DIGITAL TRANSFORMATION OR INFORMATION MANAGEMENT: WHAT DIRECTION ARE COMPANIES GOING IN?

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Abstract

The research assessed Digital Transformation and Information Management with a view to determine between both, what preferences the contemporary company is exploring in the era of the digital economy. Information Management is a traditional discipline that is responsible for the preparation and distribution of information; it is connected with a company's information strategy (InS) and information systems (IS), while Digital Transformation is an emerging subject area that explores organisational transformation through the incorporation of digital technologies into organisational processes and reinvention of business models to improve a company's market competitiveness. A mixed method approach is adopted for the research, it involved quantitative and qualitative methods was adopted for the research. Data for the quantitative research was gathered through an online questionnaire; it covered respondents from 60 companies spread across 17 different countries. About 70% of companies implemented some form of InS, while about 80% of organizations had more than one type of information systems implemented within their business processes. From the ICT point of view, more than 50% of companies implemented the following: document management systems, business intelligence, cloud computing, and social media. The qualitative research involved in depth interviews with top management staff from the five companies covered in the survey. The respondents were of the opinion that the relationship between IM and DT within their organization was a priority for strategic planning and future growth. The survey results also showed that some respondents considered DT a sub-function of InS. Three maturity levels of the company and organization in relations to DT and InS were also suggested as follows from the analysis: the basic (37%), middle (26%), and high (37%) level. The paper concludes with an evaluation of the working hypothesis.

Keywords: *information management, digital transformation, information strategy, ICT, quantitative and qualitative research*

1 INTRODUCTION

The Information Management (IM) and Digital Transformation (DT) are two subject areas of strategic importance to a company which could translate to significant value if properly harnessed. They both elicit a lot of interest from academics and industry practitioners who seek to adequately leverage them for their inherent benefits to industry. Information Management is traditionally a subject with significant footprints in industry. Information management (IM) is a broad conceptual term that has various meanings and interpretations among different constituencies. Often the term is used interchangeably with others. However, Information management generally covers how information is created, acquired, organized, stored, distributed, and used as a means of promoting, efficient and effective information access, processing, and use by people and organizations (Detlor, 2010), the terminology is also often used interchangeably with Information Systems (IS), Management Information Systems (MIS) and Information and Communication Technologies (ICT).

On the other hand, Digital Transformation relatively maintains the status of an emerging subject among industry practitioners, government policy makers and academic researchers. According

to Riedl et al. (2017), Digital Transformation is the process of introducing digital technologies into internal processes to effect changes that lead to organizational transformation. However, it is pertinent to state that Digital Transformation is a subject that is still shrouded in a lot of conceptual obfuscation hence making it difficult to establish harmony in terms of how it is defined and interpretation by different groups of stakeholders. It is pertinent to state that Digital Transformation requires an enterprise mind-set and impacts every function and business unit of an organization (Carcary, Doherty & Conway, 2016).

Empirical evidence suggests that Information Management and Digital Transformation may not necessarily not operate in isolation of each other, hence the need for one not to be ignored in favour of the other especially in an era of hypercompetitive business environments wherein organizations are in desperate need for sustainable growth through improvements in process efficiencies and cost reduction, that ultimately translates to overall improvements in a company's overall market competitiveness. Within the context of the digital economy, Carcary et al. (2016) argues that "Digital Transformation needs to become central to how businesses operate, and that organizations need to effectively to re-think and possibly re-invent their business models, so that they continually learn from interactions with customers, suppliers, and partners in the business ecosystem in order to remain competitive". This must be done without losing the benefits of Information Management to the company or organization.

Hence, this research aims to assess what works best for a company or organization in the fast paced competitive environment in which they operate in today. This will be done with a view to gain a better understanding what strategic path companies are following in terms of technology adoption and implementation within their operations. The research will address the following research questions: Are companies disposed to explore digital transformation or do they prefer to remain conservative by retaining traditional Information Management systems? How is Digital Transformation influencing the traditional roles and tools of Information Management in companies today? And finally, what are the emerging business models in companies that are dependent on digital technologies? The research adopts a mixed method approach that combines both qualitative and quantitative research methodologies. The paper concludes by contributing meaningfully to the body of knowledge on IS as it relates to the traditional field of IM and the emerging field of DT. It also brings to the fore other important areas that deserve more thorough investigation in future research.

2 LITERATURE REVIEW

2.1 Information Management

Information Management as applied in informatics and management, encompasses the whole spectrum of information activities within a company. It focuses on tasks such as the acquisition, processing, reporting and distribution of information within an organization (Afifi & Weiner, 2004; Riedl et al., 2017; Robertson, 2005). The primary objective of Information Management is the provision of the quickest and the best support for workers of a company or an organization, with the information required to improve internal and external processes of the company or organization. Hence, Information Management covers the following segments of management functions: planning, management, administration, and control; and for working with data and information: acquisition, storing, retrieval, processing, and distribution. Information activities do not only cover the preparation of information, it also extends to the preparation of information systems (IS) and knowledge resources, to support the information work requirements of the organization.

Also, Robertson (2005) views "Information Management as an umbrella term" that involves all systems and processes within the company and organization, that results in the creation, usage, and distribution of information. IM deals with people, processes, and technology. In addition, Wilson (2016) explains various aspects of Information Management such as source and connection with other disciplines; elements of Information Management; the economics of information; access to information, its privacy and security; Information Systems and education for IM. For Whittaker, Bellotti and Gwizdka (2006), Information Management involves the information processing and management functions that should deliver the right information to the right people in the right time. They also argue that Personal Information Management (PIM) is about the activities of people with as it concerns information processing in their various tasks and roles as organization or company employees; as members of communities or individuals. The views expressed are also similar to those of several other authors (Afifi & Weiner, 2004; Franklin, Halevy & Maier, 2005; Hicks, 2007; Mildeova & Brixi, 2012; Mithas, Ramasubbu & Sambamurthy, 2011; Moen & Brennan, 2005).

2.2 Digital Transformation

Within the business and academic community, the subject of Digital Transformation means different things to different stakeholders. However, there is a convergence of opinions as it relates to how digitalization through digital technologies is having a transformative effect on businesses and organizations. Digital technologies cover a broad range of electronic tools, systems, devices and resources that generate store or process data. They include social media, online games and applications, multimedia, productivity applications, cloud computing, interoperable systems and mobile devices. They enable the compression of immense amounts of information on small storage devices that can be easily preserved and transported. Digital technologies have significantly affected society by transforming how people communicate, learn, and work. Digitization is at the core of the entire process, in its most basic form, it is the conversion of analogue information into digital information (Ernst & Young, 2011). Digital transformation goes much more than that; it incorporates the whole gamut of digital technologies and organizational structures interacting in a continuously evolving manner. Clemons et.al. (2013) define Digital Transformation as "transformation precipitated by a transformational information technology." While Bondar et al. (2017) define Digital Transformation "as a consistent networking of all economic sectors and as adaption of actors to new circumstances of the digital economy".

The nature of such transformations could be as diverse as resulting in a significant change in business processes, organizational capabilities, operational routines, and entering new markets or exiting old markets (Ahlemann, 2016; Chen, Pan & Ouyang, 2014; Dehning et al., 2003; Orlikowski, 1996; Pan, Xianghua & Huang, 2009; Venkatraman, 1994). Digital Transformation is also incorporates the alignment of IT and organizational structures (Venkatraman, 1994). Beyond the nuanced approach to understanding Digital Transformation, Venkataraman (2015) takes a more direct view to defining digital transformation, he comments that "it is all about re-imagining certain aspects if not entire business processes, services and interactions with customers, partners and vendors by leveraging consumer oriented digital technologies to deliver superior experience."

2.3 Relationship between Information Management and Digital Transformation

Exploring the relationship between Information Management and Digital Transformation, Riedl et al. (2017) provides a summary that introduces conceptual clarity through three possible scenarios. Firstly, that Digital Transformation is a subset of Information Management; secondly, that Information Management and Digital Transformation are independent areas with

different underlying factors; and lastly, that Digital Transformation deals with topics related to strategic Information Management. He further argues that Digital Transformation comprises of tasks and methods that are already included in existing Information Management frameworks. He cited the example that 'strategic objectives' and 'tasks' are subsumed under the prefix 'digital', some of which have long been included in Information Management frameworks. However, i-Scoop (2016) explores the relationship between Information Management and Digital Transformation from a much more intertwined perspective; it is argued that Information Management is not just a key part of Digital Transformation. It also appears at each step along the journey towards achieving both specific and enterprise-wide Digital Transformation goals such as the improvement of customer experience through digital channels, improving operations, innovating or realizing competitive advantages. Thornley et al. (2016) from their research work on a knowledge management (KM) maturity model which is a component (critical capability) of the IT Capability Maturity Framework argue that the KM is 'fit for purpose' for organizations in the digital age.

Zimmermann et al. (2016) investigate Digital Transformation of business and IT, and it integrates fundamental mappings between adaptable digital enterprise architectures and service-oriented information systems. The Internet of Things, Enterprise Social Networks, Adaptive Case Management, Mobility systems, Analytics for Big Data, and Cloud services environments are emerging to support smart connected products and services and the Digital Transformation. Biological metaphors of living and adaptable ecosystems provide the logical foundation for self-optimizing and resilient run-time environments for intelligent business services and related distributed information systems with service-oriented enterprise architectures. We are investigating mechanisms for flexible adaptation and evolution for the next digital enterprise architecture systems in the context of the Digital Transformation.

2.4 Summary of Review

Empirical evidence from the reviewed literatures supports the argument for a complex and changing dynamics in the relationship between Information Management and Digital Transformation. While traditional Information Management systems in organizations originally focused their coverage to traditional information systems or core information technology for operational purposes, the need to review their relevance from a broader perspective to cover Digital Transformation related technology trends such as Internet of Things (IoT), Big Data and Data analytics, Cloud based services, Digital Platforms, Enterprise Social Networks, etc.

As these technology innovations become ubiquitous thereby leading to enterprise-wide adoption, they bring unique value to the business which manifests in more efficient processes, reduced operational expenses and in turn better customer engagement which leads to higher customer satisfaction and retention rates. Regarding the interaction between Information Management and Digital Transformation, the literatures reviewed also reveal that for a successful Digital Transformation in any business organization which does takes full advantage of existing Information Management systems and processes and builds upon them, digital maturity and a modern organization culture are indispensable and important. Three key areas that may not be ignored: (1) Customer Demands - this is primarily about the provision of top-notch and delightful experience in every aspect of engagement and delivery of products or services; (2) Process Orientation - this should focus on digitization of processes within the company and employee enablement that ensures data-driven decision-making, which should ultimately result in greater performance improvement and overall operational transparency; and (3) Innovation in Business - this should lead to the development of new digital products or services, it could also be about digitizing existing business models and should go beyond

existing business needs with the aim of developing new innovative products and services that would cater to changing business needs.

However, the literatures reviewed also indicate three possible scenarios that define the relationship between Information Management and Digital Transformation within the organization (Riedl et al., 2017). It is easy and straightforward to understand the practical significance of Information Management or Digital Transformation as a standalone subject matter, but when viewed from the perspectives of these scenarios, it becomes challenging to juxtapose the academic understanding of the possible scenarios of relationships between Information Management and Digital Transformation with the practical applications. The first scenario, which treats Digital Transformation as a subset of Information Management, has the risk of ignoring the importance of Digital Transformation as a tool for complete transformation of an organization, with the implication of adopting a technological perspective and thereby limiting the immense potentials of Digital Transformation in reinventing the organization. The second scenario, which treats Information Management and Digital Transformation as distinctive and independent areas may lead to confusion and misunderstanding of how to harness the potential of each in creating a more efficient organization. The final scenario, which seems the most practical approach in viewing their relationship takes into consideration the overlaps in roles of both Information Management and Digital Transformation thereby making it easier to interpret both of them as being interrelated and interdependent (i-Scoop, 2016).

3 METHODOLOGY

The research adopted a mixed method approach, it combined both qualitative and quantitative methods in its analysis. The qualitative aspect of the research involved a comprehensive review of relevant literatures that explored the subjects of Information Management and Digital Transformation within business and the academia, the objective was to establish evidence from previous research that analyses and investigates how information management and digital transformation interact within a company. It also involved expert interviews with high-level stakeholders within industry. Peer reviewed journals articles covering the subject areas of interest were identified and sourced from scientific database such as Google Scholar, Scopus, and Web of Science, the search term employed in querying these databases were keywords relating to “Information Management”, “Information Systems Management”, and “Digital Transformation”. The quantitative aspect of the research involved the collection of quantitative data through the use of an online questionnaire. A total of 60 respondents completed the survey questionnaire. Purposive sampling technique was employed in selecting the survey respondents, the primary criteria being that the respondents should fall within the top management cadre of their companies. Simple statistical analysis was conducted on the data collected from the survey, this was done with a view to analyse the state of adoption and implementation of different types of digital technologies within the companies covered by the survey, as this would give an insight into the emerging business models and direction of Digital Transformation within the companies.

The research was conducted in three stages. Stage one involved a review and analysis of evidence from literature that cover current trends in the subject areas of interest - Information Management and Digital Transformation. It investigated the status of Information Management viewed through the prism of a company’s Information Strategy and Information Systems. The status of Digital Transformation in companies covered by the research is analysed using the following indicators: Information Systems, Document Management System, Business Intelligence, Internet of Things, Enterprise Social Networks, Adaptive Case Management, Mobility access to IS, Analytics for Big Data, Cloud computing, in Memory Computing, etc.

Stage two involved the use of an online questionnaire for collecting data used in the quantitative aspect of the research; the major limitation of this part of the research was the difficulty encountered in obtaining sufficient amount of responses from a larger pool of respondents. Finally, stage three involved statistical analysis of data collected through the online questionnaire, the simple statistical analysis yielded results that provided the basis for the discussions and final recommendations of the paper.

4 EMPIRICAL RESULTS

The survey questions were divided into two parts, the first part captured the demographic data of respondents, while the second part captured data on information management and digital technology implementation and use cases within the companies covered in the survey. The section on demography had questions that captured company name, number of employees, and location of the respondent. The Information Management/Digital Transformation specific questions captured availability of Information Systems policy in organization, year of implementation of Information Systems policy (if available in organization), availability of standard information systems procedure in organization, how extensive is the level of information systems implementation in the organization, and if the information systems implemented in the organization are able to work efficiently together. The issues of adoption of digital technologies is investigated to enable the researchers understand the key organizational components that are impacted by these technologies, the specific types of digital technologies adopted, and the innovation use cases for which they were implemented.

4.1 Results of the quantitative research

The survey ran for a duration of 30 days, there were 60 respondents who completed the survey. The selection of respondents was on the professional profile and work experience, which had to be inclined to persons especially in managerial positions with extensive work experience in the ICT functions of their respective organizations. Survey respondents were spread across the globe as follows (the most important): Netherlands (14), Nigeria (14), United States of America (7), Germany (6), Canada (3), and Great Britain (3), 17 countries together. The survey covered companies ranging in size from small and medium scale enterprises (SMEs) to large corporations. The result from simple statistical data analysis indicated that about 70% of companies covered had some form of information strategy implemented, while those that had more IS within the organization that operated harmoniously across all segments of the organization were about 80%. This result shows that especially for smaller companies, there was not a stringent requirement to adopt a comprehensive Information Systems, this is generally attributable to the size of the organization and cost implications of having an elaborate strategy implementation regarding management of information systems within smaller organizations.

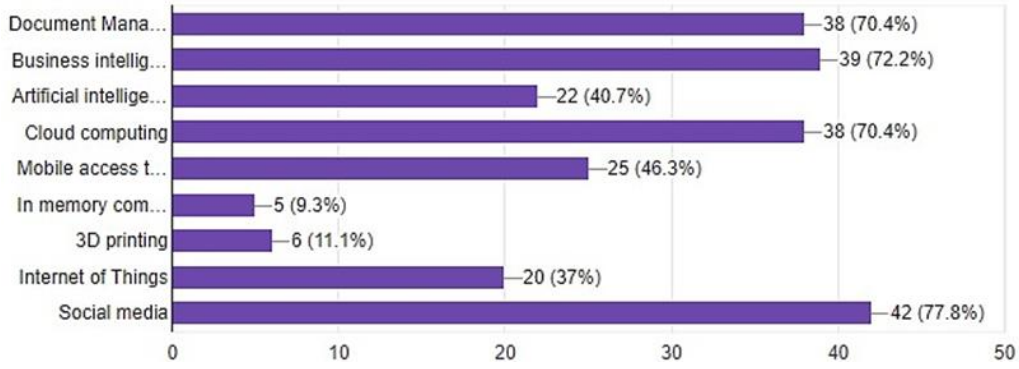

Fig. 1 – ICT adopted in DT by companies covered in survey. Source: own research

For standardized IS procedure, 64% of respondents acknowledged that their organizations had it implemented, and for IS working in harmony within the organization, about 54% acknowledged that their organizations had well functional systems, while 46% responded in the negative. In response to the question on adoption of digital technologies, 80% of respondents acknowledged that their organization had some form of DT adopted within their organization. The graphs in Fig. 1 and Fig. 2 indicate which of the DT were more widely adopted within the organizations covered in the survey and for what use cases they mainly cover. At the Fig. 1 is depicted the ICT adoption in DT and at the Fig. 2 is referred to the state of implementation of the new business method in era of DT.

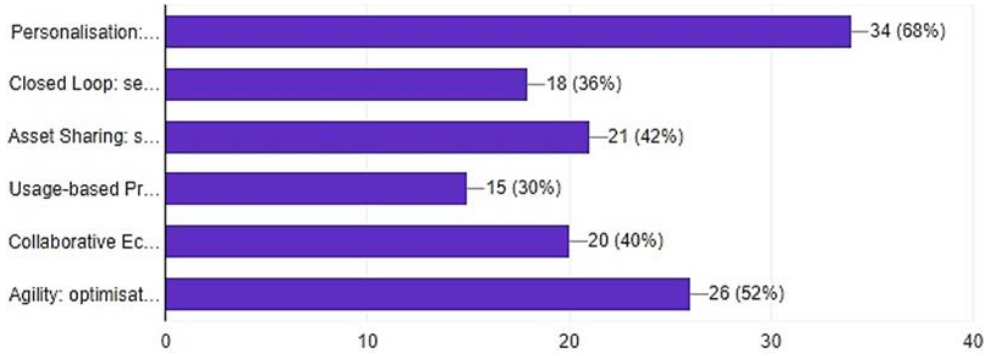

Fig. 2 – New business methods use cases at the companies. Source: own research

There are some patterns observed in the results of survey conducted. The first major observation is that there is a high adoption rate of DT within large multinational corporations and these DT is well integrated with their existing IS. It seems to suggest that they are able to attain a reasonable level of DT, which does not disrupt or negatively influence their existing information management systems. This is an indication of a well-structured information strategy policy for these large corporations. The second observation is that smallest companies that were captured in the survey lacked any clearly articulated Information Systems, this could be attributed to size of the companies and limited financial resources. While size does not make it so necessary for an elaborate information strategy policy, limited financial resources does on the other hand influence their ability to adopt IS such as CRM and ERP. However, they are able to leverage the benefits of DT such as cloud computing and social media, which play a vital role in reducing barriers to entry and improving their opportunities to reach new client base.

Among the list of DT most commonly adopted by companies covered in the survey, social media (SM), business intelligence (BI), document management systems (DMS), and cloud computing (CC) are the most adopted in that order; while the least adopted are in memory computing, 3D printing, and Internet of Things in that order as well. The high adoption rate of social media cuts across of company sizes. The reason can be seen from the perspective of its usefulness as a tool for customer engagement, advertising and building brand equity and managing company reputation. For Innovation Success Use Case, DT that enables a high degree of personalization and agility for the companies also see high adoption and applicability by companies covered in the survey. On the other hand, use cases that focused more on usage based pricing and closed loop saw the lowest levels of adoption and applicability. The use cases also represent the ability of the companies covered in the survey adoption to DT of the business processes, organizational structure and client engagement.

4.2 Results of the qualitative research

The qualitative research involved in depth interviews with top-level management staff from five of the companies covered in the survey. Staff selection for the interviews was based on

their within the companies. The objective was to contextualize the realities in these companies and achieve a deeper understanding of the quantitative analysis result from the survey. The identity of the interviewed staff is kept private for confidentiality purposes. The first respondent spoke about the relationship between IM and DT within their organization as a priority for strategic planning and future growth. He emphasized that the organization understood the rapid transformations of their industry segment by DTs and that management was actively pursuing strategies of implementation and adoption of DTs within the current framework of the company's operations to see how they can achieve sustainable growth and remain competitive.

The second respondent spoke in similar manner with the first, the major difference being that his own organization was more interested in application of ICT within the company in customer facing business processes especially because they operate within the financial services industry. He argued that it was more strategic in such capacity because of the peculiarities of their business operations, which is 'Services', based and required a level of unprecedented speed and need to maintain brand reputation at all times. The third respondent spoke about DT within her organization as a sub-function of the IS strategy. She stated that her company's management based this decision on the consideration that they were only applying technologies, which they considered ICT tools in the operations of the company and did not really see any business case for specialized adoption or justification for changing their current organizational processes.

The fourth respondent stated that his company saw the importance of ICT and was keen on reviewing operational processes with a view of integrating them into the business processes of the company. However, the management believed that it would be best to do it through a comprehensive review process that involves cross-departmental stakeholders to achieve their objectives without much disruption to already established processes. They were particularly more interested in harnessing the opportunities of cloud computing and data analysis because they considered both of more strategic importance to the operations of the company and their business interests. The last respondent spoke about the lack of interest in ICT by his company's management. He stated that management based the consideration on the size of the company and the belief by management that ICT would not offer any particular strategic advantage.

5 DISCUSSION AND CONCLUSION

The Digital Transformation strategy observed in companies covered in the research, when related to the diagnosis of the future concepts of Industry 4.0, highlighted five maturity levels outlined as follows: the company has an existing information system for production management, its Internet presence is passive (website only), the company's management see a need for and contemplates process digitization, digitization in production, maintenance, product design, etc., it does not yet have a defined digital strategy, even though it has the partial ability to engage in information flows within its supplier-customer relationship; for the companies whose business model is driven by web interactivity and software enabled solutions begins to the potential of its business generated data, this has the potential to move them towards the path of setting up and implementing a digital strategy involving some level of automation of processes, and leading into information flows and integration of its supply-chain (linked digital code lists, interactive digital catalogues, semi-automatic orders); there is also the possibility of the companies taking advantage of multi-channel presence (web, mobile and tablet, social networks, etc.), this is usually a result of the company implementing a defined digital/information strategy, alongside the existence of data culture basics - data architecture projects, Managed Execution Systems, personalized products with virtual component within the company; also, with the company's integrated multi-channel presence in the digital world, company management ensures that digital/information strategy in the company is followed

through aggressively, for example by ensuring that the data architecture is integrated throughout the entire production chain from communication and data sharing to customer until after subcontractor, and use of digital diagnostics to predict failures and non-conformities in manufacturing, measuring and other systems; finally, the company is able to achieve digital transformation to a high degree when it is able to link the online and off-line operations into one fully integrated economic value adding system which enables it to offer unique personalized customer experience through virtual products/assistants, communicating with customers throughout the lifecycle of a partnership relationship, use of new and effective approaches (full automation, 3D printing, etc.), he realizes a cyber-physical system capable of individualized realization of any physical part of production, and by providing fully digitalized services to its partners and subcontractors thereby being able to control its production domain and achieving a high level of efficiency and significant cost reductions.

In line with the objectives of the research, and based on result of data analysis from survey questionnaire, the following maturity levels is proposed for companies in regards to how they approach Digital Transformation along with their established information strategy: Basic level – at this level, a company which currently does not have an information strategy starts to think about how to implement process digitization, the company has ICT implementation at a minimum or none existent and information systems support is low; Middle level – at this level of maturity, the company now has a defined information strategy which is essentially driven by its information systems, it has also been able to implement a significant amount of ICTs and digital technologies that puts it on a path of achieving digital transformation; High level – for companies at this level of maturity, they have been able to implement well defined and elaborate information strategy which is regularly updated in line with current technological trends to meet their business needs, all processes are digitized, and they have been able to implement a lot more ICTs and digital technologies thereby achieving the highest level of digital transformation.

The companies covered in the survey are grouped according to their level of Digital Transformation maturity level, and it is shown in Fig. 3 below. Even though the result of the analysis is limited because of total number of companies covered in the research, their size and locations, the result is important from a methodological point of view than from a focus on the result of the data analysis. Hence, it is proposed that further research should be conducted which would focus on gathering a more robust data set for analysis because the current research was severely resource constrained especially in the sense of timeframe for data gathering.

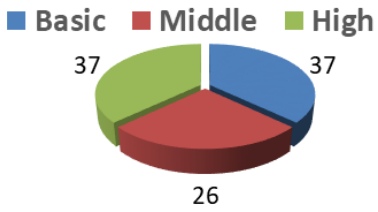

Fig. 3 – Maturity levels in DT of the companies. Source: own research

In this paper, we aimed to assess and analyse how the interaction between information management and digital transformation occurs within a company. The methodology combined both the qualitative and quantitative research approach. The limitation of the research was with respect to volume and branch of the companies that should not be involved due to small number of response in questionnaire. From the suggested methodology is possible to analyse the maturity levels in DT of the companies and organizations.

The research successfully addressed the research questions by establishing that: while IM remains an integral part of organization's information systems, the tasks and tools associated

with IM are undergoing significant changes in the era of DT. This is evident in the result as captured by Fig. 1, which shows the ICT preference of adoption of many of the companies covered by the survey. There was a tendency towards the traditional DMS, BI solutions, and CC solutions and use of SM were on the increase. The differences caused by IM by DT can be seen as stated earlier in the increasing adoption of CC solutions and use of SM as part of the IS strategic shift of most companies. Finally, the state of ICT use and implementation in all organizations covered by the survey is high, tending towards 100% utilization, which indicates that companies and organizations understand the importance of ICTs to the success of their business.

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