

# “Influence of information technology on the finance function: evidence from case studies”

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## Influence of information technology on the finance function: evidence from case studies

### Abstract

The finance function is defined by a complex set of activities and interrelationships between them. Each of these activities is also under stress from the competitive market place, to become more efficient, enhance productivity and reduce costs. The main mechanism used to address these issues is that of information technology (IT). While the definition of IT may be complex, the core characterization is the conversion, process and transfer of information. The ability of IT to impact the finance function is vast as it has multiple applications for each activity. However, the main effect of IT is to automate manual tasks to remove human error, create standard processes to enhance transparency, and ensure compliance with regulations. The implementation of IT has given Chief Financial Officers (CFOs) more flexibility in their organizations, as well as the ability to derive greater levels of insight from the current amount of data they have access to. While IT may provide the activities within the finance function with numerous opportunities to evolve, the study concludes that the pivotal evolution is to shift the finance function from a transaction processing unit to a more strategic function within the organization. This paper uses the case study approach to ascertain the influence of IT on the finance function.

**Keywords:** finance function, information technology, analytics, predictive analysis.

**JEL Classification:** G30, Z000.

### Introduction

The finance function is a vital component of any organization as the activities that take place within this function have far reaching implications across the organization. Nowadays, organizations face intense pressure to lower costs, streamline processes and enhance value creation, and this has also become a prime focus of finance. Finance in each organization is different, but all perform a similar function. The activities discussed in this paper that form the finance function, are strategy and risk, funding, management control, accounting and compliance. These are the core activities that originate from organizational activities. However, the understanding of these core activities is hard to define due to the complex nature of the interactions. Nonetheless, each one of these activities is under pressure to become more efficient and value adding. One of the main tools utilized to address these pressures is that of information technology (IT). IT has evolved to become a critical enabler of business and has become a central part of the finance strategy (Desai, 2008). IT also has far-reaching implications for an organization, which needs to try to consolidate information flows to make communication more efficient and so enabling decision makers with this information. IT impacts the finance function in a number of ways, from reducing resources needed for transaction processing to actually changing the roles of these resources to become more involved in other areas of the business (Smith and Payne, 2010). However, one of the most important requirements of

implementing IT is that it enables the finance function to play a bigger role in strategic decision making and not just be a support function. The role of finance has evolved in this manner, moving away from transaction processing to play a more important role in company strategy. While IT may provide these benefits, the understanding of IT is limited. IT, by definition, is more complex than just dealing with technology. The elements included in IT encompass vital factors that are required to implement and manage it correctly. The finance function is not immune to the growing pressures to be more efficient and value adding. This paper explores the impact IT has on the finance function's activities with regard to creating value. Overall, the study asks the question: How does IT influence the finance function within a company? In answering this question, short case studies are used to provide real-world examples of technology in play and what benefits accrued.

### 1. Literature review

Technology has been a very influential factor in today's modern world. Technology, although good, has been affecting not only how people communicate, but also the way they think or react (Zietman et al., 2010). It has also changed how people write, read and interact with others (Zietman et al., 2010). As information travels faster, the world seems to get smaller, and this has massive implications for the way business is conducted. Digitally storing important or sensitive files on a computer rather than in cabinets, for instance, has made information easily accessible and more secure. Using applications such as e-mail, enables businesses to communicate and transfer these files quickly to locations outside of the traditional office (Parazoglou, 2006). Many have argued that technology has distorted the line between

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professional and personal lives, because wireless internet, cell phones and tablets have made it easier to work from anywhere (Akkirman and Harris, 2005; Goggin, 2012). Moreover, with IT being a substitute for low skill labor, this has cost many jobs although providing cost reductions to companies (Sanders, 2005). Information technology, or IT, is a term that is over used and is used to relate to anything that has to do with technology. However, IT is much more specialized. Tasks once upon a time done manually have now become automated by computerized operating systems, which require a simple single click of a mouse, if at all, to complete. Since we live in the information age, IT has become a part of everyday lives. The formal definition is that IT incorporates all types of technology used to create, store, transfer, transform and access information in its various forms (Lodewyk, 2006).

While in theory IT may provide a host of potential benefits to a company, it is important to distinguish if this is just perceived benefits meaning that the implied benefits are just the natural evolution of efficient processes or is it direct benefits as a result of IT. Early studies point to ‘firm effects’ as accounting for a large portion of the benefits associated with IT however it was also established that the elasticity of IT remained significantly positive (Brynjolfsson & Hitt, 1995). On a similar note Brynjolfsson and Hitt (1995) also utilized the theory of production along with the production function to analyze IT productivity. The production function provided a robust framework as it also

accounted for differences between companies. The significant results from this study showed no difference in IT elasticity between companies that experienced growth versus those that did not. This finding does not indicate that IT receives a disproportionate share of budget but may be an indicator that companies were reluctant to cut IT budgets in tough economic times. Therefore suggesting that investment in IT is attributed to competitive challenges rather than economic hardship (Brynjolfsson & Hitt, 1995). While early studies may point to an indifferent view, contemporary studies take a firm stance on the value derived from IT. These views have been the basis for the rush of IT innovation within all areas of business, to keep up with competition and changing market dynamics.

Utilizing the Technology, Organization and Environment (TOE) framework along with factor analysis Chong et al. (2009) found that when faced with competitive pressure IT is able to provide a relative advantage. This is a popular finding among most contemporary studies (Lin & Lin, 2008; Liu, 2008; Martins & Oliveira, 2007; Zhu, Dong, Xu, & Kraemer, 2006). Further evidence of the favorable adoption of IT is found in figure 1 where companies that use IT heavily (A) outperform those that do not (B and C). This foundation has led to companies actively adopting IT within all functions. One function that has seen heavy investment is the finance function.

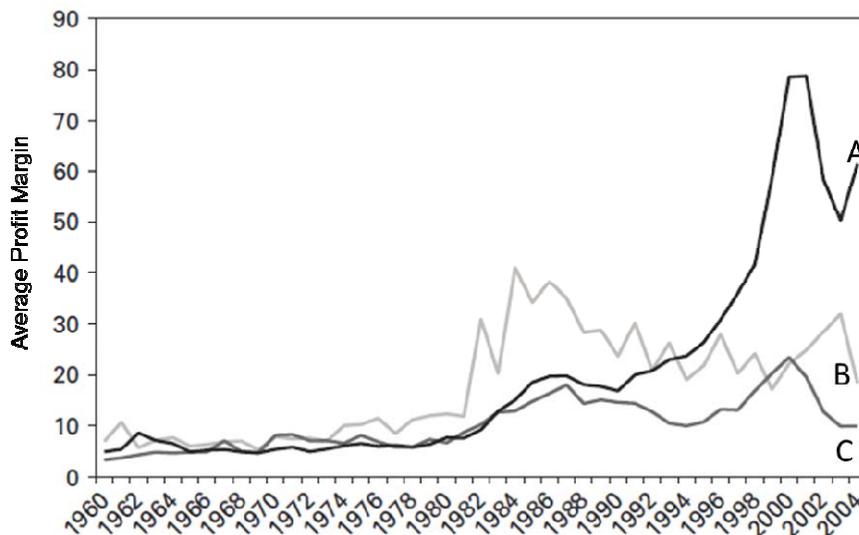


Fig. 1. Profitability in IT-intensive industries (Brynjolfsson & Saunders, 2010)

In these uncertain economic times, there is a growing pressure to reduce the enterprise cost base, provide transparency to stakeholders and, most importantly, make faster decisions. The Global Chief Financial Officer (CFO) study carried out by IBM in 2008 revealed that CFOs are concerned that their finance organizations simply lack the

enterprise-wide integration and required flexibility essential to mobilize resources and information effectively and quickly enough. One key finding from the study of over 1200 CFOs, was that increased effectiveness, driving integration of information across an enterprise, is a major differentiator for financial outperformers (Rogers et al., 2008). The process and

transfer of information is a key factor not only in the finance function, but in the entire organization. This was evident as early as 2001, when organizations were complaining of drowning in data while thirsting for useable information (Herrmann, 2001). The data that organizations have access to include sales, demographics, economic trends, competitive data, consumer behavior, efficiency measures, financial calculations, social media trends, campaign data and employee performance (Nolan and McFarlan, 2005). Such data can be extremely valuable if correctly transformed into useable information that can inform decision making. IT has provided numerous ways in which to convert large amounts of data into information, such as by using management information systems (MIS), business intelligence (BI) solutions and analytical applications.

The finance function is one of the most important functions within any organization. The term 'finance function', in this paper, is used to denote finance activities within an organization. To layout a template of set activities that are carried out in an organization can be complicated due to the set of complex interrelationships which pan out differently over time, depending on the context and changes in the nature of the business. Hence, a conclusive understanding of the finance function and its contribution to company success may not be easily reached. Although frameworks do exist to analyze the finance function, most are not contemporary as they contain an exhaustive list of activities rather than logical groupings (Desai, 2008; Financial Executives Research Foundation, 1995). However, drawing on the work from Smith and Payne (2010) and Herbert et al. (2011), the following groupings have been identified: strategy and risk, funding, management control, accounting, and compliance.

These groups of elements have a complex set of interactions between them that form the finance function, which is fundamental to the successful operation of any organization. However, this function does not work in isolation and a number of other elements shape the implementation and efficiency of finance-related activities. These elements are the external drivers that influence the operations of the finance function. IT falls into this category, as one of the external drivers.

The exact impact and nature of the relevant drivers will not be the same for each organization, the reason being that each operates in its own context. Therefore, this also applies to the finance function: their impact will differ. However, there will be common trends, and organizations often mimic actions that have worked well for other organizations. The complex set of interactions between finance activities and drivers is largely heightened by the constant state

of change that these drivers are subject to (IMA, 1997). This is particularly true for the IT driver, which by its very nature is constantly evolving and thus varying in its impact on the finance function.

## 2. Methodology

Case studies were used as the medium to enhance the practical understanding of the influence of IT on the finance function. The intent for using a case study approach stemmed from notion that this method allows for a strong basis on which ideas can be built on. In addition it allows the capturing of data that would otherwise be lost with other techniques (Gerring, 2004). IBM's internal intranet project reference site was used to source information used to populate the cases. However, the information used was publically available information as the projects used are available via the internet to all. The names were excluded in the analysis to keep the anonymity of the companies. The projects selected which formed the foundation of the case studies were selected based on a typical-case approach (Gerring, 2006). In essence a typical case is representative of a broader phenomenon. In addition most recent projects in the financial sector domain of products made up the rest of the criteria. The analysis of the information followed a combination of both an explanation building analytical technique and document analysis method. The goal of the explanation building technique is to analyze the information by building an explanation about the case (Yin, 2014). The reason this technique was selected is attributed to the complex and difficult nature of measuring precisely the areas covered (Riege, 2003). Hence it provided an easy to understand analysis by drawing out the business information from within the technical foundation the projects were based within. Similar to the work done by Edgar Schein (2003) explanation building was used as the information analysis method of choice. This technique was used in conjunction with document analysis, which follows some of the same principles. Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give added voices and meaning to the research topic (Patton, 2005). Document analysis also formed a key portion of the methodology due to the variety of documentation produced within a project and therefore these needed to be reviewed to derive the information forming the case study. Hence, these two techniques were used in conjunction to draw out the core elements from each project to develop the case study and highlight the appropriate findings.

## 3. Findings and discussion

The on-going development in IT has a transformative impact on the implementation of

finance activities. One of the major reasons for implementing technology worldwide is to automate processes and, by doing so, create a level of standardization. In the case of the finance function, automation results in the reduction of the number of resources required for transaction processing. This reduction is desirable because the finance function is now moving away from transaction processing in an effort to free up more resources for other strategic areas. Automation using technology has seen benefits from as early as 1963, when Harding (1963) stated that computers can achieve a great deal of productivity improvements in finance. Moving on a couple of decades to 1997, a report revealed that the finance function needed to be reinvented around IT in order to save on transaction costs (IMA, 1997). This shows how IT became more and more important as time went on with regards to its ability to impact on transaction processing. In a more contemporary report, KPMG found that the biggest change agent in modern

business and the finance function is technology (KPMG, 2008). While pure technology may have enabled this level of automation, IT has enabled the collection, integration and analysis of financial information. This contribution provides the finance department with the information to play a more active role in business support and decision making (Scapens and Jazayeri, 2003). This shift has already begun, with more than 70% of CFOs playing a critical decision making role in areas such as business model innovation, enterprise risk mitigation, and the selection of key performance indicators (KPI) linking performance to strategy (Bramante et al., 2010). Also, these globalized, standardized and integrated finance processes will result in moving away from the silo-based mentality in finance, and towards more integrated working methods (Capgemini, 2008). Case study 1, below, provides a practical example of how the integration of information systems was able to make the finance function more agile.

#### Case study 1:

Company: A leader in energy and automation technologies

Background: Founded in 1988, the company ventured on an aggressive expansion program targeting Europe, Asia and America. Succeeding a wave of strategic investments, joint ventures and acquisitions, which included some 40 companies in its first year, it wound up with multiple finance reporting units and CFOs in each of the 140 countries in which it did business.

Key issues: This bottleneck scenario resulted in a complex network of reporting streams, redundant information and unnecessary complexity. Business leaders realized that the finance and accounting functions were hampering growth, as well as increasing the company's transaction costs and operational inefficiencies.

Outcomes: The company began a substantial finance consolidation and integration project, which would unify the company's financial processes into one fully integrated system, which was essential for Sarbanes-Oxley compliance and reducing costs and inefficiencies. Therefore, the company knew that it needed to streamline standardization across the enterprise, and to do this an integrated and consolidated set of IT processes and systems was implemented across the enterprise. This meant that every acquisition was now speaking the same language in terms of information flow and standardization of reports. These information systems utilized the existing technologies in each acquired company in order to minimize costs, and local support for the new applications. Company directors believed that the integration of the systems would enable the finance function to be more agile and position itself as a strategic service.

Source: IBM project reference hub.

#### Fig. 2. Information system integration

While IT may enable financial information to become more accessible, which subsequently frees up finance resources to become more involved in decision making, it can also lead to a contraction in the workforce because resources are not needed to provide and distribute the said information (Nevries et al., 2008). Although this may be a possibility, the continuous innovation in IT gives CFOs more opportunity to rearrange resources in order to maximize benefits (Iversen, 1998). This also allows CFOs to extract more out of their current workforce, although it also leads to new requirements for these resources. Such resources need to have some

technology skill or knowledge in order to thrive in this integrated environment. Also, by freeing up the time of these financial resources, they are able to put in more time in understanding the operations of the business, thus increasing their knowledge and effectiveness. This can also create a shift in the organizational structure that CFOs need to actively manage. Another important issue that CFOs need to proactively manage is that of regulatory requirements. While regulation and compliance are complex areas, IT allows for a standardization and automation of processes, which eases the burden of meeting certain requirements. Further, there is a

level of transparency when it comes to the handling and use of information as each alteration to the information is tracked, thus creating an auditable trail for the information. Due to the intense pressures to comply and the need to have the

relevant information on hand, regulatory requirements are one of the factors contributing to the changing role of the CFO (Ernst & Young, 2008). These factors are demonstrated in the following case study.

### Case study 2:

Company: Developing-world financial institution

Background: The institution was recently bought by a much larger company and needed to integrate into this company. This included following new regulations and compliance, as well as consolidation in order to fit into the structure of the acquirer.

Key issues: In the past, its local and independent status allowed it to turn a blind eye to missed reporting deadlines and when errors were made. However, as a new division of a multi-national corporation, it was a requirement to comply with 'Work Day 5' (WD5) reporting, and eliminating errors or abnormalities.

Outcomes: In response, the finance team went into overdrive, however still using their traditional methods, which needed a lot of manual intervention. This resulted in massive amounts of overtime for resources, and even pulling in non-finance personnel to help with the work load. At the same time, the organization's IT infrastructure was being underutilized, which in effect provided another barrier. The impact of this on the staff was high turnover, exhaustion, stress and a bad reputation. Therefore, a fundamental transformation was needed. By implementing a financial management strategy and, more importantly, transforming its IT infrastructure, the department was able to complete this much needed transformation. The financial management strategy included process improvements, while the changes to IT included appropriate training so employees would be able to make use of the system to the fullest, increased band width to allow the system to be able to handle the workloads, and a reduction in duplicate and redundant systems. The updated IT systems also included easy-to-use reporting templates, which cut down on a lot of the manual intervention. The final result was a shortened report time, improved quality of reports, and elimination of the overtime needed in meeting the WD5 requirements. This allowed senior business executives to rely on the reports being generated and have confidence in their compliance with WD5, as well as achieve more with the current finance department of the newly acquired division.

Source: IBM project reference hub.

### Fig. 3. Regulation and compliance

The main theme highlighted in the above discussions is the creation and availability of information. Information is regarded as the new currency in the business world, however not just any information but actionable information, information that is value adding. Companies rely heavily on information for decision making, and in this competitive environment, information is key in capitalizing on new trends and opportunities. However, the information available today is likely to be out dated tomorrow (IBM, 2005). CFOs, along with the other chief executives level suite, need to have information on demand in order to have an accurate picture of the health of the organization. However, they do not need detailed information at a transaction level, but higher-up summarized information that speaks to the big picture, and then, if necessary, to be able to drill down on interesting points. In the case of the finance function, the CFO needs to see key KPIs and metrics on demand, to ensure that the function can be proactively managed (IBM, 2005). In the 21<sup>st</sup> century, this is the need that IT has been able to meet. By leveraging unique tools, software, processes and ideas, IT has been able to take raw data from both inside the company and externally, and turn that into usable information.

Internally, IT has streamlined the flow of information between departments making them more integrated and less silo based. It has also made this information more accessible to all on demand. One of the unique ways in which IT has given executives more visibility is by the use of dashboards. Dashboards are basically online interfaces that contain key pieces of information that are needed by the user, similar to how the dashboard of a car displays the key pieces of information needed to operate it (Eckerson, 2010). Its relevance to the finance function is that it provides CFOs with a view of the key activities that take place in the finance function but on a higher level. This allows the CFO to be in the loop and not completely separated from the activities. Hence, having timely information allows for decisions to be made faster. When talking about processing information to derive insight, a fairly new term, which is analytics, emerges. Analytics is the foundation on which insights and predictive insights are built. Analytics has become the bedrock on which high-volume and real-time information processing is built (Eckerson, 2010). What this means for the finance function is more accurate budgeting and forecasting, as models are able to control for more

variables and are able to train themselves as they get used. It also means potential risks and threats are easier to deal with because of advanced scenario planning due to analytic applications. This analytics

angle is touched upon in Case study 3, below. All this gives the CFO and decision makers alike more power and makes the organization as a whole more flexible.

### Case study 3:

Company: Award winning IT group

Background: Provides managed IT services and infrastructure designed to cover the entire lifecycle of an organization's spectrum of information systems, from design, implementation and consultancy, to on-going support and management. The group acquired three companies since 2008 and is continuing to focus on growth, targeting doubling its size in the next few years by acquiring complementary businesses.

Key issues: As a result of this rapid growth path, management encountered numerous challenges in improving its overall business performance. One of the most significant obstacles was better financial insight from existing systems. The company's recent acquisitions also meant that it had three different accounting and sales order processing (SOP) systems, which needed to be consolidated so that an accurate viewpoint of the company's financial positions can be gauged at any time.

Outcomes: The solution used was an implementation of a corporate wide business intelligence (BI) solution; BI is a subset of analytics. This solution was founded on intuitive dashboards backed by business intelligence. Therefore, by implementing these dashboards across the SOP and accounting systems, management was able to correct the issue of no overall view of the financial position of these various acquisitions. The group's implementation of intuitive dashboards was able to seamlessly integrate into its existing information systems, help-desk systems and numerous spreadsheets, which enabled a consolidated view of the most important business data in the right amount of detail and in an easy-to-use graphical format. Senior management had the following to say: "With intuitive dashboards, we have our finger on the pulse of our business and it's a dynamic reading; we don't have to wait for management accounts to be published to tell us how well we're performing". And: "We've realized fast ROI from our implementation. Now, we're no longer driving the business whilst looking in the rear view mirror, as intuitive dashboards allow us to see over the horizon and take fast, corrective action".

Source: IBM project reference hub.

**Fig. 4. Analytics in finance**

These case studies highlight the impact of IT on the finance function and how IT interacts with the finance function within an organization. Utilizing IT may be making them more efficient, by reducing complexity and eliminating human error.

### Conclusion

The finance function is a complex set of activities with a web of information flows between them. However, all these activities work together to provide the organization with what it needs to operate, be it from a compliance standpoint or a funding level. However, like all other departments, the finance function is on a mission to do away with redundant and inefficient systems, so that it can streamline activities and add more value to the organization as a whole. One of the main ways this is being done is by utilizing IT to enable resources to complete tasks quicker, thereby freeing up their time to work on other initiatives. Making use of technologies to better integrate with suppliers, or enhance communication within the organization, allows the finance function as a whole to move away from transaction processing towards more

organization decision making. While regulation and compliance become more important in the everyday operations of a company, the need for standardization and transparency is heightened. This is one of the key concerns for CFOs and this is why there is an increased need to automate processes to remove the human element, which is prone to errors. While the IT space is vast, some methods are revolutionizing how business is done. IT has the capacity to make a company more efficient and effective. However, if IT is not implemented correctly with the appropriate management and skill levels, the results can be disastrous. Poor management and inadequate requirements gathering are some of the reasons why the majority of IT projects fail. This can be very costly for a company seeing as how expensive these solutions have become. Therefore, while a company may implement IT solutions to become more efficient, this should be done with caution.

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## References

1. Akkirman, A.D. and Harris, D.L. (2005). Organizational Communication Satisfaction in the Virtual Workplace, *Journal of Management Development*, 24, pp. 397-409.
2. Bramante, J., Frank, R. and Dolan, J. (2010). IBM 2000 to 2010: Continuously Transforming the Corporation While Delivering Performance, *Strategy & Leadership*, 38, pp. 35-43.
3. Brynjolfsson, E. & Hitt, L. (1995). Information technology as a factor of production: The role of differences among firms, *Economics of Innovation and New Technology*, 3 (3-4), pp. 183-200.
4. Brynjolfsson, E. & Saunders, A. (2010). Wired for innovation: how information technology is reshaping the economy.
5. Capgemini (2008). *CFO Agenda 2008. Dimensions of Successful Strategy*. Paris: Capgemini.
6. Desai, M.A. (2008). The Finance Function in a Global Corporation, *Harvard Business Review*, 86, p. 108.
7. Chong, A.Y.-L., Ooi, K.-B., Lin, B. & Raman, M. (2009). Factors affecting the adoption level of e-commerce: An empirical study, *Journal of Computer Information Systems*, 50 (2), p. 13.
8. Eckerson, W.W. (2010). *Performance Dashboards: Measuring, Monitoring, and Managing Your Business*, Hoboken: Wiley.
9. Ernst & Young (2008). What Next for theCFO? Where Ambition Meets Reality. Available at: <http://www.cfoclub.cz/data/1211947519/CFO-report.pdf>. Financial Executives Research Foundation (1995). *Reengineering the Finance Function*, Morristown, NJ: Financial Executives Research Foundation.
10. Gerring, J. (2004). What is a case study and what is it good for? *American political science review*, 98 (02), pp. 341-354.
11. Gerring, J. (2006). Case study research: principles and practices: Cambridge University Press.
12. Goggin, G. (2012). *Cell Phone Culture: Mobile Technology in Everyday Life*, New York: Routledge.
13. Harding, S.R. (1963). *Increased Productivity – The Role of Finance*, London: Icaew.
14. Herbert, I., Murphy, W. and Wilson, R.M. (2011). *The Evolving Role of the Financial Function: A Framework for Best Practice*. Available at: [http://www.role-of-finance.com/pages/news/fourth article 17.5.05.doc](http://www.role-of-finance.com/pages/news/fourth%20article%2017.5.05.doc).
15. Herrmann, K.R. (2001). *Visualizing Your Business: Let Graphics Tell the Story*, New York: J. Wiley & Sons.
16. IBM (2005). The Agile CFO: Acting on Business Insight. Available at: <http://www-935.ibm.com/services/us/imc/pdf/ge510-6239-agile-cfo-full.pdf>
17. IMA (1997). Redesigning the Finance Function. *Statements on Management Accounting*, Montvale, NJ: Institute of Management Accountants.
18. Iversen, K.L. (1998). The Evolving Role of Finance, *Strategy & Leadership*, 26, pp. 7-9.
19. KPMG (2008). Finance for the Future – Looking Forward to 2020. Available at: <https://www.kpmg.com/dutchcaribbean/en/services/Advisory/Documents/finance-of-the-future.pdf>.
20. Lin, H.-F. & Lin, S.-M. (2008). Determinants of e-business diffusion: A test of the technology diffusion perspective, *Technovation*, 28 (3), pp. 135-145.
21. Liu, M. (2008). Determinants of e-commerce development: An empirical study by firms in shaanxi, china. Paper presented at the Wireless Communications, Networking and Mobile Computing, 2008. WiCOM'08. 4th International Conference on.
22. Lodewyk, P.H. (2006). *Telecommunications Technology Transfer/Diffusion Model into Rural South Africa*. Unpublished doctoral dissertation, University of Pretoria.
23. Martins, M. & Oliveira, T. (2007). Determinants of information technology diffusion: a study at the firm level for Portugal. Paper presented at the Proceedings of the European Conference on Information Management and Evaluation, Academic Conferences Limited.
24. McAfee, A. and Brynjolfsson, E. (2012). Big Data: The Management Revolution, *Harvard Business Review*, 90, pp. 60-66.
25. Mercola, D. (2009). *How Large is a Petabyte?* [Online]. Available at: <http://Articles.Mercola.Com/Sites/Articles/Archive/2009/08/01/How-Large-Is-A-Petabyte.aspx> [Accessed 19 November 2013].
26. Nevries, P., Langfield-Smith, K. and Sill, F. (2008). Are Management Accounting Departments Successful? Evidence From Germany. *New Directions in Management Accounting*. Brussels.
27. Nolan, R. and McFarlan, F.W. (2005). Information Technology and the Board of Directors, *Harvard Business Review*, 83, p. 96.
28. Noseworthy, G. (2012). *Infographic: Managing the Big Flood of Big Data in Digital Marketing* [Online]. Available at: <http://Analyzingmedia.Com/2012/Infographic-Big-Flood-Of-Big-Data-In-Digital-Marketing/> [Accessed 19 November 2013].
29. Parazoglou, M.P. (2006). *E-Business Organisational and Technical Foundations*, New York: John Wiley & Sons.
30. Patton, M.Q. (2005). *Qualitative Research, Encyclopedia of Statistics in Behavioral Science*, Wiley Online Library. DOI: 10.1002/0470013192.bsa514.
31. Riege, A.M. (2003). Validity and Reliability Tests in Case Study Research: A Literature Review With “Hands-On” Applications for Each Research Phase, *Qualitative Market Research: An International Journal*, 6, pp. 75-86.
32. Rogers, S., Lukens, S., Lin, S. and Jon, E. (2008). *Balancing Risk and Performance with an Integrated Finance Organization: The Global CFO Study 2008*. IBM Corporation in Cooperation with the Wharton School and Economist Intelligence Unit. October, 159-1. [Pennsylvania].

33. Sanders, M. (2005). *Technology and the Decline n Demand for Unskilled Labour: A Theoretical Analysis of the US and European Labour Markets*, Cheltenham: Edward Elgar.
34. Scapens, R.W. and Jazayeri, M. (2003). ERP Systems and Management Accounting Change: Opportunities or Impacts? A Research Note, *European Accounting Review*, 12, pp. 201-233.
35. Schein, E.H. (2003). Organizational Socialization and the Profession of Management, in *Organizational Influence Processes*, edited by L.W. Porter, H.L. Angle and R.W. Allen (pp. 283-94), Amonk, NY: M.E. Sharpe.
36. Shwayder, M. (2012). *One-Third of World's Population Using Internet, Developing Nations Showing Biggest Gains* [Online]. Available at: <http://www.lbtimes.com/One-Third-Worlds-Population-Using-Internet-Developing-Nations-Showing-Biggest-Gains-795299> [Accessed 19 November 2013].
37. Smith, P. and Payne, R. (2010). *The Finance Function: A Framework for Analysis*. Finance Direction Initiative, ICAEW. Available at: <https://www.icaew.com/~media/Files/Technical/Business-and-financial-management/finance-direction/finance-function-a-framework-for-analysis.pdf>.
38. Yin, R.K. (2014). *Case Study Research: Design and Methods*, London: Sage.
39. Zhu, K., Dong, S., Xu, S.X. & Kraemer, K.L. (2006). Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies, *European Journal of Information Systems*, 15 (6), pp. 601-616.
40. Zietman, A., Goitein, M. and Tepper, J.E. (2010). Technology Evolution: Is it Survival of the Fittest? *Journal of Clinical Oncology*, 28, pp. 4275-4279.