A Qualitative Study of the Influence of Advanced Manufacturing Technology Investment on Performance of Production Firms

Ekanem Edem Udo Udo (PhD)
Senior Lecturer,
Department of Management,
Ritman University,
Ikot Ekpene, Nigeria
edem.ekanem@yahoo.com

Ezekiel Gbenga Ilori (PhD)
Department of Advancement
University of Lagos
Lagos, Nigeria
gbengailori2005@yahoo.com

Adeogun Bukola Simeon (PhD)
Research Scholar,
Department of Business Administration
Babcock University
Ilishan-Remo, Nigeria.
bukky_2001@yahoo.com

Alhaji Abiso Kabir
Research Scholar,
Department of Business Administration & Sustainable Development
Information & Communication Technology University, USA
Yauonde, Messasi Campus, Cameroon.
abiso.kabir@ictuniversity.org

Abstract
Technology investment can be seen as a commitment of knowledge and machinery that is required to operate an organization with the objective of making gains in the future or any investment made by firms in technology resources which are anticipated to increase the performance of an organization. Investment in technology can be referred to as expenditure in information technology (IT), machinery investment, advanced manufacturing technology (AMT), flexible manufacturing technology as well as an investment in any form of technology. Advanced manufacturing technology investment advances speedily and help to transform the techniques organizations carry out their operations. Advanced manufacturing technology investment helps organizations to modernize business operations, produce a modern business model and enhance their customer relationship management. The main aim of this study is to find out the influence of advanced manufacturing technology investment and performance of production firms in Nigeria. This research used a qualitative method of data collection through a tape recorded interview of about 15 managers of production firms located in Oyo state in Nigeria. Data collected was transcribed and analyzed through content, thematic, and case by case cross case analysis. The study finds that technology investment entails investing in new equipment and structures for the purpose of increasing firm performance. It also means increasing capital expenditure by expanding technological

facilities in an organization; the reason for such investment could be to boost production, increase sales, make work processes seamless and above all raise profit and shareholders returns. This study finds that organizations have a strong opinion to support that investment in advanced manufacturing technology infrastructure enhances firm performance. This study suggested that production firms in Nigeria should evolve strategies before investing in advanced manufacturing technology.

Keywords: *Technology Investment, Firm Performance, Production Firms, Qualitative Study, Nigeria.*

1.0 Background of the Study

Technology investment is perceived as a commitment of knowledge and equipment that is needed to operate an organization with the aim of future profitability (Ta and Te, 1997; Brown and Ostroff, 2004). The concept is also viewed as any investment made by firms in technology infrastructure which are predicted to increase firm performance. However, Teece et al. (1997) argued that an investment in technology can be referred to as expenditure in information and communication technology (ICT), machinery, advanced manufacturing technology (AMT), flexible manufacturing technology as well as an investment in any form of technology that is geared towards enhancing organizational prosperity. Wie (2003) described technology as an array of physical processes which transform inputs into outputs by adopting procedural processes as well as organizational preparations to carry out the transformation. In the opinion of Wright (2008), technology is the knowledge and processes which people make use of to satisfy their needs and wants. Stock and Tatikonda (2000) brings a broader understanding regarding technology as a technique or device, technique of doing or physical equipment, process or product. While, within the operational framework, technology is considered as a technical expertise and may as well be linked to be tools, an electric powered or mechanical element and software code, as chemical process, a patent, an approach, and or a person (Ajagbe et al., 2013; Ismail and Ajagbe, 2013). Nonetheless, from this viewpoint, technology can be seen as the production, modifications, usage, and knowledge of tools, equipment, technique, systems, crafts, procedures of business, in order to solve a problem, enhance a pre-existing remedy to a problem, acquire a goal or execute a particular function. However, technologies can be considered as the knowledge and machinery which are required to conduct an organization's operations. It might consist of both the hardware and software components (Bartel, 2010; Ajagbe et al., 2013; Yao et al., 2009; Ismail et al., 2013). The connection between technology investment, enhancement in organization performance and efficiency has always been very difficult to discover, irrespective of the huge technology investments by firms (Zhang and Li, 2009). Hence, with the consistent improvement in technology investment, professionals and stakeholders have been interested in estimating the performance and profitability of cost in technology investment. However, the greater consideration professionals give towards the real benefits of technology investments, the harder researchers are becoming more severe in measuring the influence of technology investment (Wie, 2003; Wright, 2008).

The substantial amount of capital invested on technology by firms in recent times has challenged researchers and professionals in trying to acknowledge better connection between technology investment and firm performance by means of empirical research (Zehir et al., 2010). Though, for over a decade, some authors have tried to study the effects of technology investments on performance of organizations, but the studies are not consistent and sufficient (Ta and Te, 1997). Some investigators, however, have uncertainties relating to the generalization from the studies, mainly because the outcomes of existing studies which have

discovered the positive effect of technology investment on firm performance usually rely on information gathered from advanced countries, especially the United States, whereas just a few of research has have been conducted in some developing nations. Zehir et al. (2010) stressed that organization performance is related to technology investment because it has positive, negative and mixed effect. However, the link between technology investment and firm performance varies from developing countries to developed countries. Bailey et al. (2005) argued that the adoption of traditional appraisal techniques to justify investments in communication technology and information systems (IS) has received much attention in recent years. The authors added that the huge amount of capital expenditure invested on adoption of latest technology infrastructure is responsible for this increasing interest, and the increasing need to justify significant capital expenditures. Nonetheless, most management executives are not comfortable with the available set of tools and techniques used to justify their investments in technology (Alter, 1999; Bailey et al., 2005; Chwelos et al., 2012). In addition, Lefley and Sarkis (1997) proffered that investment justification processes used by management are often based on the use of traditional appraisal techniques, which are inadequate for strategic decision making. Such traditional techniques the authors opined lack the preciseness in definition and results that management expects. Irani and Love (2001) stated that there is tendency for senior managers to be myopic when considering technology investment decisions, primarily because they have no framework to evaluate their technology investment. In addition, they pay less attention to the "hidden" or indirect costs surrounding technology investment, which can quadruple the direct cost component. Li et al. (2000) suggested that many construction organizations may only realize the significance of these additional cost factors only after they have actually implemented technology infrastructure. Overwhelmingly, poor technology investment decision making can result in financial losses, which can translate into a loss in jobs and competitiveness. Lefley and Sarkis (1997) found the process of investment justification was a major barrier to implementing technology infrastructures in many organizations. Primrose (1991) identified the perceptions of the production firms in area of investment justification as a budgetary process that gives a final nod on the success of technology infrastructure proposal. Consequently, managers may view investment justification as a challenge that has to be overcome, and not as a technique for evaluating the worth of implementing investment in technology infrastructure (Alshaawi et al., 2000; Hochstrasser, 1992). This has serious consequences, as during the preparation of a technology investment proposal, managers may spend too much time and effort investigating technical aspects of the technology and thus become committed to the belief that the investment is essential from a technical point of view.

In Nigeria, technological development seems to be an essential element of the country's growth component as a developing nation. Through the help of technology, Nigeria was steadfast in producing with the present day requirements of individual firms situated in the country. Nigeria is among the majority of technologically advanced nations amongst industrializing countries in the continent of African (Idris et al., 2008). While investment can be defined as an asset or product that is purchased with the aspiration that it will produce income or appreciate in the long run. Within the economic perception, an investment could be the acquisitions of items that are certainly used in the future to create wealth (Roth and Miller, 1992; Investopedia, 2013). In finance, an investment is a financial asset purchased with the notion that the resource will deliver earnings in the future or appreciate and be sold at a higher price (Investopedia, 2013). Manufacturing industry has become more competitive and the number of new entries in this market has put enormous pressure on management for making changes in their ways of operating business. Goldhar and Jelinek (1983) posited that senior executives in the production industry encounter demanding choices from its

consumers. These factors have forced them to offer high quality products as a way to attract and keep their customers. Hence, the implementation of advanced manufacturing technology (AMT) apparatus offer potentialities in meeting those demands. Lei and Goldhar (1991) argued that some firms in the industry have considered AMT to combat the phenomena of fragmented mass markets, shorter product life cycle and increased demand for customization. Hence, there are evidences for the contributions of technology to jobs, productivity, and earnings based on highly aggregated country or industry-level data on relatively small-sample surveys of production firms (Faberberg, 1994; Idris et al., 2008). In this dimension, investing in product and process technology should be seen as a long-term strategic choice for the firm. These choices could be based solely on a simple payback formula. Ajagbe et al. (2013) argued that though returns on investment will continue to be an important criterion for these investment decisions, improved product quality, faster delivery of customer orders, increased product and volume flexibility, reduced production costs, increased market shares and other advantages will have to be included into future capital-budgeting decisions. Boyer (2001) added that investment in product and process technology must be seen as a strategic choice to change the factory into a competitive weapon that assists the corporation in capturing market share. However, prime consideration should be given to the benefits that the firm expects to derive from the investment of AMT (Beaumont et al., 2002). Some researchers were conducted to find out the effects of AMT on performances of production firms. This research recognized the essential technological factors that contribute to the values of organizational operations. Idris and Rejab (2008) suggested four dimensions of advanced technology that suited production atmosphere as design, manufacturing, administrative, and resource planning technology. The emergence of another factor of resource planning technology adds to the knowledge of managers for effectively managing their production activities. Adlers (1998) only identified 3 factors as the dimensions of advanced technology. They suggested that production firms in Nigeria should observe and invest in resource planning technology as it is viewed as an important area that could aid firm performance. Since there is evidence that investment in advanced technology will improve firm performance; firms aiming for higher achievements should strategically invest their operating capital to reap from such benefits. The figure 1 below shows the conceptual framework of this research indicating technology investment as the independent variable and firm performance as the dependent variable.

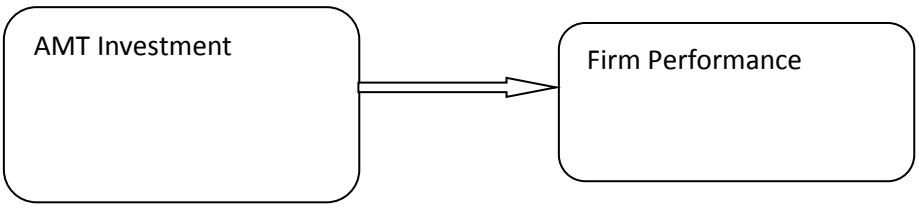

Figure 1: Study Conceptual Framework

2.0 Methodology

This study used the qualitative research standpoint because an overview of previous research exposed the relevance of having a strong knowledge of the experience of managers in production firms in Nigeria about the concept of technology investment. However, in as much as researchers try to understand the knowledge of experience, it is essential to recognize the construction of such. Hence, this study design is dependent on these principles. For instance, this study adopts purposeful sampling, makes use of the case study as an exploration mechanism, and uses analogous technique to prove the positivist ideas of validity, reliability, and objectivity. In another view, this study adopts the inductive qualitative technique which means that patterns, themes, and categories of analysis come from the data;

they emerge out of data instead of being decided prior to data collection and analysis (Lincoln and Guba, 1985; Patton, 1987; Dana and Dana, 2005). This technique is referred to as semiotic technique of analysis, and consists of between 45 to 60 minutes discussions with 15 organizations in the production and service industry in Oyo state.

Sekaran (2003) opined that though qualitative data collection does not dictate a certain desirable number of respondents required to derive understanding. For the purpose of this study, 15 respondents from a cross section of production and service firms in Oyo state was enough to create a viable data set as suggested by Yin (2009), who opined that between 9 to 20 in depth interview is enough to gain the most insight from the respondents in a qualitative research. For this study, a semi structured interview guide was designed with the use of resource materials with guidelines for constructing interview questions that relate to the proposed research questions (Seidman, 2006). Data for this qualitative study was collected through the use of personal face-to face interviews through a digital audio recording device to ensure accuracy with the respondents in the sample. Hence, this qualitative case study was built on the grounded theory approach. There are different sources for secondary data including: Books, conference articles, journals articles, electronic documents, e-journals, websites, online materials (Merrian, 1988; Ajagbe et al., 2015). This research gathered information from production and service firms in various industry as mentioned earlier and using different data source, to ensure multiple data sources in order to provide the basis for triangulation in which data of different kinds could be compared. The data were transcribed and analysis of the interview goes through the coding technique making use of an identification of categories of patterns and themes that emerged from the analysis or called content analysis (Creswell, 2007).

3.0 Data Analysis and Discussion

3.1 Meaning of Advanced Manufacturing Technological Investment

This question examined the level of knowledge of respondents about the concept of technological investment. After careful analysis and coding of the interview transcripts, the study showed that all 15 (100%) respondents agreed that they have in-depth knowledge and understanding of the meaning of technological investment. However, some of the verbatim translation of the interview transcript reveals thus; **"***The total cost expended on technological infrastructure"* (RES2). Additionally, it also entails the investment in information and communication technology, an expectation on returns in investments although it may not be directly measurable. Another respondent stated that it involves investing capital, effort and time on useful technology infrastructure. However, RES5 stressed that "*Technology investment involves investing in new equipment and structures for the purpose of increasing organizational performance"*. Other important descriptions of the term that emerged from the transcribed data is that investment in technology means increasing capital expenditure by expanding technological facilities in a firm, the reason for such investment could be to increase production, increase sales, make work processes seamless and above all ensure profitability and assure on shareholders returns. This finding is similar to past result of Ta and Te (1997) who posited that technology investment is perceived as a commitment of knowledge and machinery that is needed manage a firm with the aim of making gains in the future. In addition, it involves channeling in capital to secure relevant technology apparatus such as engines and instruments for an organization is the main crux of technology investment.

3.2 Relevance of Advanced Manufacturing Technology Investment

The researchers asked this question in order to understand the mindset of the respondents about the need to commit resources in technology infrastructures by production firms. In view of this, responses revealed that just 2 (14%) out of 15 firms surveyed still maintain old technology in day to day operation. While, 13 (86%) out of 15 firms implement current technology in running their business enterprise. Hence they have a strong opinion to support that investment in latest technology tools is useful in boosting organizational output. RES1: "*No, our firms still rely on existing technology*" In another dimension, responses indicated that it is necessary to adopt suitable technological machines to promote work in terms of speed and productivity outputs (RES2). However, *"total reliance on machines is not the best (RES3)".* A few organizations sampled opined that the issue of investment in technology is not up to 1% of their critical success factor which is not in technology; the respondent added that what drives technology is the management policy. More views from this study reveals that technological investment is the implementation of machines to aid production and packaging process. The respondent also stressed that in his company, the implementation of technology has made aided production, stock management and optimization of costs. Moreover, to invest in technology using less manpower has resulted in cost effectiveness and increased profitability. Thus, investing in technology helps enhance efficiency and effectiveness of operations. Primrose (1991) agreed that justifying investment in technology could be a budgetary process that gives a final nod to the decision of managers to approve proposals for investing in technology infrastructure. Nonetheless, managers may also perceive investment justification as a task that has to be overcome, and not as a technique for evaluating the worth of implementing investment in technology infrastructure. Lefley and Sarkis (1997) found the process of investment justification was a major barrier to implementing technology infrastructures in many organizations. Figure 2 shows the opinion of the respondents on the relevance of implementing technology investment.

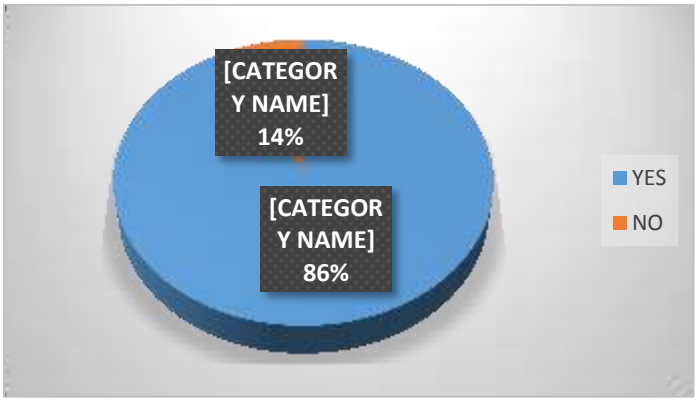

Figure 2: Relevance of AMT Investment

3.3 The Term Firm Performance

This section examined the degree of respondent's knowledge about the term organizational performance. Careful analysis and coding of the interview transcripts revealed that all 15(100%) respondents mentioned that they have full knowledge of the concept. This could be as a result that all the respondents are in senior managers in their organizations and are responsible to drive employees to perform in their various units. Thus, responses from this question showed that "*Organizational Performance entails the performance of a group or organization depending on their set goals and their missions, how far they are able to achieve their missions* (RES1). RES2 added that "*Organization performance means working*

towards the intended objective of the organization and ensuring that relevant structures and equipment are put in place to achieve such laid down goals". Other important definitions of the concept are that; Organization performance is the output by the staff strength of the company. In addition, through the use of technology infrastructures firms are able to attain maximum production level. The aim of setting limits for measuring organizational performance is to meet organizational standards and set goals to maximize profit. Consequently, in past empirical literature, many authors have described organization performance but the simplest definition is to measure productivity (Gholami et al., 2006; Zehir et al., 2008). However, Macion (2010) concluded that organization performance refers to what has been achieved, thus amounting to a balance variable. The author also reported that the concept can be seen as the proficiency of an enterprise to invest in such technologies that could enhance efficient and effective modern ways so as to attain organizational objectives, including profit, return on investment (ROI), return on assets (ROA), sales growth and customer satisfaction.

3.4 Categories of Advanced Manufacturing Technology Investment

It is important to understand the various components of technological infrastructures that Nigerian organizations have invested in for their day to day operations because researchers would be able to ascertain whether production firms have invested adequately on latest technological infrastructures that could enhance firm performance. Responses from this question showed that 15(100%) of the surveyed firms have adequately invested in equipment for day to day business operation that enhance increased productivity. However, analysis of the themes that emerged from the coded data indicates some of the components of technological tools invested in by Nigerian firms. However, the verbatim transcription of the collected data as reported by RES1 showed that *"we adopt low technology in our daily operations because we are only covering on metal over the other to preserve the metal you are covering via a galvanizing process"*. Another respondent mentioned the following equipment as important for their daily operations; soap making machine, packaging machine, metallurgical coke, electric arc-furnace, blast furnace, sinter plant, coke ovens, pet, lowing machine, gas spectrophotometer, fork lift, gas chromatography, computer (hardware and software), digital photo lab machine, wielding machines, drugs compressors to make tablets, filing machines, hydrogen touches smoothing and soldering food cans. The findings of this study is in line with that of Idris and Rejab (2008), who suggested four dimensions of advanced technology that suited production firms in Nigeria, namely, design, manufacturing, administrative, and resource planning technology. Goldhar and Jelinek (1983) posited that senior managers in the production industry are faced with demanding choices from its consumers. Many factors have forced them to offer high quality products as a way to attract and keep their customers. Nonetheless, the adoption of advanced manufacturing technology tools offer potentialities in meeting those demands. Ajagbe et al. (2013) argued that though returns on investment will continue to be an important criterion for these investment decisions, improved product quality, faster delivery of customer orders, increased product and volume flexibility, reduced production costs, increased market shares and other advantages will have to be factored into future capital-budgeting decisions.

3.5 Advanced Manufacturing Technology Investment and Firm Performance

This query is important in order to enquire whether interviewed respondents think that investment in technology by their firms has actually contributed to improved organizational performance. thus, coded information revealed that 2 (14%) among 15 production firms surveyed mentioned that their organization still make do with old technology in their day to day operations, the respondent added that considering their kind of products, it might not

necessarily require that they invest in new infrastructures. However, 13 (86%) among 15 production firms agreed that investment in appropriate technology by their organizations has substantially increased performance. The earlier respondent stated that "*We use the traditional technology so no major technological investment, although from day to day, new technologies are coming out (RES1)"*. The other respondents believed that "*it is necessary to make do with current instruments because over time it is appropriate and makes you very competitive (RES7)"*. Most of the organizations interviewed mentioned that their output has increased as a result of implementing latest technological apparatus for business operations. Thus, comparing the performance with investment in tools indicates the total analysis of an organization's performance in relation to its achievement of objectives and goals. Hence, adopting such instruments makes work easier, improves product quality and maximizes profit. Zehir et al. (2010) stressed that organization performance is related to technology investment because it has positive, negative and mixed effect. However, the link between technology investment and organizational performance varies from developing nations to developed nations. The connection among technology investment, enhancement in organization performance and efficiency has always been very hard to discover, irrespective of the large investments in technology by organizations (Zhang and Li, 2009). With the constant enhancement in technology investment, professionals and stakeholders have been fascinated in computing the performance and profitability of expenditure in technology investment. Boyer (2001) added that investment in product and process technology must be seen as a strategic choice to change the factory into a competitive weapon that assists the corporation in capturing market share. However, prime consideration should be given to the benefits that the organization expects to derive from the investment of AMT (Beaumont et al., 2002). Figure 3 shows the extent of belief of the respondents that investment in technological infrastructures enhances organizational performance.

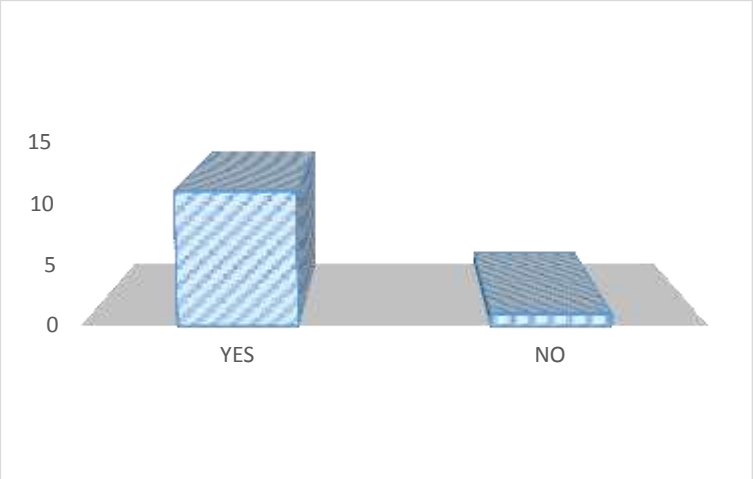

Figure 3: Technology Investment and Firm Performance

4.0 Research Implications

The study finds that advanced manufacturing technology investment entails investing in new equipment and structures for the purpose of increasing firm performance. It also means increasing capital expenditure by expanding technological facilities in an organization, the reason for such investment could be to boost production, increase sales, make work processes seamless and above all raise profit and shareholders returns. This study finds that organizations have a strong opinion to support that investment in latest technology tools aids firm performance although very few of the firms do not support the idea of investing in new technologies because the nature of their products does not warrant such capital investment.

The idea to examine firm performance is to determine whether organizational standards and set goals are achieved for the purpose of profit maximization, satisfying stakeholders, meeting customer's needs and satisfying employees. In this study, a sizeable number of the firms agreed that investment in appropriate technology by their organizations has substantially increased performance and has positioned their firms as a globally competitive one. Hence, it is essential to use latest technologies for day to day operations because over time it is appropriate and makes you very competitive. Hence, evaluation of firm performance with investment in tools indicates the total analysis of a firm's performance in relation to its achievement of objectives and goals. Thus, implementing such technology makes work easier, improves product quality and maximizes profit. This study reported that production firms have encountered increase in the production of more unit of output as a result of current investment in production automation. In addition to this, product packaging process has been a lot easier compared to if it had to be completely manual without any form of automation. There has also been low manpower due to investing in machines however, maximizing profit. Other areas are speed of production, waste reduction, elimination of repeated process, risk reduction, and higher quality. This study recommends that production firms should also develop appropriate strategy, peep into the future by projecting the possibility of the service, and assess investment returns before investing in any new technology.

Acknowledgements: The authors wish to thank Dr. Musibau Akintunde Ajagbe for his useful comments and guide in articulating this research. Dr. Ajagbe is an external post graduate supervisor to Durban University of Technology, South Africa, and also he was a visiting senior lecturer and external post graduate supervisor to ICT University, USA and Cameroon.

References

Ajagbe, A. M., Ismail, K., Aslan, S. A., Thwala, W. D. and Long, C. S. (2013). Selection Criteria for Financing Young Firms Using Debt Options. Frontiers of Business, Management and Economics: An Interdisciplinary Collection of Managerial Research Findings and Breakthroughs. Book Chapter Ed. by Mehran Nejati, pp. 265-269.

Ajagbe, A. M., Isiavwe, T. D., Sholanke, B. A. and Oke, A. O. (2015). Qualitative Inquiry for Social Sciences. In the Proceedings of the Covenant University International Conference on African Development Issues (CU-ICADI 2015) held on 11-13th May, 2015, pp. 319-325.

Adlers, P. S. (1998). New technologies, new skills. California Management Review, 9-28.

Alter, S. (1999). Information Systems: A Management Perspective, 3rd ed., Addison-Wesley, Reading, M. A.

Alshaawi, S., Irani, Z. and Jassim, A. (2000). "Novel cluster performance matrix: a decision aid for evaluating computing hardware", Journal of Intelligent Systems, 10(5-6), 543 60.

Bartels, A. (2010). Predictions 2010: E-purchasing Markets. Forester research. Cambridge, MA.

Beaumont, N., Schroder, R. and Sohal, A. (2002). "Do foreign-owned firms manage advanced manufacturing technology better''. International Journal of Operations & Production Management, 22 (7), 759-771.

Brown, W. and Ostroff, A. (2004). R&D Intensity and Finance: Are Innovative Firms Financially Constrained? London School of Economics Financial Market Group.

Bailey, J. P., Cantor, D. E. and Grimm, C. G. (2005). The Impact of IT Investment on Product Innovation: Theory and Evidence from the Pharmaceutical Industry"

University of Maryland College Park Working Paper, College Park, Maryland.
Boyer, K. K. (2001)."Advanced Manufacturing Technology Investment Patterns", American Journal of Business, 16, (1), 23-28.
Chwelos, P., Cockburn, I., Kleis, L. and Ramirez, R. (2012). "Information technology and intangible output: the impact of IT investment on innovation productivity." Information Systems Research, 23(1), 42–59.
Creswell, J. W. (2007). Qualitative inquiry and research design: Choosing among five approaches (2nd ed.). Thousand Oaks: Sage Publications.
Dana, L. P. and Dana, T. E. (2005). Expanding the Scope of Methodologies used in Entrepreneurship Research. International Journal of Entrepreneurship and Small Business, 2(1), 79–88.
Faberberg, J. (1994). Technology and International Differences in Growth Rates. Journal of Economic Literature, 32, 1147-1175.
Goldhar, J. D. and Jelinek, M. (1983). Computer integrated flexible manufacturing: Organizational, economic and strategic implications, Interfaces, 15 (3), 94-105.
Gholami, R., Tom-Lee, S. Y. and Heshmati, A. (2006). 'The Causal Relationship between Information and Communication Technology and Foreign Direct Investment', the World Economy, 29(1), 43-62.
Hochstrasser, B. (1992). "Justifying IT investments", in Proceedings of AIS; The New Technologies in Today's Business Environment, 17-28.
Investopedia, US. (2013). A Division of Value Click, Inc.
Ismail, K. and Ajagbe, A. M. (2013). The Roles of Government in the Commercialization of Technology Based Firms. Middle East Journal of Scientific Research, 16 (2), 229 236.
Irani, Z. and Love, P. E. D. (2001). "The propagation of technology management taxonomies for evaluating investments in manufacturing resource planning", Journal of Management Information Systems, 17(3), 161-77.
Idris, F., Rejab, R. and Ahmed, A. (2008). Relationship between Investment in Advanced Manufacturing Technology (AMT) and Performance: Some Empirical Evidences. European Journal of Economics, Finance and Administrative Sciences, 13, 67-78.
Lincoln, Y. S and Guba, E. G. (1985). Naturalistic Inquiry. Beverly Hills, CA: Sage Publications, Inc.
Lefley, F. and Sarkis, J. (1997). "Short-termism and the appraisal of AMT capital projects in the US and UK", International Journal of Production Research, 35(2), 341-55.
Li, H., Love, P. E. D. and Irani, Z. (2000). "The relationship between the use of IT/IS and the productivity of consulting firms in construction", International Journal of Construction Information Technology, 2(4), 46-57.
Lei, D. and Goldhar, J. D. (1991). Computer-integrated manufacturing (CIM): Redefining the manufacturing firm into a global service business. International Journal of Operations and Production Management, 11(10), 5-18.
Macion, M. (2010). Sustainability Strategy and Firm Performance in Residential Trade and Industry: A Conceptual Analysis. World Academy of Science, Engineering and Technology, 42(1), 945-949.
Merriam, S. B. (1988). Case Study Research in Education: A Qualitative Approach. San Francisco: Jossey Bass.
Primrose, P. L. (1991). Investment in Manufacturing Technology, Total Technology Department, UMIST, Manchester and Chapman and Hall, London.
Patton, M. (1987). Examples of Designs, Analyzing and Interpreting Qualitative Data. How to Use Qualitative Methods in Evaluation, Sage, Newbury Park, California, 65–69.
Roth, A.V. and Miller, J. G. (1992). Success factors in manufacturing. Business Horizons

(July-Aug.), 73-81.

Sekaran, U. (2003). Research Methods for Business: A Skill Building Approach. (4th Edition). New York: John Wiley & Sons Inc.

Seidman, I. (2006). Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences. Third edition. Teachers College Press. Columbia University, 9-27.

Stock, G. N. and Tatikonda, M. V. (2000). A Typology of Project-level Technology Transfer Processes. Journal of Operations Management, 719-737.

Ta, B. and Te, M. (1997). Relating Information Technology Investment to Organizational Performance a Causal Model Analysis. International Journal Management Science, 25, 43-56.

Teece, D., Pisano, G. and Shuen, A. (1997). Dynamic Capabilities and Strategic Management. Strategic Management Journal, 18 (7), 509-533.

Wie, T. K. (2003). The major channels of International Technology Transfer to Indonesia: An Assessment. Conference Sun Catch-Up Growth and Technology Transfer, University of Groningen, Groningen.

Wright, T. R. (2008). Technology. Tinley Park, Illinois, USA: Goodheart-Willcox Company, Inc.

Yin, R. K. (2009). Case study research: Design and methods (4th ed.). Thousand Oaks, Calif.: Sage Publications.

Yao, L., Sutton, S. and Chan, S. (2009). Wealth Creation from Information Technology Investments Using the Eva, Journal of Computer Information Systems, Winter.

Zehir, C., Muceildili, B., Akyuz, B. and Celep, A. (2010). The Impact of Technology Investment on Firm Performance in National and Multinational Companies. Journal of Global Strategic Management, 143-154.

Zhang, Y. C. and Li, S. L. (2009). High performance work practices and firm performance: Evidence from the pharmaceutical industry in China. International Journal of Human Resource Management, 20, 2331-2348.