

Business adoption of digital marketing dashboards

Master's Thesis
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1 INTRODUCTION

1.1 Research area

As the number of organizations has grown significantly over the past couple of decades, the competition amongst the organizations has become tougher and sturdier. Companies around the world are looking for the most effective and efficient ways to reach their customers. Digital marketing is the sum of activities used to popularize brands and products through different electronic media. According to Gartner, budget allocation for marketing continues to increase and big corporations (with more than \$5 billion revenue) spend around 13% of their annual revenue on marketing, while small companies (\$250 to \$500 million revenue) spend around 10% of their annual revenue. These stats make the digital marketing industries a billion-dollar business in USA and Europe alone. It is predicted that investment in digital marketing will only increase in coming years, since online sales grew significantly (14% in Europe and 15% in US) from 2015 to 2016.

Organizations with these kinds of endowment in digital marketing expect maximum Return on Investment (ROI). Digital marketers play a key role in launching and managing campaigns on multiple digital channels to reach potential customers in a particular demographic. These include display marketing, paid search, emails, retargeting displays, affiliates, and social media marketing (Facebook, Google, Instagram, Pinterest, and so on). For example, a company selling electric toothbrushes might post banners on Facebook (using Facebook advert), Google (using Google adwords), send emails (through customer relationship management system) to potential customers and put referrals links on relative websites like on dentists webpages. All these posts direct any potential customer to the respective website where they may or may not buy the product. At the same time a customer might come to their website of their own accord by typing the web address in their browser or through various channels before making a purchase (Li & Kannan, 2014).

To be successful a digital marketer to be successful needs to interact with customers and increase their brand value or product awareness. The most common challenges a digital marketer faces are exploding volume of data (big data), intensive competition and development in addition to maintenance of numerous digital channels.

A successful digital marketer needs to be able to handle huge data sets (big data) in order to initiate fast decision-making processes. One of digital marketer's most important

duties is to maintain or increase the brand value by continuous monitoring and managing brand equity, raising the brand awareness and supporting the development of new brands (Erkollar & Oberer, 2016).

After 2 years of experience with Philips as a Digital Marketing Analyst, I believe digital dashboards are the most important tool for any digital marketer to achieve their objectives as explained above. I was hired as an intern at Philips to develop a global digital performance dashboard. This experience taught me a different aspect of digital marketing. Digital dashboards are treated as a great tool in decision making process. Being part of this project from the start gave me great insight on the development and adoption of digital dashboard.

1.2 Research gap

The effective measurement of marketing productivity to the business is one of the key objectives of any marketing department or firm. In order to do reach this goal, a marketing department needs to develop a system called marketing performance measurement (O'Sullivan & Abela, 2007). In the last couple of decades, marketing dashboards were introduced and heavily used all over the world to bring the key marketing performance indicators into one single view. Marketing dashboards solve the complexity faced by marketers who work on complex and diverse market data in this age of information. Thus, digital dashboards are an essential tool for the marketers to measure and monitor the marketing performance indicators.

Diffusion of innovation is a philosophy that tries to explain why, when and how a new technology or concept spreads. Adopters assess an innovation based on its relative advantage (how beneficial the results of this innovation will be), compatibility (how easy it is to integrate it with the existing system), complexity (effort required to learn how the innovation works), observability (how visible the results of innovation are to others) and trialability (how easy it is to experiment/customize it) (Meade & Islam, 2006).

In my professional experience, one of the biggest challenges we had to face in the project was the business adoption of our digital dashboard. This being said, I would like to create a research model to explain the business adoption of a digital dashboard.

1.3 Research question

Reviewed academic literature gave an understanding on what scholars have concluded on the topic of digital marketing dashboard adoption. There are only few studies found on this topic. The most relevant study is presented by Pauwels (et al. 2009), in which he builds a framework of best practices to develop a digital marketing dashboard. Lehmann and Reibstein (2006) performed a study on key performance indicators. They defined a framework for the organizations to understand their growth drivers.

This research extends the work done by Pauwels (et al. 2009) by combining it with the theory introduced by Rogers (2003) on diffusion of innovation, to understand the drivers of digital marketing dashboard adoption. The study concentrate on the question, when and how business executives make a decision to adopt the digital marketing dashboards. The underreporting assumption is associated to the fact that digital marketing dashboards play a crucial role for managers and marketers to make a well informed decision. The study aim to answer the following questions

- 1) When and why a business executive makes a decision to adopt a digital marketing dashboard?
- 2) To what extent each identified factors/variables influenced this decision?

2 LITERATURE REVIEW

2.1 Digital Marketing

Over the last few years, the concept of digital marketing has increased in a good number of organizations and become more popular than ever. In the current era of advanced media and technology, it is almost impossible for brands and companies to progress and grow without using digital marketing. By adopting digital marketing, marketers are increasingly bringing brands closer to consumers' everyday lives. The emergence of internet technology as a medium of commerce presents companies across all industries with an opportunity to adopt the internet as a more effective marketing tool compared to traditional methods.

Several scholars have defined marketing as an innovative practice used by business organizations as a way of studying their customers and identifying their needs, how the need can be satisfied as well as determining the most convenient market place for both the seller and buyers. O'Connor (2015) defines digital marketing as the "process of promoting product and services using different online platforms to reach customers", while Li and Kannan (2014) defines it as the sharing of content created based on consumer groups, using different channels in the digital media to reach potential customers on global networks at the right time, thus creating brand and product awareness.

Digital marketing challenges the traditional way of doing business and communications management between consumers and companies. It extends beyond internet marketing by including channels that do not require internet. It embodies a wide selection of products, services and brand marketing techniques that use internet as their main promotional tool. O'Connor (2015) argues that increasing a company's exposure through digital marketing is not only relevant but also effective and targeted by allowing marketers to provide real-time, personalized products and content to specific consumers.

The evolution of digital marketing can be traced back to the early 1980s, when IBM launched its first personal computer. During that period, Channel Net erstwhile soft Ad Group, an advertising company, introduced the concept of digital marketing which later gave rise to other promotional types of digital marketing including reader reply cards used in magazines (David Chaffey & Bosomworth, 2013). However, a decade later digital

marketing acquired a new meaning as the phase of digital approached and marketing started changing. In 2002, the total number of internet users across the globe was 560 million, a huge improvement from 17 million in 1995 (Dahiya & Gayatri, 2018), whereas in 2016 number of users crossed over 3 billion (statistics, International Telecommunication Union (ITU)).

According to statistics, the average number of hours spent by individual on the internet was 30 minutes a day in 1997 while in 2002, an average American spent 11 hours on the internet (Liu, 2017). Despite this, the popularity of internet remained relatively low, which the authors attribute to the high cost of internet accessibility and adaptability (Dahiya & Gayatri, 2018). As of 2017 the average time spent by any individual is about 24 hours per week (Liu, 2017).

However, owing to the rise of millennial, digital marketing has acquired a different meaning altogether. By late 2005, the actual significance of digital marketing was brought to light, with the introduction of different social media platforms. Mark Zuckerberg started Facebook in 2004, Google presented Gmail in the same year, which was followed by the launching of Twitter in 2006. This resulted in the growth of digital marketing by 48% in 2010. Statistics indicate that by 2012 developed economies such as Australia, United States and Luxembourg had the largest expansion in terms of digital marketing practices (Kannan & Li, 2017).

Kannan (2017) identifies interactivity and digital as the two key features of digital marketing. By being interactive, digital marketing is able to provide crucial information to potential consumers and also respond to questions received from consumers in addition to involving them in the communication process. Kannan suggests that the quality of the environment in which digital marketing takes place hugely affects the outcome, as it varies depending on the content, qualities of the user and the tools employed. On the other hand, O'Connor (2015) suggests two different forms of digital marketing that brands and companies can adopt to create brand awareness: push digital marketing and pull digital marketing. While in pull digital marketing the users seek and directly find content through websites and blogs, push marketing involves both the company and the targeted consumers exchanging messages with each other on digital platforms. O'Connor (2015) notes that while push digital marketing allows for the personalization of messages to the target market and enables the brand to track and report progress, pull digital marketing is advantageous as the organizations have more freedom over the content type and size.

Extensive research has shown that in the 21st century, a consumer is likely to turn to their individual network and information available on social media to seek feedback and opinions on various products before making a purchase. On average, customers progress nearly 60% of the way through the purchase decision-making process before engaging with a sales representative (Tiago & Veríssimo, 2014). This concurs with Kannan's (2017) findings that digital media plays a huge role in consumer decision making. Furthermore, empirical evidence suggests that digital media facilitates buyers purchasing decisions by enabling them to search, evaluate, recommend and also give feedback on products they have used before. Despite digital marketing being a more cost-effective and easier to monitor promotional tool, statistics have revealed that only 5% of all online visitors actually purchase the product (David Chaffey & Bosomworth, 2013). The researchers attribute this to changing consumer behavior.

Consumers in digital market have become more demanding and empowered with a hindered customer satisfaction limit. This also implies that despite perceiving them as effective, brands are yet to harness the full potential of e-marketing channels (Chaffey and Bosomworth, 2012). However, Tiago and Verismo (2014) argue that measuring the effectiveness of online marketing is faced with several challenges as a result of multitude of potential metrics that can be used to assess effectiveness. Tiago and Verismo translates the effectiveness of digital marketing to "taking the right action from a practical point of view to produce the desired outputs and outcomes", while Chaffey (2009) identifies the ability to attract customers, engage them, retain them, relate to them and learn about them as the majorly desired outcomes of digital marketing from a marketer's viewpoint. In concurrence O'Connor (2015) states that it is crucial that companies are aware of how to attract customers to their website and convert them into loyal customers through customer's engagement. On his account, this can be achieved through online communication techniques which influence purchasing decisions by cohering potential buyers on digital media platforms to visit their websites, engage with the company and ultimately make a purchase.

Yahiya and Gayathri (2018) postulate that content remains the centerpiece of most brands' customer engagement efforts. On this account, content quality is more crucial in attracting and retaining customers than the actual product being sold. Previously treated as an insignificant aspect of a marketer's role in promoting specific campaign objectives, several factors have in the recent past influenced the demand for high-quality content. Most notable factors fueling this change are: increase in lead nurturing programs, introduction of blogs and use of search optimization. A common factor most brands use to

cope with this challenge is the underutilized content production effort. The power of search engines is also supported by several empirical studies. Chaffey and Bosomworth (2012) observed that customers acquired through paid searches purchased more and generated higher customer lifetime value than customers acquired by use of other marketing tools, implying that search engine is a reliable and effective selection mechanism to identify high-value customers. Additionally, Tiago and Verismo (2014) found that paid search advertising is far more profitable than offline advertisement.

2.2 Digital Dashboards

Marketing dashboards are answer to the expanding complexity and diversity of the data used by all the marketing departments in any organization. The first issue is the amount of data generated on a daily basis due to the decentralized media, multi and digital channels and the vast variety of product lines (Hyde, Landry, & Tipping, 2004). Miller and Cioffi (2004) explain the example of Unisys, where Unisys generates data for a lot of metrics for their brand tracking, customer relationship management database, customer loyalty efforts, media reports, web activity and so on. Collaboration between international firms, mergers and multi-device platforms potentially multiply the complexity and amount of data generated.

The executive officers in the organization demand more accountability from the marketers and marketing department (Webster Jr, Malter, & Ganesan, 2005). Hyde (2004) conducted a survey to point out the rising expectation from the marketers to drive growth at low cost. The most alarming revelation was the disconnection between the goals of the marketing department and those of the company's leadership agenda. Thus, the Chief Marketing Officers are advised to agree on specific metrics with the leadership team in order to measure the performance and improvement. A dashboard in this case is very helpful to keep all the stakeholder on the same page, when it comes to detecting and measuring the success and failure of marketing department (Hyde et al., 2004).

Last, the marketing department faces an issue with integrating different functions to achieve the company's goal (Hyde et al., 2004). Landry explained how Coca Cola integrated marketing and innovation strategy into a single corporate function (Landry, Tipping, & Kumar, 2006). Cross functions integration is particularly difficult when inter-

national merges and global expansions bring together different cultures, values and performance metrics in the marketing department. Standardized dashboards are expressly important to keep tracks of the processes and functions standard across the company in order to achieve the characteristics of “Growth Champions” (Landry et al., 2006).

There are many dashboards definitions published in recent days. Pauwels defines the dashboard as a small collection of the interconnected metrics (key performance indicators) and underlying base metrics (drivers) that measure the performance of the organization against the short term and the long-term goals set by the leadership team (Pauwels et al., 2009). The concept of key performance indicators (KPIs) is not new. Business intelligence teams of many organizations have tried to master this for many years now (Dover, 2004).

If we were to make an example, for a book salesman the key performance indicator (KPI) of the dashboard would be a single metric which would describe the performance of the sales by the salesman against the competition. This single metric dashboard would be the most simplistic example. In practice companies have many complex metrics and considerations. If we consider the above example, KPIs for the book manufacturing company would be completely different. For instance, book printed per author, average time required to print a book, sales of book per store/region, sales by year and so on (Lehmann & Reibstein, 2006).

The users of the dashboards vary based on the objective of the dashboards. Senior management use dashboards to monitor high level metrics like overall sales, return on investment, cost per lead, campaign cost and so on. At lower level, dashboard users monitor drivers to understand how to improve the performance of the high-level metrics. This particular feature is termed as drill down functionality and this functionality is an important characteristic of a dashboard. The reason is that it allows users on different levels to obtain information relevant to them. In addition, it helps aligning goals of different organizational levels by introducing the element of transparency. Advantages of using marketing dashboards include consistency in metrics and measuring procedures across the organization, monitoring continuous performance of marketing effort within the organization, planning, developing and implementing procedures based on findings, and standard communication across the organization (Pauwels et al., 2009).



Figure 1: Marketing Dashboard (Pauwels et al., 2009 p.2)

As shown in figure 1, a dashboard display is usually an interactive graphic user interface. Wind (2005) explains that integration of different processes and performance metrics makes dashboards a strong management tool. By allowing the business to build their own data model and connect data to that model, dashboards provide a mechanism for the management team to make quick and informed decisions.

The idea of the dashboard is greatly influenced by the concept of the balanced scorecard. Kaplan and Norton (1996) built the balanced scorecard on the theory that a single performance metric is incomplete. The combination of financial and non-financial metrics is very crucial when it comes to measuring the overall performance of an organization (Kaplan & Norton, 1996).

2.3 Innovation

2.3.1 Definition and Introduction to Innovation

Whenever the term ‘innovation’ is used, more often than not, it is used to refer to a concept that is perceived as foreign and unique by the environment in which it is adopted.

On many occasions, ‘innovation’ and ‘invention’ have been used to mean the same thing, while in essence, these are two completely different entities. According to Prajogo (2016), while innovation is basically the creation of a new concept or in other cases, the improvement of an already existing one, invention entails the creation of an entirely new concept. Also, Forés and Camisón (2016) concur by stating that apart from their difference in meaning, the two occur in different environments, where inventions can take place in educational institutions, health facilities and businesses while innovation is majorly present in, but not limited to, business practices and environments.

According to Rogers (2003) diffusion of innovation theory, an innovation is “any idea, practice, or project that individuals or other units of adoption perceive as unique and new” (Nelson, 1993). Roger further differentiates innovation from invention by arguing that while inventions can be carried out anywhere including universities and research institutions, innovations majorly occur in organizations. As such, innovation is an extension of invention. On the other hand, the Organization for Economic Co-operation and Development (OECD) (Macinko, Starfield, & Shi, 2003) defines innovation as “the implementation of a new or significantly improved product, process, new marketing method or a new organizational method in business practices, workplace organization or external relations” (Afuah & Afuah, 2003). Based on these definitions, the minimum requirement for an innovation is that the product or marketing method being introduced must be either new or significantly improved for the organization.

Early researchers on innovation focused on addressing the ability of an organization to react and adapt to internal and external changes (Greenhalgh, Robert, Bate, Macfarlane, & Kyriakidou, 2008). Later studies on innovation have, however, highlighted more on the need for pro-active innovation by distinguishing different types of innovation. More specifically emphasis has been put on organizations’ ability to adopt both product and process innovation, despite whether or not there is a pressing need to introduce new products and processes (Leonard-Barton, 1995). The product and process innovation are no longer sufficient for organizations, hence why the introduction of strategy innovation. As per Garcia and Calantone, strategy innovation is focused on the increasing need for 21st century organizations to proactively address future challenges through adoption of radical innovation that will positively impact their internal environment and market (Garcia & Calantone, 2002). In concurrence, Sahin (2006), suggests that unless organizations adopt strategy innovation, they are doomed to fail if they only embrace product innovation and adapt to their environments. Figure 2 refers to the proposal from Garcia and Calantone to

operationalization of innovation. Product innovativeness are measured against two dimensions namely macro or micro and technology or marketing discontinuity. This proposed structure from Garcia and Calantone gives a visual conceptualization of the distinction in innovation.

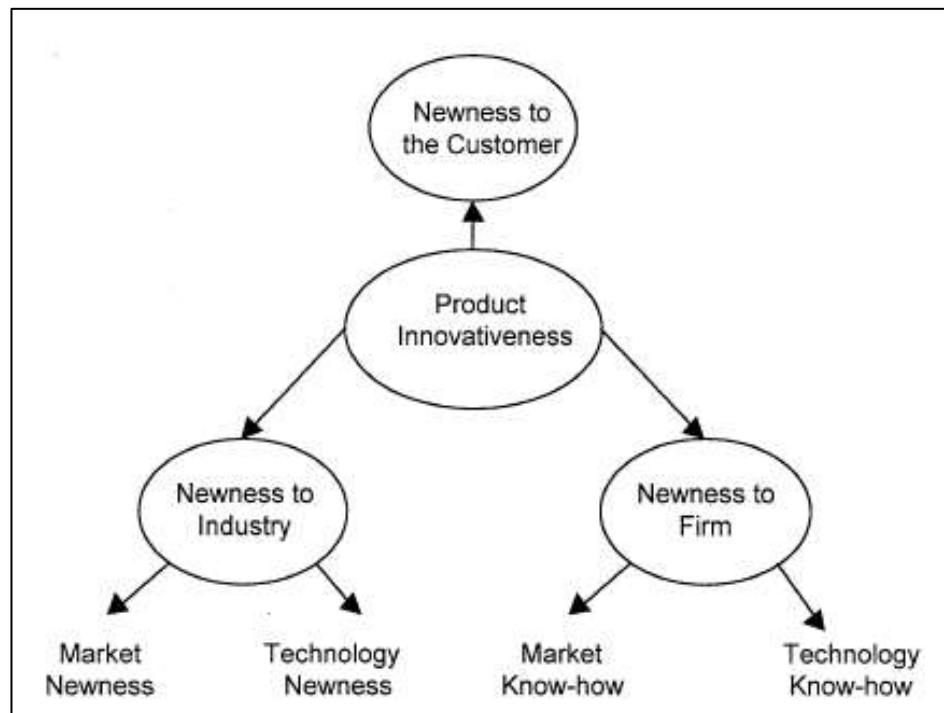


Figure 2 : Operationalization of innovativeness (Garcia and Calantone, 2002 p.124)

Sahin (2006) further advanced the concept of innovation by differentiating aspects of newness and impact. Owing to the fact that new innovations often have an insignificant impact, Sahin focused on differentiating sustaining and discontinuous innovations. On his account, sustaining innovations are aimed at improving performance of already existing products and services while discontinuous innovations introduce unique products and services to the marketplace. Sahin however notes that discontinuous innovations do not always yield a higher utility and could in some cases result in the introduction of products and services that are underperforming in comparison to already existing products. The researcher attributes this to the fact that the momentum of current sustaining innovations may push product functionality beyond the needs and requirements of potential buyers.

The rise in demand for improved quality and continuous improvements, coupled with the recent focus on change management, organizational learning and knowledge management, have led to the growth of process innovation. A good number of organizations in developed economies are reported to reach the limits of incremental process improvement. Greenhalgh et al (2004) coined the concept of radical engineering on the basis of their conviction that firms can only enjoy maximum efficiency and effectiveness in the presence of radical process engineering of both the firm and its processes. Due to technological advancements, processes are often far behind what is achievable, making it impossible to accomplish the required transformations by use of incrementalism. Extensive research has however revealed that the adoption of radical engineering in the late 1990s did not yield the anticipated results (Nelson, 1993). Several organizations reported to have invested high capitals and time with minimal pay-off.

According to Sahin (2006) this failure could have been a result of poor management. On his account, successful re-engineering of an organization demands that the management itself first undergoes radical engineering, a factor that might not have been sufficiently addressed. Utterback (1994) further argues that contrary to popular belief, organizations cannot transform as fast and to the extent that radical engineering encourages. Another challenge facing radical engineering innovation, as outlined by Afuah and Afuah, (2003), is that several organizations embark on radical engineering without adequate information and a realistic plan on how to best manage the current operations while transitioning to the new model. Besides lacking the sustained effort needed to produce results, various corporations are adopting downsizing as an aspect of radical engineering, despite downsizing having short-term and little benefits.

Most literature on innovation addressed factors hindering and enabling successful innovation at the organizational level. The organizational level output theory emphasized the development on new products and the speed of bringing them to the market (Moore & Benbasat, 1996). However, great attention is now focused on increasing corporation's innovation input capacity. Greenhalgh et al (2004) defines input capacity as "the ability to continuously absorb, accumulate and create new knowledge necessary to bring about new ideas." In order to squeeze out more outputs, organizations must first be willing to absorb an equally high number of inputs. Sahin, (2006) refers to this as the corporation's "absorptive capacity", whereby absorption means that organizations must conduct an environmental analysis to come up with new ideas that could be relevant to the organization, encourage employees to generate new ideas and also adopt external innovations that could

be beneficial to the organization. Research has also revealed that small organizations with little bureaucratic leadership are more capable of innovating. Garcia and Calantone (2002) opine that large organizations should consider becoming incubators of innovation not only internally and externally but also through appropriation.

Organization's external environment is also receiving increased attention as a potential source of innovation. Despite being previously considered as being beyond the control of the organization, inter-organizational collaborations have become a recurring topic in the field of innovation. Garcia and Calantone (2002) suggest that competent innovation requires that organizations analyze the situation from an internal and external perspective. To ensure innovation competency, corporations must have a fluid notion of organizational boundaries and willingness to embrace new ideas. Further, creation of open market for capital investment and managing risks is equally important.

As time goes by and with the dynamism being experienced in the business environments, the concept of innovation has continued to become more complex. While it originally meant the introduction of new or improved systems, innovation has grown to encompass not only that, but also the strategies adopted to enable businesses to adapt to external and internal environments of its operations (Schaltegger, Lüdeke-Freund, & Hansen, 2016). According to Forés and Camisón (2016), the complexity of innovation could also be a result of an organization's need to swiftly embrace innovations created outside the organization and to implement them internally for the organization's benefit.

Innovation can be termed as establishment of improved, new products and ideas. Often experienced in business environments, innovation has rapidly grown to be used not only in the internal environment of an organization, but in the external environment as well. Nonetheless, there is a need to further develop literature on ways in which organizations can take advantage of external and environmental factors to encourage and sustain innovation. Also, methods through which corporation can use innovations to buffer them from environmental threats should be explored.

2.3.2 Disruptive Innovation

Over the years, the concept of disruptive innovation has attracted a lot of attention among company executives as an effective approach to innovation-driven growth. Extensive research on disruptive innovation has yielded several citations while also provoking numerous debates. Today, “disruption” has become a crucial part of many businesses, although the core concept of disruptive innovation theory remains widely misunderstood (Christensen, Raynor, & McDonald, 2011).

The term ‘disruptive innovation’ was first coined by Christensen (et al., 2011) to describe the process by which a new product or service gets adopted in the market, starting with simple applications at the bottom of the market and gradually moving up to displace established competitors. Similarly, Christensen, Raynor and McDonald (2015) define “disruption” as the process through which small size companies with less resources are able to successfully compete against large and established organizations. In an effort to improve their products and services to meet the needs of their most profitable and demanding customers, large organizations often exceed the needs of some segments while ignoring the needs of others. To be disruptive, small businesses must enter the market by successfully targeting segments that have been overlooked by large organizations. To gain a huge market share, the new entrants ensure that they deliver more suitable options, such as low prices. Overtime, the entrants spread to other market segments by delivering a high level of performance that customers require, while being keen to preserve their core advantages that contribute to their initial success. Guttentag (2015), notes that disruptive innovation occur when customers of large organizations start adopting the offerings of the entrants in large volumes. An innovation that is disruptive will allow a new population of consumers who are at the bottom of the market to access products and services that were initially reserved for and accessible to buyers with a lot of money and skills.

Some of the distinct characteristics of disruptive businesses and firms, especially at their early stage is that they have a lower gross margin, small target market as well as a simple product and service which is less attractive than the existing ones (Guttentag, 2015). According to Christensen, disruption can be either low-end or new-market. Low-end disruption refers to the type of businesses that start at the bottom of the market and meet customer needs in a satisfactory manner by focusing on greater profit margins, whereas new-market disruption to the group of firms and businesses that are focused on competing against non-consumption in sectors of the market with lower profit margins. Although both low-end and new-market disruptions are similar in that products offered under both businesses are ‘good enough’, the main difference between the two is that

while low-end disruption is more concerned with overserved customers, new-market disruption has a major focus on underserved customers (Christensen et al., 2015)

Christensen (et al., 2015) further argues that disruption is a process, rather than a product or service. As such, many innovative products and services do not immediately qualify to be disruptive in their respective industries. According to the author, it takes time to determine whether or not an innovator's business model will be a success. Christensen uses Netflix as an example to show how its business model initially failed, as the DVDs by mail service did not satisfy consumer need for instant new releases. As such, Netflix did not threaten Blockbuster, until it later shifted to an on-demand streaming model, enabling it to siphon Blockbuster's core customers. As such, existing firms can determine whether new products and services will be a threat by analyzing the ability of their business models to serve customer needs.

2.3.3 Systemic Innovation

Although there has been a significant increase in the use of the term 'systemic innovation' in the recent past, there is no general consensus among social scientists on its meaning. Based on the existing literature, several ways of using the term have been identified. A good number of researchers define systemic innovation as a type of innovation where value can only be derived when innovation is integrated with other innovations in different organizations (Schaffers & Turkama, 2012).

Systemic innovation can be defined as "a set of interconnected innovations that are dependent on each other" (Wieczorek & Hekkert, 2012, p. 77). In order to realize the full value of radical innovation, systemic innovation has to take place. The term was first used to describe a specific class of innovations that required specialized and complementary assets in order to yield the needed results. Such innovations include cars that improved the nature of transport. To achieve this innovation, it was necessary to introduce as well complementary innovations in terms of services and products that make the use of cars possible be introduced as well. Such services and products include petrol stations and driving schools. Similarly, in order for electric cars to function in the modern world, systemic change will not be realized until charging station and battery production plants are put in place.

Consequently, achieving systemic innovation requires cooperation among different organizations and sectors, since different but related innovations have to be introduced at the same time. Systemic innovation cannot be accomplished by a single organization. Instead, it requires the involvement of actors from several sectors. For instance, to achieve an effective system of waste recycling and management, a combination of new laws, new services, technologies and behaviors among consumers is necessary. The absence of either will not achieve the desired result and may cause the entire initiative to fail.

According to Wieczorek, and Hekkert, (2012), the involvement of all four sectors of the economy (business, civil society, government and the household) in systemic innovation makes it much slower and harder to achieve compared to individual social innovations. Furthermore, implementing change in very complex systems requires changes not only in behavior but also in structure and processes. Additionally, achieving significant shifts in any system will be slow as they tend to be optimized around their current forms and powerful interests. However, Wieczorek, and Hekkert, (2012) is keen to note that despite the high complexity and many challenges associated with realizing systemic innovation, it is still possible to achieve. Some of the common examples of systemic innovation include the creation of welfare states, the North Karelia project as well as ICT development that have led to the proliferation of high speed broadband and mobile phone technology.

2.3.4 *Social innovations*

Despite the growing interest in social innovation among foundations and researchers, there is a lack of shared definitions of social innovation. While some of the current definitions of the term are specific and do not include many examples of social innovation, others are extremely broad and describe social organizations and businesses that are not innovative in any way. Nicholls and Murdock (2012) attributes this to the fact that social innovation is a field led by practice, thus definitions and meanings have resulted in new ways of doing things rather than just thinking about them. Due to the fact that social innovation looks and feels different in various environments, the meanings and definitions tend to vary. For instance, what is considered a social innovation in rural India may not be perceived so in the Eastern side of England due to different social needs of both environments.

The existing body of literature suggests that social innovation is multi-disciplinary by nature, cutting across different sectors and fields of action. This ambiguity and openness to a wide range of interpretations could be the reason why many organizations are willing to adopt the term. Nicholls and Murdock (2012) define social innovations as new solutions that simultaneously meet a social need while at the same time leading to new and improved capabilities and relationships as well as a better use of assets and resources. The new solutions may range from products, services, models and processes that are both good for the society and enhance people's capacity to act. The five elements that must be present for a practice to qualify as socially innovative include: novelty, ability to meet a social need, effectiveness, proficiency in enhancing the society's capacity to act as well as transition from ideas to implementation (Cajaiba-Santana, 2014).

Some of the earliest references to social innovation can be traced back to mid-1960s, when the term was used to refer to experimental research within social sciences and humanities. Over the years, the use of the term has extended to various fields including social enterprises, entrepreneurship and innovations. This, coupled with a growing dissatisfaction with technological emphasis on innovation policy, has led to a significant increase of literature on social innovation at both policy and research levels. For instance, the panel for Future EU Innovation Policy (Cajaiba-Santana, 2014) pointed that their priority is to invest in knowledge rather than utilize it in a rapid and powerful manner for the benefit of the society. Furthermore, the panel argued that there was a pressing need for the European Union to act around compelling social challenges (Cajaiba-Santana, 2014).

The OECD Forum (Pol & Ville, 2009) on social innovation insists that social innovation is different from economic innovation. This because, unlike economic innovation, social innovation does not introduce new types of production, neither does it exploit new markets without satisfying new needs. However, both are similar in that they follow the six stages of social innovation as outlined in the 'open book of social innovation'. These include: prompts for social innovation, proposals, prototyping, and sustaining, scaling and systemic change.

2.4 Diffusion of Innovation

Over the last several decades, disciplines such as anthropology, geography and sociology have attempted to understand the current behavior in terms of diffusion patterns and spread of ideas from their sources to other people in the community. Critics, however, argue that this tradition has neglected the casual processes of diffusion of innovation by focusing solely on descriptive history (Gort & Klepper, 1982). The quantitative study of the diffusion of innovations was pioneered by rural sociologists, with the most classic studies being the diffusion of hybrid corn and 2-4-D weed killer in America. In the early 1950s, the diffusion of innovation theory was first used in Iowa to enable farmers understand how the use of hybrid corn seeds was adopted (Gort and Klepper, 1982). It took the farmers in the society of Iowa an average of 6 years to shift from normal to hybrid corn, although the latter yielded more crops and produced harder, drought resistant crops. The length of time it took for the idea to diffuse showed a positive improvement in farming although an immediate change in the farming procedure was not guaranteed

The innovation diffusion model was introduced by Rogers (1962). In his book there are more than five hundred different studies conducted by different researchers. Based on these studies, the author formulated a unifying theory which could explain why, how and at what rate innovation can be adopted by different cultures (Greenhalgh, Robert, Macfarlane, & Bate, 2004). Diffusion of innovations is a research model which describes how new ideas, products or positive health behaviors spread through the society. The model identifies and examines various factors influencing how quickly or slowly an idea or behavior is adopted. It examines how members of the society adopt new ideas and how the decision to do so is made. This conceptual phenomena is presented in figure 3, where X axis represents time and Y axis represents adoption.

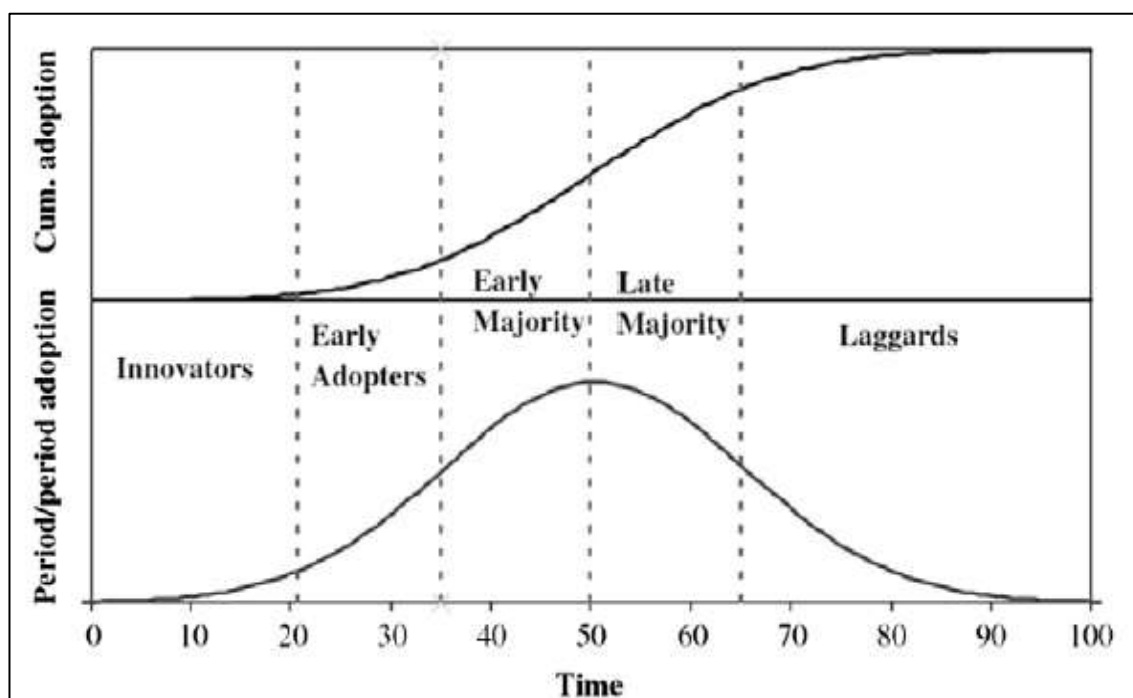


Figure 3: Theoretical diffusion curves (Meade and Islam, 2006 p.520)

According to Rogers, adoption is “the full use of an innovation as the best course of action available” (Rogers, 2010). Rogers further defines diffusion as the process through which an innovation is communicated through specified channels within a certain period of time among the members of a social system. It is a measure of the rate of adoption and puts into consideration the relationship the users have with one another and also their relationship with the product. Diffusion takes place in a complex system, whereby networks linking members of a social system are either overlapping, multiple or complex. Moreover, Rogers (2010) argues that diffusion occurs mostly in heterogeneous areas where enough differentiation among network members is evident.

Mintrom (1997) argues that when adopting an innovation, both mass media and interpersonal communication channels are involved. According to his theory, wide adoption of innovations is crucial in the attainment of development and sustainability. Prior studies have shown that the adoption of new ideas (or diffusion of an innovation) is significantly influenced by the characteristics of the innovation, its communication channels, time and the community.

For the diffusion of an idea or project to occur, its viability and target should be clearly defined. Also, it must be evident what kind of innovation is being introduced. Walker

(1969) argues that the rate of diffusion depends on factors such as the idea's relative advantage, compatibility, its trialability and ability to solve the need of the targeted population. The relative advantage of a product is the rate at which the targeted consumers perceive the idea or product as being superior to the already existing options, while compatibility is the extent to which the project or product to be introduced is in line with the target consumer's needs, attitudes and past experiences (Walker, 1969). The new product should also be easier to use compared to the existing one and should allow customers to try it before making the decision to adopt it.

Rogers (2010) further suggests five steps that decision makers in an innovation process undergo before finally adopting the idea, project or product. The author identifies introduction and persuasion as the first and second steps respectively. Although the features of a new innovation may persuade consumers to adopt it, the manner in which it is introduced to them will significantly influence the behavior and willingness to adopt it (Rogers, 2010). Awareness of the innovation is created through various communication channels.

The knowledge obtained through channels such as newspapers, television and word of mouth enable the targeted consumers to have a perspective of the innovation and draw their own conclusion on whether or not adopting the innovation will be of any benefit to them (Greenhalgh et al, 2004). During the persuasion stage, consumers compare how compatible the innovation will be with their lifestyle, as well as the complexity and cost of adoption. The third stage is the decision-making process, whereby consumers act by deciding to either adopt the new innovation or reject it. During this stage, the advantage and disadvantages of adopting the new innovation are weighed and a conclusion is made. In the event that the customers choose to adopt the innovation, the stage of implementation is next, followed by the last stage of confirmation.

As suggested by Rogers (2010), the time component affects the diffusion of an innovation in several ways. Greenhalgh et al (2004) concurs that the inclusion of time as a variable in diffusion research is one of its strengths. This is because there is a relative difference in the rate at which different people in the social system will adopt an innovation. Rogers (2010) groups the adopters in five categories, depending on how soon they are willing to adopt the new innovation. The categories include innovators, early adopters, early majority, late majority and the laggards who are usually the last to adopt and consist of about 15% of the total adopters.

Diffusion scholars have previously studied how early adopters differ from late adopters. Extensive research shows that innovators are active information seekers, with a relatively higher exposure to media and large interpersonal networks that stretch beyond their locality. Unlike other categories of adopters, innovators are also risk-takers characterized by a high ability of coping with uncertainties associated with different innovations.

The diffusion of adoption is important to not only for designers but also for marketers, as it enables them understand adoption in the context of a larger social system. Having a deep knowledge of the theory allow marketers to predict performance of new products in the market and to also come up with strategies aimed at facilitating a quicker adoption of their innovations by a large number of targeted customers.

3 RESEARCH METHODOLOGY

This section focuses on the systematic approach through which research work is conducted. It will provide detailed description of research, step by step process, methods and techniques involved in the research. Research methodology is, by definition, a logical approach which solves research studies problems; by giving explanation, description and prediction of phenomena to establish regularity of occurrence (Chinnathambi, Rajasekar, & Philominathan, 2013).

Research methodology refers to all the techniques and methods used while conducting a research (Kothari, 2004). Kothari further explains it as the totality of the instruments and behaviors used while selecting a research technique, like tools for data analysis, data processing, data recording, etc. Research methodology defines systems, procedure and series of events involved in the research study, which invariably is the crucial part of the methodology. Research methodology also considers the logic used to select a particular method, and provides the reasoning or the explanation of the selection. Thus, it provides a deep understanding of the study conducted (Kothari, 2004).

Quantitative method built on positivist philosophical stance is used as a research methodology in this study. Philosophical stance (positivist) heeds the view that knowledge obtained through observation and measurement is the only objective (trustworthy) truth (Creswell, 2014). The reason behind selecting quantitative method is purely based on the method used for data collection and also the research technique involved. Data was collected using survey method and the target audience were digital analyst, campaign managers, data engineers, data scientist, optimization experts, and visualization developers. Also, SPSS tool was used to analyze the data since the technique employed required some statistical analysis. The analysis was based on the variables identified from personal organizational experience and related literature review either to validate the existing knowledge or to make new discovery/findings

The main objective of quantitative research is to build an objective and valid description of a phenomena (Taylor, 2005). Quantitative method eliminates personal preferences from the research outcome, making the study as objective as possible. Also, the method explains how events can be controlled by using some variables. The role of quantitative method within the realm of realism is to be extensive and descriptive, which helps to evaluate actions for the main purpose of building an association and consistency between variables (Saunders, Lewis, & Thornhill, 2009).

Quantitative method is proficient in testing hypotheses as it evaluates numerical data using statistical analysis method (Taylor, 2005). In quantitative method the relation between the variables is presented and measured using numeric data format and then analyzed using statistical methods. Creswell (2014) explains quantitative method as an approach to objectively test concepts by evaluating the connection between the variables.

As discussed previously, according to Rogers (2003) innovation decision process passes through five stages: 1) knowledge of innovation 2) perception or attitude towards the new idea 3) decision of adoption or rejection 4) implementation of the innovation/idea and 5) confirmation. As explained by Sahin (2006), over the past three decades, adoption process of new innovations has been vastly studied and a broad variety of disciplines have adopted Roger's model as theoretical framework for their research. Hence Roger's theory of diffusion of innovation occurs to be the most pertinent to investigate the adoption of digital marketing dashboards in the marketing department to measure the performance of the organization. The conceptual framework in the research focuses on the attitude and perception of the people in the organization regarding the adoption and the sustained use of the digital dashboards.

A sample survey approach has great flexibility when it comes to time and resources, thus the research is designed to use cross sectional sample survey methodology. Cross sectional approach is compatible with the research objectives as the respondents are drawn from a population at a particular point of time. The target audience of the survey are the people working in digital marketing teams of Philips, which is one of the leading organizations in the world. Thanks to Philips' strong analytics community, I managed to get target audiences from four different continents. In order to ensure there was no biased response, the target audience role ranged a lot from analysts to managers, optimization expert, developers, data scientist, and data engineers.

As previously discussed, the methodology adopted is Rogers' theory of diffusion (Rogers, 2003), I used a 5-point Likert Scale structured questionnaires in the survey to investigate the variables influencing the adoption and sustained use of digital dashboards amongst the digital marketing team. According to Pauwels (2009), it is important for all stakeholders in digital marketing team to know the existing digital dashboards and their use in measurement of organizational performance. Positive attitude towards the digital dashboards is considered to be a necessary step in order to implement and accept the new innovations.

4 RESEARCH OBJECTIVE AND HYPOTHESIS

The research hypothesized that adoption and sustained use of digital dashboard is positively correlated to visualization of the dashboard. A clear, attractive and intuitive designed dashboard is positively correlated, whereas a complex and generalized design of the dashboard is negatively correlated to the adoption and sustained use of digital dashboard. Positive perception of the dashboard will lead to early adoption and sustained use of the dashboard, on the contrary negative perception will lead to late adoption. In other words, dashboards that are perceived by the users to have a relative advantage, observability, compatibility, trialability and less complexity will be adopted by the users quickly. According to Rogers (2003), one of the most important aspects of innovation is to explain the rate of adoption.

Apart from the above characteristics, three other perceived characteristics are also considered as necessary aspects that may have potential impact on the willingness of digital marketing teams to adopt and make a sustained use of digital dashboards: 1) Data reliability: dashboard aggregates data from multiple source systems to indicate the performance of the Key Performance Indicators (KPIs) established by the digital marketing team. Thus, the reliability of the data displayed is very important to win the confidence of the users to trust the dashboard while making decisions based on the dashboard data. 2) Communication: a clear communication of the new features, development, feedback, etc. is quite important to keep the users engaged with the dashboard. Due to the increasing change in the marketing trends, constant development of the dashboard is common practice. The rule of the thumb is “there is never a finished product” (CEO of Booking.com). Here in Philips we publish a newsletter about the dashboard every month in regards of when the data is refreshed, new features are added, issues are resolved and so on. 3) Training: it enables users to be self-reliant and access the data on demand. Empirical literature shows that high number of training of any software increases the rate of adoption of that particular software

4.1 Objective

Little (1979) defines a marketing decision support system as a collection of tools, data and techniques with appropriate hardware and software, which allows an organization to gather and interpret relevant information, and convert it into a list of marketing actions.

According to the above definition, marketing dashboards are similar to decision support systems which provide managers key insights to make an informed decision.

Dashboards created at Philips follow the framework built by Pauwels (2009) as shown in figure 4. This framework has five independent factors, namely demand, supply, fit between demand and supply, implementation process and perception of the users and one dependent factor. The demand side of the marketing dashboard consists of users, organization style when it comes to making decisions, relation between the organizational goals with the department goals and the type of industry. Whereas the supply side consists of performance metrics, sophistication of the dashboard when it comes to its capability, visualization and drill down functionality. The fit between supply and demand side is very critical when it comes to determine the success of the dashboard (Goodhue & Thompson, 1995; Lim & Benbasat, 2000). The information provided should match with the expectation of the users and the metrics in the dashboards should be in line with the organization strategy. The next factor is the implementation of the dashboard, which consists of prototyping, A/B testing, communication, consultation and support from top management. Next factor is the predisposition towards the dashboard. It consists of attitude, trust and expectation. For example, a carefully implemented dashboard with a good fit between demand and supply would be perceived as an acceptable dashboard by the users. Finally, Pauwels explains the dependent variable of the framework as adoption and success of the dashboard. He further explains adoption as the extent to which a user actually uses the marketing dashboard. According the framework presented in figure 4, adoption is one of the mandatory condition of the success of the digital dashboard (Pauwels et al., 2009).

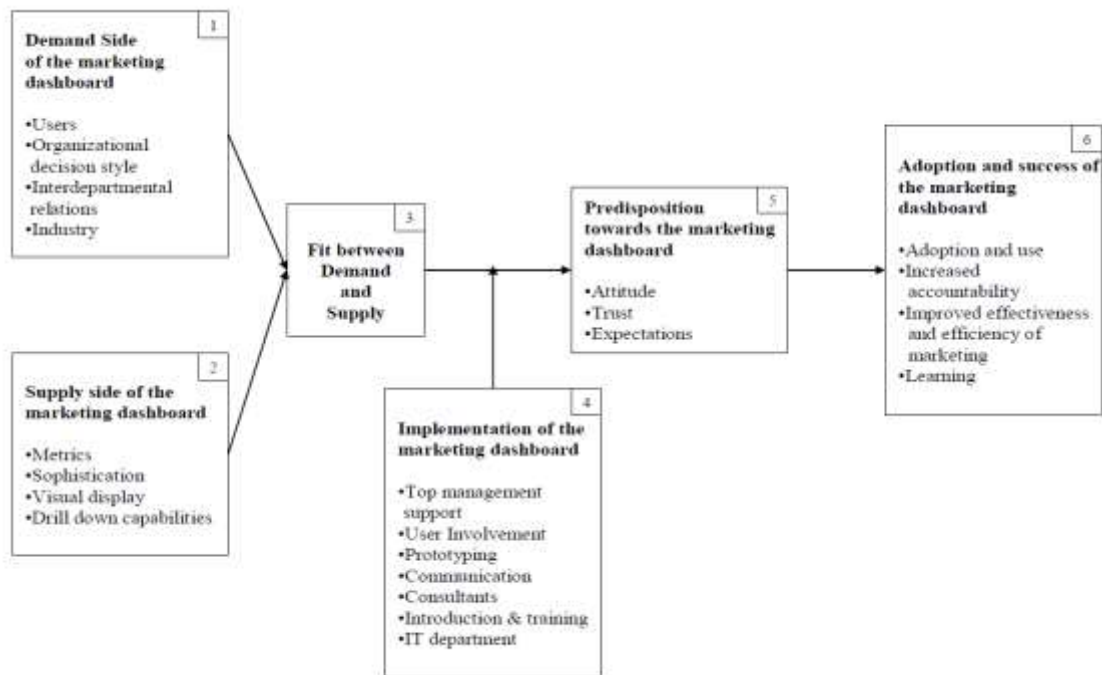


Figure 4: Framework for the Adoption and Success of Marketing Dashboards (Pauwels et al., 2009, p. 19)

Based on response from nearly 100 executives, Reibstein explains that managers commonly report their organizations is working on developing the dashboard, but almost none consider that their dashboard is complete and/or has high quality. Still the demand for dashboards remains high (Reibstein, Norton, Joshi, & Farris, 2005). This study extends the framework depicted in figure 4 to identify the drivers behind the adoption of the marketing dashboard. The main objective of the study is to review which factors influence perception of the marketing department of an organization to adopt, diffuse and sustain the use of digital dashboards to measure their performance and make key strategic decisions.

In my professional experience, every manager or executive uses the marketing dashboard or the data presented in the marketing dashboard at a different frequency. Some use the dashboard in daily progress status meetings while others prefer to see monthly performance status. The frequency of use of a dashboard is more of a managerial style rather than the success of adoption. Similarly, every manager or executive has a personal decision-making method and this study doesn't intend to evaluate the impact that digital dashboards have on decision-making processes, as managerial style is out of scope for this study.

Success of an organization is determined by analyzing where an organization is, in regards to its mission and ambition. Digital marketing dashboards are a tool for alignment and integration on an organizational level and therefore they potentially have a crucial role in steering the organization in the correct direction. This research will create an understanding on how to build a support system in order to facilitate adoption and sustained use of digital dashboards in an organization.

4.2 Hypothesis

The previous research conducted by Pauwels et al. (2009), introduced the framework of best practices to build a digital marketing dashboard. The theory provided a guideline to build objective driven marketing dashboards. The success variable identified in this research was the executives' intention to use the dashboard. These independent variables were not tested in the presented theory by Pauwels.

The main question of the research is, when and how business executives adopt digital dashboard. In my personal experience after being a product owner of a digital dashboard for more than a year, one of the key issues for adoption of digital dashboards is the reliability of the data presented in the dashboard. It is complex to build a sustainable back-end system to support the architecture of your database design, particularly when the data is coming from multiple marketing tools. For example, combining the data coming from a CRM system with the data coming from your websites in a single table is quite complex. Another key issue is to have a simple design of the dashboard in order to make it easy to understand but at the same time show the most relevant information to the key audience. Visualization of a dashboard is of key importance when it comes to making the dashboard more relevant. Finally, timely communication with detailed documentation and training makes the users more confident about how to navigate through the system to get the desired results quickly. Communication with your key users is also very crucial to get constructive feedback on the dashboard's user interface, speed, performance, and so on.

Given that the research is aimed to identify the factors influencing the intensity of adoption, diffusion, and sustained use of digital marketing dashboards, the questions asked in the survey are those determining the motivations, perception, and challenges for the users adopting digital marketing dashboards. In respect to the literature review and my personal experience, the dashboard visualization, communication, training, and data

integrity resulted to be very significant for dash-boards adoption and sustained use. The survey questions can be found in Appendix. The questions asked in the survey are to prove the hypotheses listed below:

1. When the visualization of the dashboard is clear, attractive and intuitive, the adoption and sustained use of the digital dashboard is high
2. When the data displayed in the dashboard is not reliable and customizable, the adoption and sustained use of the digital dashboard is low
3. When the training and communication of the dashboard is clear and frequent, the adoption and sustained use of the digital dashboard is high

5 DATA ANALYSIS

5.1 Introduction

This section focuses on the research data analysis, which covers the description of the data, data source and how the data was analyzed. This includes tools used, data coding, tables, figures and the result of the analysis. The analysis is a framework explaining the influence of the identified variable on the adoption and sustained use of the marketing digital dashboards. Hence, it is statistics analysis of the response collected through the survey. The data analysis was done on the SPSS statistics tool, which was used to perform the principal component analysis (to identify the most influencing variables), Spearman correlation analysis (to identify the relation between different variables) and multiple linear regression analysis (to identify the linear relation between the variables). The data source is the survey responses collected from the Webropol survey platform. The objective is to prove the hypotheses of the research in order to understand the influences of marketing digital dashboard adoption rate. The variable includes dashboard visualization, dashboard data integrity, communication and training of the dashboard.

5.2 Survey respondents

The target audience of this study was the executives working in digital marketing team in Philips across the globe. Philips has presence in 17 markets and has offices in 70 countries and counting. The survey was created using the online tool Webropol and was circulated using Philips Microsoft exchange distribution list email addresses. At the time of the survey distribution, digital marketing community of Philips along with consultants was around 86 people. Altogether 47 people answered the survey questionnaire and all respondents were included in the analysis.

Out of the 47 respondents 36% of respondents were female and 64% of respondent were male. Table 1 displays distribution of the age group of the respondents. As shown in the table 1 around 68% of respondents are in the age group of 26 to 35 years.

	N	Percent
18 to 25	5	10.64%
26 to 35	32	68.08%
36 to 45	8	17.02%
46 to 55	2	4.26%
55 years and above	0	0%

Table 1 : Age group of respondents (Source: Weboropol)

More than 70% of the respondents have 6 or more than 6 years of working experience. Table 2 displays the distribution of the work experience of the respondents. Thus, when compared to business executive who are familiar with digital marketing concepts, 98% of people responded “Yes”. More than 56% of respondent use marketing channel “very frequently” and 31% of respondent use marketing channel “frequently”. Thus measuring the performance or the effectiveness of these marketing channel is one of the key objectives of the respondents.

	N	Percent
less than 1 year	0	0%
2 to 5 years	14	29.79%
6 to 10 years	18	38.3%
11 to 15 years	9	19.15%
16 years and above	6	12.76%

Table 2: Work experience segmentation (Source: Webropol)

In the data, regarding the question “is digital marketing is an efficient means of popularizing brands and product?” 80% of the people respondent “Yes”, which aligns with theory presented by Pauwels (et al., 2009).

5.3 Descriptive Statistics and Data coding

The descriptive statistics show the mean scores for the dashboard adoption in relation to sub-items of user-interface of the dashboard, reliability of the data, communication, and training related to using dashboard. The variables were measured on a 5-point Likert

scale. For user interface, communication and training, 1 denoted “Strongly disagree” and 5 denoted “Strongly agree.” Sub-items of the data scale were reverse coded and 1 denoted “Strongly agree” and 5 denoted “strongly disagree.” This was done to indicate that lower scores mean lower adoptions.

Average scores for user-interface, communication and training ranged from 3.19 to 4.57, which indicates that respondents agreed that higher scores for user-interface, communication and training variables lead to higher adoption of dashboards. On the other hand, the average score for data sub-items ranged from 1 = “Strongly Agree” to 5 = “Strongly Disagree” so that lower scores indicate lower dashboard adoption.

Variables	M	SD	Min	Max
Adoption rate is high when UI is Clear	4.57	0.77	1.00	5.00
Adoption rate is high when UI is Attractive	4.26	0.79	1.00	5.00
Adoption rate is high when UI is Intuitive	4.51	0.78	1.00	5.00
Adoption rate is low when data is Unreliable	1.32	0.75	1.00	5.00
Adoption rate is low when data is Non-Customizable	2.17	1.01	1.00	5.00
Adoption rate is low when data is from Unknown Source	2.13	0.82	1.00	4.00
Adoption rate is high when Communication is Clear	4.49	0.72	3.00	5.00
Adoption rate is high when Communication is Frequent	3.66	0.79	2.00	5.00
Adoption rate is high when Communication is Personalized	3.81	0.99	2.00	5.00
Adoption rate is high when Training is Frequent	3.70	0.81	2.00	5.00
Adoption rate is high when Training is Generalized	3.19	0.82	2.00	5.00
Adoption rate is high when Training is On demand	4.15	0.78	2.00	5.00

Table 3: Descriptive Statistics (Note: UI = User Interface; M = Mean, SD = Standard deviation)

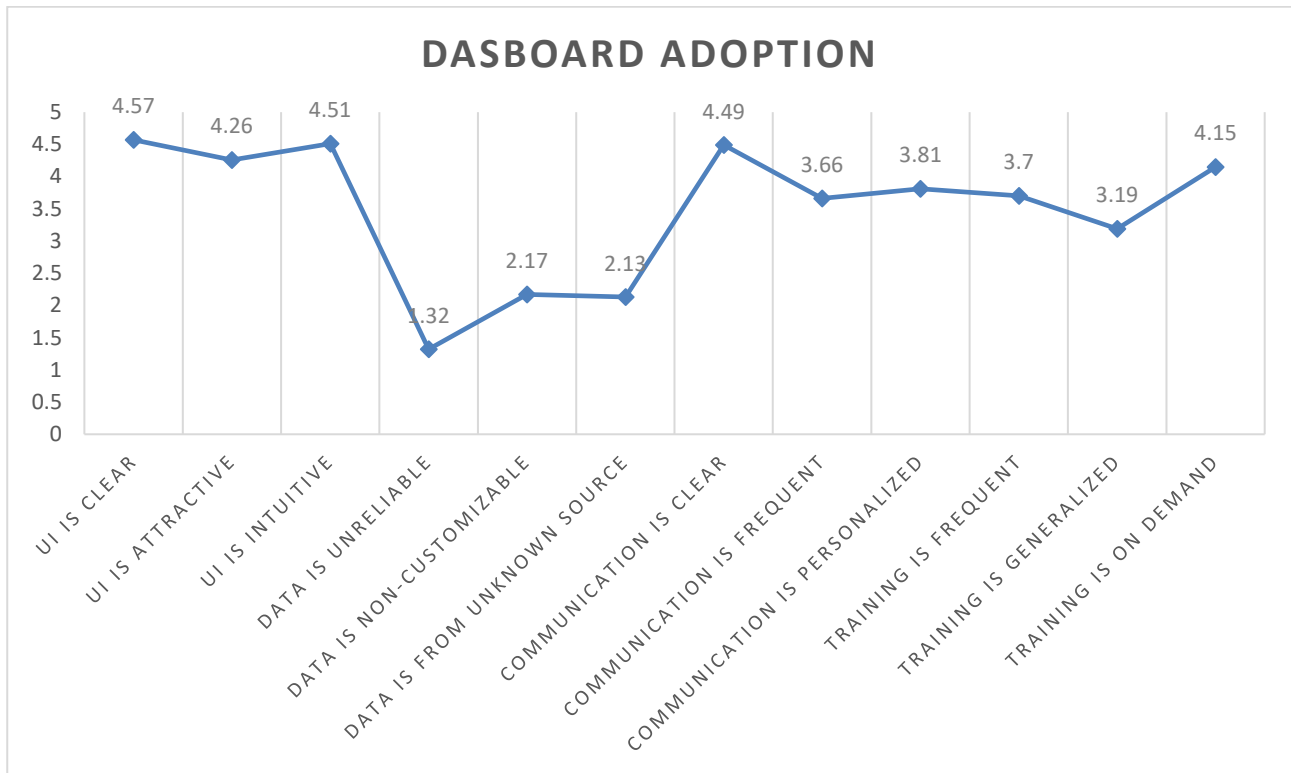


Figure 5: Mean score for Dashboard adoption based on sub items of user-interface, data quality, communication and training

5.4 Principal Component Analysis

This section of the chapter identifies the dimensionality of the variables presented in the data using principal component analysis. The hypotheses presented in this study describes 12 sub variables and with principal component analysis we can analyze the interrelation between the variables present in the data set (responses from the survey) (Jolliffe, 2011).

Principal component analysis is a data reduction technique. It is applied more often on large data set to identify the significant variable among them and then analysis is done by using only those variables. Since the data set in this study is small, correlation matrix is more preferable than covariance matrix for the simple reason that correlation matrix will treat all the variables in analysis on equal level (Jolliffe, 2011).

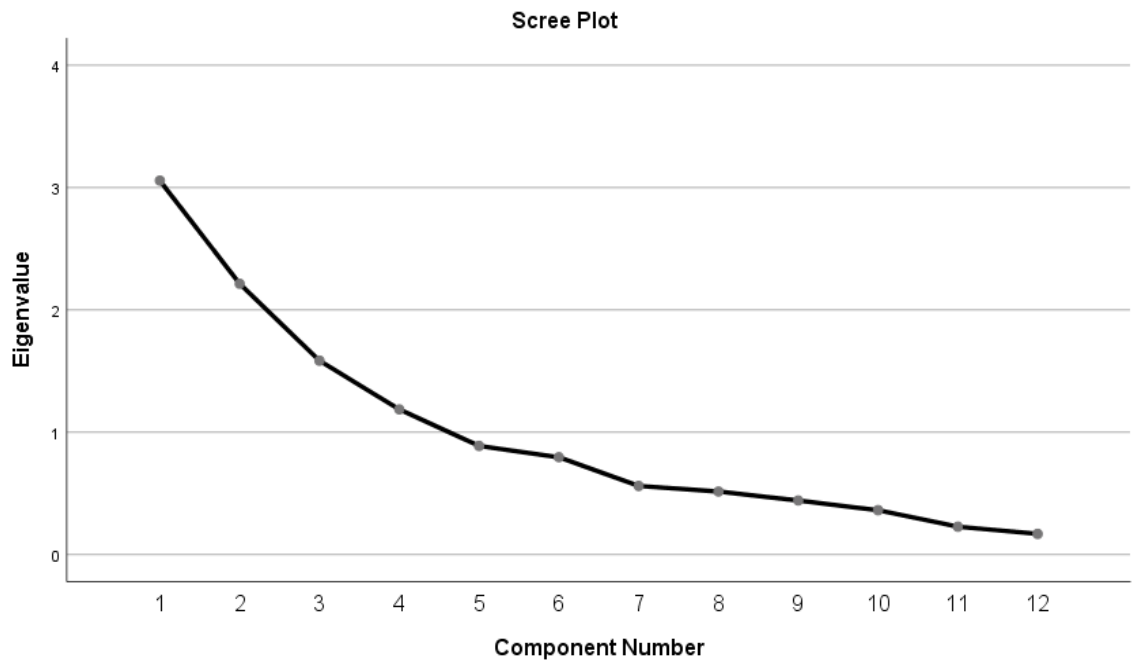


Figure 6 : Scree Plot (SPSS)

Component Number	1	2	3	4
User Interface is Clear	-0.496	0.657	-0.025	0.018
User Interface is Attractive	-0.566	0.652	-0.185	0.201
User Interface is Intuitive	-0.523	0.746	0.010	-0.012
Data is Unreliable	-0.328	-0.388	0.307	0.605
Data is Non-Customizable	-0.651	-0.231	0.215	0.449
Data is From Unknown Source	-0.362	-0.243	0.656	-0.186
Dashboard Communication is Clear	0.367	0.388	0.637	0.027
Dashboard Communication is Frequent	0.616	0.224	-0.090	0.544
Dashboard Communication is Personalized	0.548	0.221	-0.431	0.210
Dashboard Training is Frequent	0.571	0.052	0.152	0.366
Dashboard Training is Generalized	0.518	0.184	0.251	-0.263

Table 4 : Principal Component Analysis (Correlation Matrix)

Researchers often use principal component analysis to make various decisions. As shown in the scree plot in figure 6, only four components have Eigenvalue more than 1 and thus the analysis in this study was limited to only four components (Gniazdowski, 2017). Table 4 displays the output (correlation matrix) of the principal component analysis.

The result displayed in table 4 describes the correlation of each variables when loaded on individual component/factor. All the correlations over 0.4 is deemed important in this analysis and marked in bold in the table (Gniazdowski, 2017). The first component is strongly correlated with 8 variables in the table. This component can be perceived as the scenarios where the dashboard communication is frequent and personalized and dashboard training is frequent and generalized; there is less work required on dashboard visualization to make it more clear and intuitive. Whereas the second principal component can be perceived as how all the dashboard visualization characteristics vary (increase or decrease) together. The third principal component decreases when the dashboard communication is personalized but increases when the dashboard communication is clear. Finally the fourth component can be perceived as the occasions when data integrity and dashboard communication variables vary together.

In conclusion, principal components 1 and 2 validates hypothesis construct on when the dashboard adoption rate is high or low. However principal component 3 and 4 gives an inclusive results.

5.5 Correlation Analysis

5.5.1 Introduction

This section of the chapter describes the strength of relationship between the identified variables from the principal component analysis. It is important to understand correlation nature (positive or negative) of the variables, in order to validate the hypothesis.

Researchers define the term correlation as connection, relation or any form of association between variables. This translates to a statistical representation of how two variables can co-vary from “1” (correlation = positive) through “0” (correlation = none) to “-1” (correlation = negative). According to Altman (1990), correlation is a way of evaluating

a possible 2-way linear statistical relationship between 2 continuous variables. Correlation is measured by correlation coefficient. The correlation coefficient represents strength of the relationship between 2 variables. If the correlation coefficient is closer to +1, it means a strong correlation, whereas if it is closer to -1, there is no correlation among the variables. In other words, if the coefficient is positive then the variables are directly related and if the coefficient is negative then the variables are inversely related (Mukaka, 2012).

Spearman's rank correlation coefficient is denoted as "rs" for sample statistics and "qs" for population statistics. Mukaka (2012), explained that compared to Pearson's correlation coefficient, Spearman's correlation coefficient is more robust when it comes to outliers in the data set. Since the sample size is small, and the variables related to user-interface, data quality, communication, and training are ordinal in nature (measured on a 5-point Likert scale), Spearman rank correlation analysis is used instead of Pearson product-moment correlation.

5.5.2 Relationship between Dashboard Adoption and User-Interface Quality

Table 5 displays the result of Spearman Correlation analysis between user interface quality and dashboard adoption, performed in SPSS statistic tool. Correlation results indicated that dashboard adoption has a significant and a positive correlation with user interface sub items. It shows that one unit increase in clarity of user interface will lead to a .0310 unit increase in dashboard adoption ($r_s = .301, p < .01$). Intuitive user-interface also has a significant and positive correlation with dashboard adoption. A unit increase in intuitiveness of the user-interface will lead to a .406 unit in dashboard adoption ($r_s = .406, p < .05$). User-interface attractiveness is also positively correlated with dashboard adoption ($r_s = .304, p < .05$). The sub items of the user-interface quality scale were significantly and positively correlated with each other. It indicates that increases in user-interface clarity also leads to increases in intuitiveness ($r_s = .369, p < .05$) and attractiveness ($r_s = 0.296, p < .05$).

Variables	1	2	3	4
1-Dashborad Adoption	1	.301*	.406*	.304*
2-Adoption HIGH when UI is Clear		1	.369*	.296*
3-Adoption HIGH when UI is Intuitive			1	.455**

Table 5: Spearman Correlation between dashboard adoption and user-interface quality (Note: * $p < .05$; ** $p < .01$)

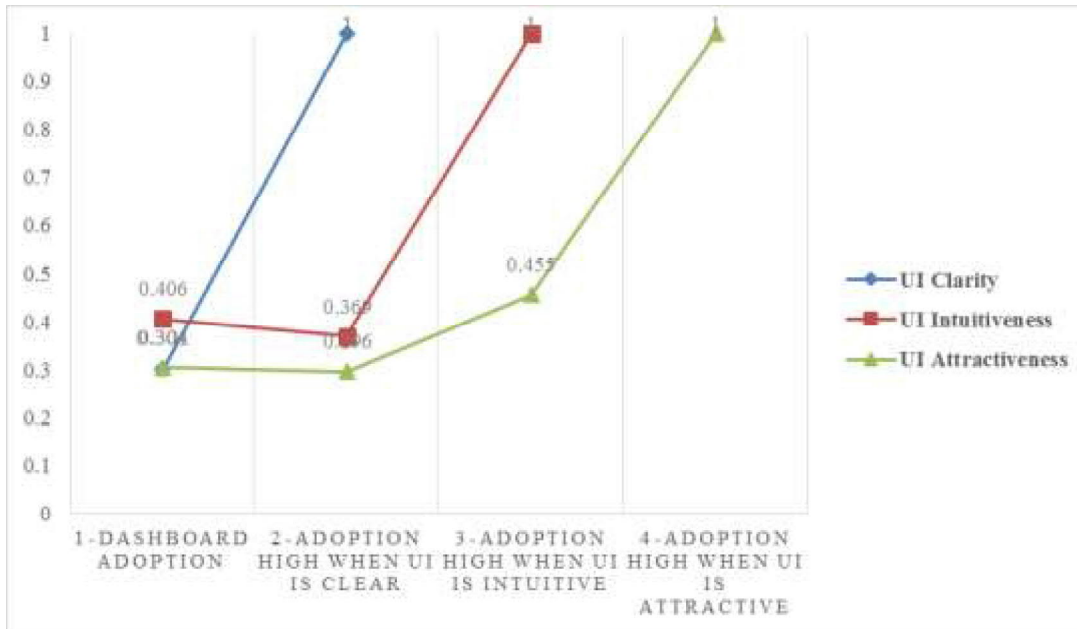


Figure 7: Correlation between dashboard adoption and sub items of user-interface quality

5.5.3 Relationship between Dashboard Adoption and Data Quality

Table 6 displays the result of Spearman Correlation analysis between data quality/integrity and dashboard adoption, performed in SPSS statistic tool. The results indicate that sub items of data quality had no correlation with dashboard adoption ($p > .05$). All the sub-items had insignificant correlation coefficients. On the other hand, unreliable data had a significant and positive relationship with non-customizable data ($r_s = .470$, $p < .01$). Non-customizable data also had a significant and positive correlation with data from an unknown source ($r_s = .366$, $p < .05$). It indicates that non-customizable data is also likely to be unreliable and from an unknown resource.

Variables	1	2	3	4
1-Dashboard Adoption	1	.180	.250	.169
2-Unreliable Data		1	.470**	.178
3-Non-Customizable Data			1	.366*
4-Data from Unknown Source				1

Table 6: Spearman Correlation between dashboard adoption and data quality
(Note: * $p < .05$; ** $p < .01$)

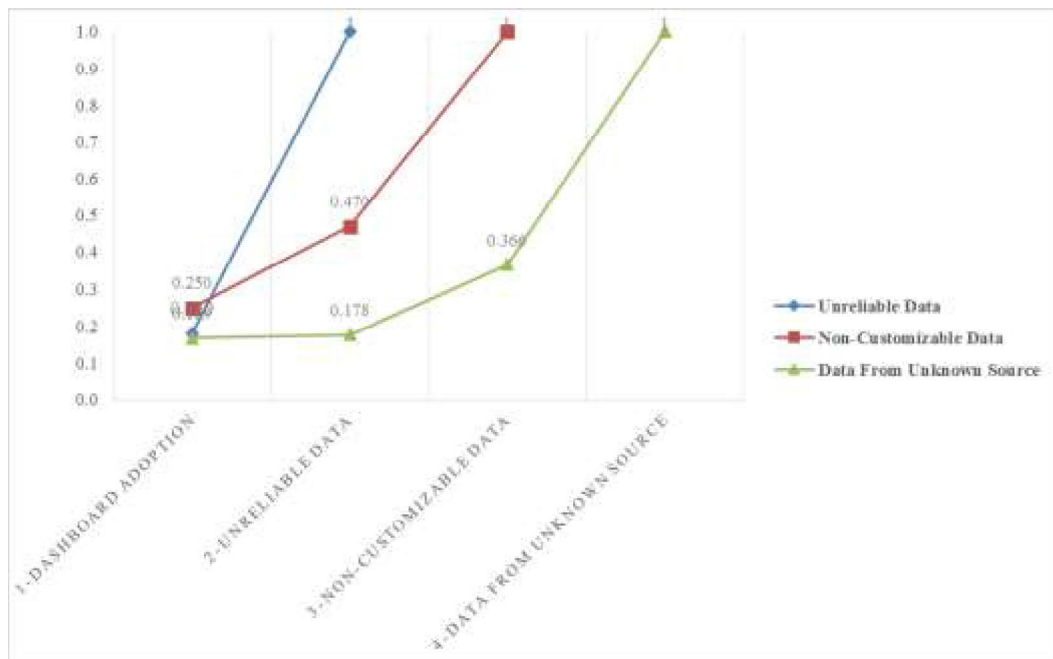


Figure 8: Correlation between sub items of data quality and dashboard adoption

5.5.4 Relationship between Dashboard Adoption and Communication

Table 7 displays the result of Spearman Correlation analysis between dashboard communication and dashboard adoption, performed in SPSS statistic tool. The results indicate that clear communication has a significant and positive correlation with dashboard adoption ($r_s = .493$, $p < .01$). The clearer the communication is, the higher the dashboard adoption will be. Frequent communication also has a significant and positive correlation with dashboard adoption ($r_s = .386$, $p < .01$). It also indicates that more frequent communication leads to higher dashboard adoption. Frequent communication also has a significant and positive correlation with personalized communication ($r_s = .471$, $p > .01$).

Variables	1	2	3	4
1-Dashboard Adoption	1	.493**	.386**	.203
2-Clear Communication		1	.185	.012
3-Frequent Communication			1	.471**
4-Personalized Communication				1

Table 7: Spearman Correlation between dashboard adoption and communication (Note: * $p < .05$; ** $p < .01$)

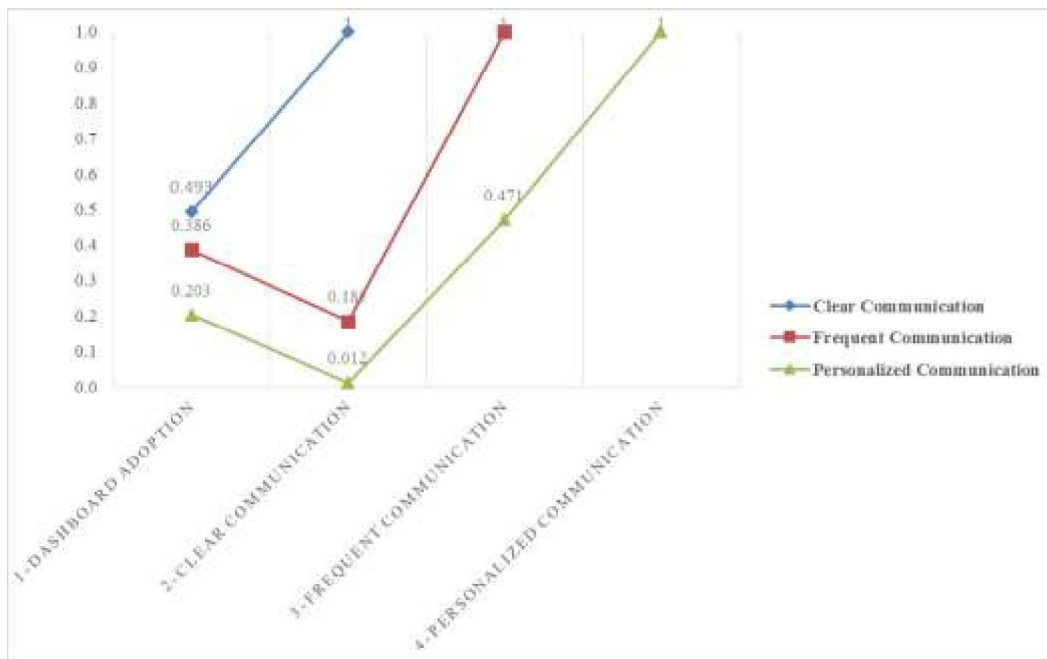


Figure 9: Correlation between dashboard adoption and sub items of Communication

5.5.5 Relationship between Dashboard adoption and Training

Table 8 displays the result of Spearman Correlation analysis between dashboard training and dashboard adoption, performed in SPSS statistic tool. The results show that frequent training has a significant and positive correlation with dashboard adoption ($r_s = .305$, $p < .05$). It implies that frequent training leads to higher dashboard adoption. Generalized training has no impact on dashboard adoption ($p > .05$). On the other hand, on-demand training has a significant and positive relationship with dashboard adoption ($r_s = .631$, $p < .01$). On-demand training leads to highest level of dashboard adoption, as it has the highest correlation coefficient among other training sub-items.

Variables	1	2	3	4
1-Dashboard Adoption	1	.305*	.281	.631**
2-Frequent Training		1	.154	.187
3-Generalized Training			1	.300*
4-On Demand Training				1

Table 8: Spearman Correlation between dashboard adoption and training
(Note: * $p < .05$; ** $p < .01$)

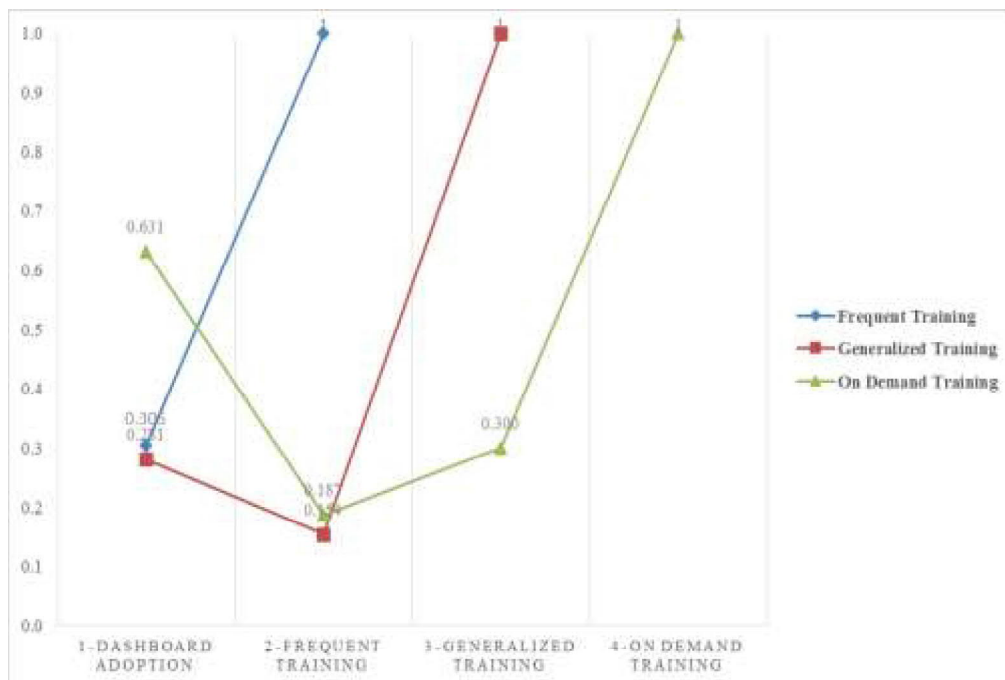


Figure 10: Correlation between dashboard adoption and sub-items of trainings

5.6 Regression Analysis

5.6.1 Introduction

In the latest section we described the positive and negative correlation between the identified variables of the hypothesis. In this section we will test the hypotheses with regression analysis to prove or disprove the hypotheses based on the response received from the survey.

Regression is generally considered as a study of dependence. A single linear regression model contains a single variance function and a single mean function. However a multiple linear regression is a generalized model of single linear regression model. Multiple linear regression model allows many variables in the mean function to be fit in the model (Weisberg, 2005). In other words multiple linear regression model has multiple independent variables and only one dependent (predictor) variable. Hypothesis 1 (H1) and Hypothesis 2 (H2) presented in this study have one independent variable and one dependent variable. Thus to prove/disprove H1 and H2 we used single linear regression model. Whereas Hypothesis (H3) has two independent variable and one dependent variable, we used multiple linear regression analysis to prove/disprove the hypothesis. The analysis was done in SPSS statistical tool.

5.6.2 Hypothesis 1

H1: When the visualization of the dashboard is clear, attractive and intuitive, adoption and sustained use of the digital dashboard is high.

The above hypothesis can be represented in using below expression.

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Equation 1 : Simple linear regression (Weisberg, 2005, p. 19)

Where

- Y is the dashboard adoption
- X is the dashboard visualization
- ϵ is independent error
- β is the slope

<i>Predictor</i>	<i>B</i>	<i>SE B</i>	<i>t-value</i>	95% CI	
				<i>LL</i>	<i>UL</i>
Constant	2.58**	0.23	11.13	2.11	3.04
User-Interface	0.21**	0.05	4.01	0.10	0.31
R ²		0.26			
F Value		16.09**			

Table 9: Regression between User-interface and dashboard adoption (Note: *p<.05; **p<.01)

Table 9 displays the result of the regression analysis performed in SPSS statistic tool. User-interface variable was created by calculating the mean of the three sub-items of the user-interface quality scale and was added as a predictor in the regression model. The regression model was significant ($F(1, 45) = 16.09, p < .01$), indicating that user-interface quality explained 26% of variation in the dashboard adoption ($R^2 = 0.26$). User-interface quality has a significant, and positive impact on dashboard adoption ($B = 2.58, SE = 0.23, p < .01$) (Weisberg, 2005). It means that clear, intuitive and attractive user-interface leads to higher dashboard adoption. Therefore, hypothesis 1 is accepted. In other words, when the visualization of the dashboard is clear, attractive and intuitive, adoption and sustained use of the digital dashboard is high

5.6.3 Hypothesis 2

H2: When the data displayed in the dashboard is not reliable and customizable, the adoption and sustained use of the digital dashboard is low.

The above hypothesis can be represented in using below expression.

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Equation 2 : Simple linear regression (Weisberg, 2005, p. 19)

Where

- Y is the dashboard adoption
- X is the dashboard data quality
- ϵ is independent error
- β is the slope

<i>Predictor</i>	<i>B</i>	<i>SE B</i>	<i>t-value</i>	95% CI	
				<i>LL</i>	<i>UL</i>
Constant	3.28**	0.12	27.23	3.04	3.52
Data Quality	0.11	0.06	1.89	-0.01	0.24
	R^2		0.07		

F Value 3.54

Table 10: Regression between Data quality and dashboard adoption (Note: *p<.05; **p<.01)

Table 10 displays the results of the regression analysis performed in SPSS statistic tool. Simple regression analysis was performed to find out the impact of data quality on dashboard adoption. The regression model was insignificant ($F(1, 45) = 3.54, p = .066$) and the model only explained 7.3% variation in dashboard adoption. Data quality has no impact on dashboard adoption ($B = 0.11, SE = .06, p = .066$) (Weisberg, 2005). It means that data that is unreliable, non-customizable and from an unknown source does not lead to low dashboard adoption. Therefore, hypothesis 2 is rejected. In other words, whether the data displayed in the dashboard is not reliable and customizable it still has no effect on the dashboard adoption by business executives.

5.6.4 Hypothesis 3

H3: When the training and communication of the dashboard is clear and frequent, the adoption and sustained use of the digital dashboard is high.

The above hypothesis can be represented in using below expression.

$$Y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \epsilon$$

Equation 2 : Multiple linear regression (Weisberg, 2005, p. 47)

Where

- Y is the dashboard adoption
- X1 is the dashboard Communication
- X2 is the dashboard training
- ϵ is independent error
- β is the slope

<i>Predictor</i>	<i>B</i>	<i>SE B</i>	<i>t-value</i>	<i>95% CI</i>	
				<i>LL</i>	<i>UL</i>
Constant	2.29**	0.26	8.75	1.76	2.81
Communication	0.13	0.07	1.97	-0.003	0.28
Training	.18*	0.07	2.44	0.03	0.33

R2

0.33

F Value

10.84**

Table 11: Regression of communication and training on Dashboard adoption
 (Note: * $p < .05$; ** $p < .01$)

Table 11 displays the results of the regression analysis performed in SPSS statistic tool. Multiple linear regression analysis was performed to assess the impact of communication and training on dashboard adoption. The regression model was significant ($F(2, 44) = 10.84, p < .01$). Communication and training explained 33% of the variation in dashboard adoption ($R^2 = 0.33$). Communication has no impact on dashboard adoption ($B = .13, SE = .07, p = .055$). It means that communication does not lead to higher adoption of dashboard. On the other hand, training has a significant and positive impact dashboard adoption ($B = 0.18, SE = .07, p < .05$) (Weisberg, 2005). It indicates that frequent, generalized and on-demand training leads to higher dashboard adoption. Therefore, hypothesis 3 is partially accepted. In other words when the training for the dashboard usage is clear and frequent the adoption of the dashboard is high, however dashboard-related communication being high and frequent has no effect on the dashboard adoption by business executives.

6 CONCLUSION

The study found out that digital marketing dashboards have numerous advantages in measuring and managing performance in the organization. If the company is committed to monitoring marketing efforts and wants to improve the outcome continuously, developing a digital dashboard has to be a priority. Reports from dashboard give clarity at first glance of the current efforts in marketing, focusing on the way efforts of digital marketing are leading to a more meaningful performance of the companies. Based on the findings, it is evident that besides monitoring performance, digital marketing dashboards play a key role in improving communication. This means that marketing dashboards are collaborative tools which help communicate the company's objectives and values and what needs to be done in order to achieve them. Additionally, the analysis of the results shows that improved performance, monitoring, and effective communication are some of the benefits of using digital marketing dashboards, which can also enhance the decision-making process.

A convenient report from a dashboard has to be clear, simple and easy to comprehend, so that the marketing managers, the analysts as well as the executives can understand it without any explanation. In regards to when and how business executives adopt digital marketing dashboards, the Spearman correlation between dashboard adoption and the quality of user-interface (UI) shows that the rate of adoption is the highest when user interface is clear, intuitive and visually attractive, and the increase in one of the qualities will positively affect the others. For instance, an increase in the clarity of user interface will automatically increase its attractiveness and intuitiveness. Communication regarded as a key purpose of dashboards resonates with a study by Yigitbasioglu and Velcu (2012) where the research discovered that communication and consistency are the primary use of dashboards among sales managers in Finland. This strengthens the current findings about how important dashboards could be in respect to corporate communication, besides acting as a collaboration tool between different end users in the organization.

The data also suggests there is a positive relationship between user interface, communication with the users, reliability of the data, and frequency of training on how to use marketing dashboards. This indicates that the variables are highly valuable to business executives when making the decision on whether or not to adopt digital marketing dashboards. Surprisingly, the results show that reliability of data had little effect on the adoption of marketing dashboards. This could mean that although this variable is important in

terms of data quality, it is not the deciding factor for the end users. Additionally, this may suggest that organizations are facing challenges in application integration which has been widely discussed in previous researches (Pauwels et al, 2009). However, user interface clarity, intuitiveness, visual attractiveness and communication clarity as well as generalization of training proved to be key prerequisites for a successful dashboard adoption. Corporation that are planning to adopt marketing dashboards should consider these factors, in order to take full advantage of this technology.

Based on these findings, the first hypothesis (H1), that when visualization of the dashboard is clear, visually attractive and intuitive, the adoption and sustained use of the digital dashboard is high, is true. Visual display of information in the dashboard can be in form of numbers, graph and bars. According to Peyrot (2002) information that is summarized and uses vivid, concrete presentation is easily accessible and more likely to be used by organizations. This explains why clear visualization of the dashboard is a major concern for business executives when adopting digital dashboards.

Similarly, the third hypothesis (H3) is also correct. As seen in the graph on mean score for dashboard adoption against the sub-items of user-interface, frequent training and clear communication increase the likelihood of dashboard adoption while also increasing its sustainability. In any organization, the users of dashboards include executives, marketing specialists, analysts and in some cases different representatives from non-marketing departments such as finance and production. Hence, training them frequently and ensuring smooth communication among them is crucial for the success of the organization. This explains why the presence of these factors in the dashboard significantly increases its adoption rate. Furthermore, when marketing departments and other departments are cooperative, goal congruence becomes easier to achieve.

However, it is worth noting that in firms where there is mistrust and rivalry among users and departments, the dashboard could be misused to fulfill the interests of individual departments at the expense of organizational goals. Furthermore, organizations may be tempted to prioritize dashboard metrics which give a favorable picture of their activities. The tailored approach by Ambler (2004) suggests that firms operating in different industries will have different requirements for their dashboards. For instance, organizations in the service industry are likely to have customer satisfaction scores, the rate of customer retention and employee performance measures as their key metrics, while firms in the package goods industry will have market shares and response to sales promotion as their

main metrics. Further research is necessary to understand the influence of the user's emotional factors in the adoption of digital dashboards.

The second hypothesis (H2) is not true. When data displayed in the dashboard is unreliable and not customizable, it has no effect on the adoption and sustainability of the dashboard. One of the explanations could be, reliability and customization of data in the dashboard is insignificant for the end user. The main function of dashboards is monitoring performance metrics and analyzing the results. However, it should be noted that data quality is key to the credibility of dashboard performance measures. Errors and lack of common data standards will compromise data quality, and consequently performance measures.

However, extensive research has however shown that organizations that use dashboards tend to have a relatively higher turnover (Ambler et al, 2004; Yigitbasioglu and Velcu-Laitinen, 2012). Although companies have continuously invested in technology over the last decades, more firms have recently become reluctant to spend resources on new tools which they may not consider worth investing in. This study nonetheless shows that dashboards play a critical role in monitoring and analyzing progress in not only the marketing department but across the entire organization. Firms that reject the concept of digital dashboards might be forgoing an opportunity to better leverage business intelligence infrastructure.

In conclusion, this study explains what digital marketing dashboards are and what drives are for its adoption. The contribution of this research study on the topic of diffusion of innovation: business adoption of digital dashboard, is highly relevant, but at the same time the study has opened up a number perspective for further research. First, it is surprising to discover that data quality or integrity has no effect on the adoption and sustained use of the digital marketing dashboard. As such, the results of the study need to be interpreted with caution as the sample size was small. It is possible that had the study included more participants from other companies, the results would have shown more diverse factors that influence adoption and sustainability of digital dashboards. However further research is required to understand the degree of data compromisation is acceptable by the business executives Second, as discussed in the principal component analysis, further research is required to understand balance between dashboard visualization effort (from the design and develop team) and dashboard communication and training effort (from the marketing team).

Furthermore, as research progress in this area, there is a need for empirical study to understand how standardized tracking and communication with the stakeholders on the marketing information can improve the marketing efficiency of the organization.

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Appendix A

The main source of information was the survey responses from digital marketing professional. The survey consists of 4 page questionnaire presented below in table 1 to table 4. The main objective of the survey was to build a base line of the most influencing factor in digital marketing dashboard adoption and sustain use by the business executives.

Table 1

Survey Questionnaire Page 1 of 4

Questionnaire for Digital Department

Dear Sir/Ma'am, kindly answer the following questions as appropriate. All information given would be made confidential and would be used for research purpose only. Thank you!

1. Gender of Respondent *

Female

Male

2. Age group of the Respondent

18 to 25

26 to 35

36 to 45

46 to 55

55 years and above

3. What is the name of the Company you currently work with? *

Table 2

Survey Questionnaire Page 2 of 4

4. In total how much work experience you have ? *

- less than 1 year
- 2 to 5 years
- 6 to 10 years
- 11 to 15 years
- 16 years and above

5. Are you familiar with concept of digital marketing ? *

- Yes
- No

11. Do you or your team use digital dashboards ? *

- Yes
- No

12. Do you believe digital dashboard can help to solve complexity faced by marketers who work on complex and complicated market data set? *

- Yes
- No

13. The adoption of the digital dashbaords is **HIGH** when the user interface (visualization) is *

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Clear *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attractive *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Intuitive *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Table 3

Survey Questionnaire Page 3 of 4

14. The adoption of the digital dashboards is **LOW** when the data presented in the dashboard is *

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Unreliable *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-customizable *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
From unknown source *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. The adoption of the digital dashboards is **HIGH** when communication from the dashboarding team is *

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Clear *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frequent *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personalized *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. The adoption of the digital dashboards is **HIGH** when Training for dashboarding is *

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Frequent *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generalized *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
On-Demand *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. Do you agree that digital dashboard can be used to measure the performance of an organization and as well guide the choice of decision? *

- Strongly disagree
 Disagree
 Neither agree nor disagree
 Agree
 Strongly agree

Table 4

Survey Questionnaire Page 4 of 4

18. In your opinion, what can you affirm has/have influenced the adoption and sustain use of digital dashboards in measuring the performance of your organization

19. Please fill your Email Address *