, more convenient, and more enjoyable, and to transform industries by enabling new services, new business models, and new experiences hence giving firms a competitive edge. While the IoT has been driven from a technology perspective by Moore's law with more powerful, low cost and small form factor chips, its value is reflected in Metcalfe's law which states that the usefulness of a network grows as the square of the number of nodes increases. Firms ought to consider this within the context of the IoT, in which tens of billions of devices and objects will be connected and interconnected in the coming years. IoT opportunities are truly limitless and the innovation is happening throughout the ecosystem and extends well beyond software, as tremendous amount of activity happening with hardware development as well is being witnessed. Privacy and Security concerns surrounding IoT will be particularly important for organizations connecting to networks. Strong data privacy and security practices are a potential source of competitive advantage. With several trillions Value at Stake, IoT presents an important opportunity to increase market share, gain competitive advantage, strengthen and grow your customer base, and increase profitability. Consumer data is the biggest differentiator in this digital era, any firm that unlocks the realms of data and uses it strategically wins.

6. Recommendation

Based on the findings and conclusions of this study, the following recommendations are drawn:

Security is one of the main priorities for the adoption of internet of things. The IT department can ensure security policies relating to (Virtual Private Network) VPN, anti-

virus software, activation of personal firewalls or use of encryption are enforced, and that in the event of a device being lost or stolen, IT is able to remotely wipe organization data. Organizations not only need to consider the value of their data and the risk of losing it, but also the potential compliance and reputation implications.

There are a number of policy guidelines that need to be put in place before the adoption of the Internet of things. Organizations must take national data privacy laws as well as vertical-specific regulations into account when developing their corporate internet of things policies. Organizations processing sensitive personal data must take adequate technical and organizational measures to protect that data.

Organizations should deconstruct traditional workspaces, using virtualization to decouple dependencies among hardware, OS, applications and user states found in traditional desktop configurations. This gives them greater flexibility to stream the right set of user profile, data and applications on-demand, at the right performance level and in a secure manner to any device, based on employee roles and IT requirements

The government and other business stakeholders should come together to hold forums and public events whereby managers and employees are informed and made aware on the benefits of adopting Internet of things while at the same time creating awareness on the risk involved in adopting Internet of things concept.

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