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RESEARCH METHODS IN INFORMATION TECHNOLOGY: FUTURE RESEARCH PERSPECTIVES

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ABSTRACT

Information Technology (IT) is a multi-disciplinary field with diverse research options. This has left many researchers confused, not knowing the exact research methods that can be applied. IT emanated from a much rigid computing field which has rigid research methods that follows specific predefined processes and it intertwin with the sociology field with much flexible and relaxed research methodology. With the diverse nature of this field with other science fields both in the social and natural science, it is therefore important to review the current research methodologies that are applicable to it and how they can be used to extend knowledge in the same field.

The essence of this research is to highlight current research dimensions and deep dive into different research methodologies that are applicable in the field of IT. The paper further analyses both qualitative, quantitative, and mixed research methods as applicable in this field. The paper also discusses the most common research methods in IT and how they have been applied in researching in this field. Ethnography, case studies, surveys, experimental and literature reviews are some of the research methods that have been reviewed by this paper. Broad cases where each of these methods are applicable are also discussed. Findings from this research shows that both qualitative and quantitative research methods are applicable in this field with each specific research method being considered on case-to-case basis. Mixed research methods are also applicable in this field.

Keywords: Information Technology research, IT research methods, quantitative methods, qualitative research methods, ethnography in IT, case studies in IT.

1. INTRODUCTION

The need for knowledge advancements necessitated the creation of research institutions whose main aim was to discover new knowledge and advance already existing knowledge. Research leads to the establishment of new facts and theories through systematic investigation (Henneberg & O'Shaughnessy, 2007). These are processes that determine how data will be collected, stored, and analyzed (Easterbrook et al., 2008). In carrying out research, a systematic process is used to search for new knowledge by applying appropriate methods to reach a given conclusion (Christiani, 2016). Scientific research involves two aspects, the process, and the product. The process involves the methods used to discover new knowledge in the area being researched. On the other end, the product is the output of the research when the process is applied (Sá & Serpa, 2018). Research methods are key cornerstones to any scientific research as they clearly outline the process that is used or followed to reach a given conclusion or to come out with the product. The choice of a research method is influenced by many issues including the domain of research among others.

Research entirely aims at bringing new awareness, comprehension or facts and theories about a given issue, problem, or controversy. This ideally means that the methods that will be applied in each of the research domains are different from one another. Research experts have introduced different research methodologies in trying to uncover new knowledge. The methods are then classified based on the depth and scope nature of the topic under investigation (Ismail, 2014). The field of Information Technology (IT) is not relatively new as it has been in existence since the 90s till date hence there exist research methods in this area.

There exist several research methods within the field of IT. However, just like other research fields, the research methods applicable in one area may not be applicable in another area within the field of IT. This is because the application of research methods fully depends on the problem being solved. Different problems in the IT domain call for the application of different knowledge and skill sets hence different methodologies. IT as a field has a wide range of real-world applications ranging from health, security, environment, education, and others, making its research methods diverse compared to other related fields like computer science. Many times, IT researchers don't know the best research methods to apply when undertaking research in their areas of expertise or lack a good understanding of the research methods available to them to use.

The purpose of this paper is to give a deep discussion of the different research methods that exist in the field of IT, highlighting important considerations that one must take into consideration when choosing one research method over the other.

2. DIMENSIONS OF RESEARCH

There exist several research dimensions along which research methods can be categorized. One of the research dimensions is the purpose of the research. With this, research methods can be categorized based on their purpose. This includes categories like descriptive, exploratory, evaluative, and explanatory research methods (Burget et al., 2016). Another dimension is the approach given to data collection in each research method. With this dimension, research can be categorized as qualitative or quantitative research methods (Hignett & Wilson, 2004). This is the most common dimension used when categorizing research methods. Quantitative methods focus on collection and analysis of numerical data through methods like surveys, experiments among others whereas qualitative research methods try to understand the experiences, attitude, and behavior by using methods like interviews, case studies and observations (Gunnulfsen, 2021). Another dimension of research is time. In this case, research methods can be classified as cross-sectional where data is collected at a given point of time or longitudinal where data is collected over a period.

The choice of any of the above research method or technique is determined by several factors including resources available, the problem being investigated, the environment where research will be carried out, the variables under consideration and the end users of the report being developed (Opoku et al., 2016). For example, a researcher may opt to use secondary sources of information as compared to primary sources due to several factors including availability of data, resources needed to access primary data, and accessibility of the data. For any research, the objectives, the process used, and the research results must be spelt out. Research methods are very important as they outline to other researchers how the process was carried out and the conclusion arrived at including the environment where the research was carried out.

Research in IT is concerned with the application of technology in society with an interest in extending the knowledge on how information technology can be applied to solve problems or contribute to the realm of knowledge. Research methods that can be applied in the IT field fall into two broad categories based on the approach dimension, namely qualitative and quantitative research.

Qualitative Research

Qualitative research method deals with processes that do not produce discrete data (Wabwoba & Ikoha, 2011). It deals with collection and analysis of qualitative data through open-ended questions. Some of the approaches in this category involve the use of interviews, observation, and participation. This group of research methods goes beyond the traditional statistical methods and tries to give meaning to the statistical data collected. Research methods that fall in this category include phenomenological research, grounded theory, case studies, action research, narrative research, and ethnography (Easterbrook et al., 2008). Some of the data collected using these methods includes text data, video data and audio. It is essential as it helps understand the concepts, views, and experiences of the participants. Research in the domains of humanities and social sciences employs these research methods to collect and analyze data. Since IT deals with the application of technology across all domains, qualitative research methods can be applied in this area as discussed in later sections.

Quantitative Research

Quantitative research involves the collection and analysis of numerical data. This type of research is commonly used when researchers are trying to establish the relationship between two or more variables and make predictions, averages, and patterns in data (Pilcher & Cortazzi, 2023). With such findings, it is easier and possible for the results to be generalized for the population. This type of research is very common in natural and social sciences. It can be used for correlational research to establish a relationship between your research variables, descriptive research, where a researcher needs to do an overall summary of the research and experimental research to examine cause-effect relationships among variables (Sharma et al., 2023). There exist several research methods in quantitative research. They include experimental methods, surveys, quasi-experimental, correlational, and descriptive research.

Descriptive Research

This type of quantitative research is used to understand a situation, phenomenon, or population. In this case, the research is trying to do a summary of a study. This type of research mostly answers, what, where when and how questions. Unlike experimental research, this type of research does not involve manipulation of a variable (independent variable) but the researcher can only monitor and measure them. This type of research can be used when the topic of research is relatively new and not well known by allowing one to identify unique trends, frequencies, characteristics, and categories.

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3. RESEARCH METHODS IN INFORMATION TECHNOLOGY

a. Surveys

This is a quantitative research method that involves the collection of information from a group of people by asking them questions and analyzing their feedback (Yavuz, 2023). To successfully carry out research using this method, the researcher needs to determine the target population and using the appropriate sampling techniques, the researcher will pick a sample population to participate in the survey (Jones et al., 2011). Once the target population is determined, the researcher will decide on how the survey will be availed to the participants (through email, in person or online). The researcher will then decide on survey questions and their layout. The survey will then be distributed among the participants who will in turn complete the survey and share their responses. The researcher is then required to analyze the responses using necessary tools and then the researcher will do a write-up of the results and share them with the necessary stakeholders.

In the field of IT, surveys are used as a research method to gather information, feedback, and insights from users, stakeholders, and customers on IT products. Surveys are used in research to get information on user experiences on different products including usability and functionality of products among other aspects (Denison & Johanson, 2007). In this domain, research questions may revolve around the ease of use of IT products, and how well the IT products satisfy user's needs among others. Surveys are important during product development as they help software engineers gather and refine user requirements and preferences. They help collect data on desired features of the IT product being developed, and expectations allowing developers to prioritize enhancements and custom make the product meet users' needs and requirements.

Surveys are used in market analysis to help assess market trends and consumer behaviors within the ever-evolving IT industry (Riedl et al., 2023). Surveys help capture data on purchasing, brand awareness and product usage habits within a diverse population. Surveys are also used in collecting information on customer satisfaction with IT services, research that focuses on the use of IT products, support, and solutions and how users are satisfied with the products or services. Researchers can employ this research method to get insights on customer satisfaction that can inform future improvements, address user concerns to help improve customer satisfaction (Perifanis & Kitsios, 2023).

Surveys are also employed in assessing the training needs of IT solutions, and professionals. It is used to collect feedback on knowledge gaps, skill gaps, and training preferences. The field of IT is ever evolving, and changes are inevitable. Surveys are used in this field to gather information on any changes in IT systems, processes, and policies. This is very important in assessing users' acceptance of the new IT products, resistance if any, and as well addressing their concerns. Through this, organizations can tailor their training to fit into where gaps have been identified. Information gathered through the surveys can be further analyzed to help gain insights and identify areas of future research within the IT realm.

b. Experiments

Experimental research is a quantitative research method that investigates the causal-effect relationship. In this case, the research method involves manipulating one or more research variables, called independent variables, and measuring how that affects other variables called dependent variables (Ross & Morrison, 2004). For one to successfully carry out research using this method, it is important for them to have a good understanding of the research topic. The process of carrying out this research includes identifying variables and how they are related. Formulating a research hypothesis and identifying independent variables in the research and how to measure the dependent variable (Stoner et al., 2022). In many cases, experiments cannot be done to the whole population hence need to select a sample as well as any other variable that could influence the results called extraneous variables.

In IT, experimental research methods have been used to investigate different causal relationships. In the field of machine learning, experimental research methods have been used to train and evaluate different research algorithms on specific datasets. In this case, researchers use experiments to compare the performance of different machine learning algorithms, variables or parameters and features to identify the most effective algorithms or approach to solve the problem (Nyabuto & Nambiro, 2024). Experiments are also used in assessing performance of different IT Products be it software or hardware. They are conducted to measure performance in terms of processing speed and response time among others under different conditions.

Experiments are also employed in comparing two or more versions of an IT product. In this case, different users are assigned different versions of the product to interact and use. From this, researchers can determine which version performs better than the other in terms of usability, performance, and other metrics (Sørensen et al., 2010). Experiments are also used to assess security vulnerability of an IT resource. In this case, researchers can conduct

vulnerability assessments, penetration tests and security risk analysis to help identify and gain insights into weaknesses in the system and effectiveness of counter measures.

Usability testing is another area where experiments are used to evaluate the effectiveness and user satisfaction of IT products and services. This includes websites, mobile applications among others where experimenters are given specific tasks to complete, and they are monitored by researchers on their interactions with the products as feedback is being gathered among other useful information (Zhang et al., 2023). In other cases, experiments are used to evaluate performance and resource utilization of cloud and virtual services. In this, experiments can reveal the impact of these virtualization technologies like their scalability, efficiency, energy consumption and their friendliness to the environment. Generally, experiments are used to provide quantitative evidence to IT based phenomenon that generally informs the design and use of IT Products and services.

c. Ethnographic

This is a type of qualitative research that involves immersing researchers in the natural environment being studied and allowing them to examine how people act and interact with each other in their environment (Reeves et al., 2013). This research involves use of naturalism, observations, and interviews research methods. This research is very important as it provides an extensive and complex understanding of people's views and behaviors through their viewpoints and experiences.

Observations research methods in ethnographic research collect systematic data through subjective methodologies. This method focuses more on characteristics and qualities than numbers. The behavior of others is closely watched and recorded without communicating with them. The effectiveness of this research method is purely based on the observer and their ability to correctly record and interpret their observations. This research method is effective in cases where sensitive information needs to be collected and the researcher does not trust the respondents hence reliability of data provided by respondents is in doubt.

Interviews in ethnographic research combine observations with one-on-one discussions to produce research data. The researcher in this case talks with the research group while conducting research related activities. This helps contextualize the collected data making it possible to get quality research data from the group.

In the field of IT, ethnographic research involves studying the interaction of people with technology within their natural environment. It involves the understanding of the cultural, social, and contextual factors that mold the interactions (Forberg & Schilt, 2023). This research method helps IT professionals better understand user needs and behavior by having an insight into how users interact with technology in their daily activities. By observing users in their natural contexts, the researcher can easily uncover any unmet technological needs, learn user preferences, pin out problematic areas that cannot be captured using the other research methods (Raffaetà et al., 2023). Since ethnographic research involves researchers observing users while they interact with technology in their natural environment, it can be used to gain contextualized inquiries, gaining knowledge on the context in which technology is applied, the different dynamics, work ethics and practices and the environment that influences user behavior.

Ethnographic research has also been used to assess the cultural and social impact of technology. It explores the cultural and social dimensions of technology, its adoption and use within society. Researchers use this method to gain insights into how technology has affected society and conversely how society has shaped the adoption of technology including the use of most recent technologies like Artificial Intelligence (AI) (Voorst & Ahlin, 2024). Additionally, this form of research is used in the workplace to explore how technology has been adopted in that setup. Researchers have used this method to observe how employees share, collaborate, communicate, and use technology to perform their day-to-day activities. With such insights from this research, researchers can recommend how well technology can be used or enhanced to improve productivity.

This research method is also used in online communities where researchers immerse themselves in the online communities in different social media platforms and virtual worlds to get insights on how individuals and groups from different cultural and social setups can communicate, exchange information, and even build relationships in the digital world (Maa & Cai, 2023). Ethnographic research helps unravel some of the factors that could positively or negatively influence adoption of different technologies within society based on social and cultural diversities. By observing how users interact with technology in different contextualized setups, the researchers can identify barriers to adoption as well as proposed strategies to promote acceptance of IT products and services within societies. During the software development life cycle, designers and innovators use this form of research to tailor make their products to fit the different cultural contexts based on user's behaviors, cultural practices leading to creation of user centered designs and solution with inclusivity.

d. Case Studies

Case study involves undertaking detailed research on a specific subject. This research design is commonly used in qualitative methods but can also be used in quantitative methods. This method keeps a researcher focused on a specific subject and helps the researcher gain useful insights on the subject under study. A researcher needs to select a case to study about, then they formulate a theoretical framework, collection of data will be done and lastly analysis and description of the case under study.

In the technological setup, case studies are widely used as a research method to help gain insights on the adoption of different technologies in organizations and societies. These research methods help researchers to focus on a specific implementation of an IT project making it possible to unravel any challenge or success associated with this implementation. Some of the challenges that case studies are bound to reveal include integration issues, technical issues, and any form of resistance to change and adopt the new technology.

Case studies are also used to evaluate adoption of different technologies in an organization. Through this approach, researchers can examine some of the factors that lead to successfully implementation of a given technology as opposed to other technologies including societal or organizational cultures among others (Ngai et al., 2015). These research methods can also be used to examine and evaluate different IT strategies adopted by an organization and how they align with the overall objective of the organization.

User experience is an important aspect that often influences the adoption and success of any technology. Case studies can be used to explore and gain useful insights in understanding user's behaviors, their preferences and challenges posed with the technological products. Researchers use case studies to observe and monitor as users interact with IT products to help them identify the pain points and opportunities for improving the products. Case studies are used to explore new and emerging technologies as researchers can investigate different use cases, opportunities, and adoption challenges of these technologies (Ding & Hernández, 2023).

Case studies are used to investigate cybersecurity incidents by following through and examining incidents that may have led or can lead to a given security breach. This is useful as it helps identify security vulnerabilities that hackers can take advantage of and propose recommendations to help improve security of IT systems. This research method is used to validate theoretical constructs in IT. For a long time, researchers have relied on this method to test different hypotheses and theoretical frameworks in a real-world setup as this reflects the actual environment making research finding to be as credible as possible hence easily generalizable.

e. Mixed Methods

This is a research approach that uses both qualitative and quantitative research methods. This approach is very useful as it provides a comprehensive understanding of complex IT scenarios that cannot well be explained using one approach (Wu, 2011). In the field of IT, mixed methods are used to explore user needs and their experiences and preferences on different IT systems. Researchers may opt to use quantitative surveys to collect data and gain insight from a large set of users and then decide to use ethnographic approaches to gain and delve into specific issues that can help better explain motivations behind user preferences and choices of different IT products and services (Shaanika, 2022). These methods can also be used to evaluate IT systems and interfaces where quantitative approaches can be used to measure task completion rates, error frequencies and qualitative methods like observations used to identify usability challenges that can help inform future designs.

These research methods are also used to assess the impact of technology in an organization, on individuals and society. In this case, quantitative measures like the financial impact technology have in the organization can be supplemented by qualitative measures to shown user satisfaction and capture diverse perspectives of technology that cannot be quantified (Onwuegbuzie et al., 2023). In other cases, mixed methods are used to validate IT theories and models where experiments are used to test hypothesis derived from theories and qualitative methods are used to get contextual insights that get more explanations to help in further refining the theories or models (Wasti et al., 2022).

4. LITERATURE REVIEW

Literature review is a research method that reviews scholarly work to provide an overview of the current and previous knowledge to help identify gaps and opportunities for future research (Snyder, 2019). This research method is important as it places research within other scholarly works using secondary data. In fields like IT that are quickly evolving, the review of literature is very important as it collects and sensitizes and summarizes information into a cohesive summary. This research method is used to identify current developments and trends in the field of IT since this is a rapidly evolving field with new approaches being used in research, frameworks among other approaches (Paré & Kitsiou, 2017). The field of IT often builds upon the already existing theories and frameworks from other fields like computer science, sociology, engineering, and psychology. Literature review helps identify gaps within the current

methodologies and approaches being used. Literature review is also used to validate research findings by comparing findings with what other researchers found out in this field (Moahmmed & Adham, 2021). Through this, researchers can find out how their research aligns with other researchers and offers a different perspective. In some cases, it may be very expensive for research to collect primary data for analysis, and they opt to use literature review as it could be cheaper and validated information quickly available.

5. CONCLUSION

From the discussions above on the different research methods, both qualitative, quantitative, and mixed methods can be used in the field of IT. Some studies are well done using quantitative research methods like surveys and experiments whereas others can be well done using qualitative methods. Where specific user perceptions are involved and researchers want to have a deeper understanding on how users feel when they use IT products, their ease of interaction with the product, it is recommended that qualitative methods like interviews, observations and cases studies are used. In some other cases, a combination of both methods, called mixed methods, is best suited to help gain more knowledge in that field. With the ever-changing nature of the IT field and evolution of some new fields in the IT world, it is therefore important to apply review all the available research methods and choose which one is best applicable on a case-by-case basis aligning with the researchers needs.

6. REFERENCES

[1] Burget, M., Bardone, E., & Pedaste, M. (2016). Definitions and Conceptual Dimensions of Responsible Research and Innovation: A Literature Review. Springer. https://doi.org/https://link.springer.com/article/10.1007/s11948-016-9782-1

[2] Christiani, T. A. (2016). Normative and Empirical Research Methods: Their Usefulness and Relevance in the Study of Law as an Object. ScienceDirect, 2019(2016), 201-2017. https://doi.org/https://doi.org/10.1016/j.sbspro.2016.05.006

[3] Denison, T., & Johanson, G. (2007). Surveys of the use of information and communications technologies by community-based organisations. The Journal of Community Informatics, 1-12. https://doi.org/http://dx.doi.org/10.15353/joci.v3i2.2378

[4] Ding, B., & Hernández, X. F. (2023). Case study as a methodological foundation for Technology Roadmapping (TRM): Literature review and future research agenda. Journal of Engineering and Technology Management, 67. https://doi.org/https://doi.org/10.1016/j.jengtecman.2023.101731

[5] Easterbrook, S., Singer, J., Storey, M.-A., & Damian, D. (2008). Selecting Empirical Methods for Software Engineering Research. In S. Easterbrook, J. Singer, M.-A. Storey, & D. Damian, Guide to Advanced Empirical Software Engineering (pp. 285-311). https://doi.org/http://dx.doi.org/10.1007/978-1-84800-044-5_11

[6] Forberg, P., & Schilt, K. (2023). What is ethnographic about digital ethnography? A sociological perspective. frontiers, 1-15. https://doi.org/https://doi.org/10.3389/fsoc.2023.1156776

[7] Gunnulfsen, A. E. (2021). Applying the Integration Dimensions of Quantitative and Qualitative Methods in Education Policy Research: Lessons Learned From Investigating Micro Policymaking in Norwegian Schools. International Journal of Qualitative Methods, 20, 1-13. https://doi.org/https://doi.org/10.1177/16094069211028349

[8] Henneberg, S. C., & O'Shaughnessy, N. J. (2007). Theory and Concept Development in Political Marketing. Taylor & Francis Online, 6(2/3), 5-31. https://doi.org/http://dx.doi.org/10.1300/J199v06n02_02

[9] Hignett, S., & Wilson, J. R. (2004). The role for qualitative methodology in ergonomics:a case study to explore theoretical issues. Theoretical issues in ergonomics science (Taylor & Francis). https://doi.org/http://dx.doi.org/10.1080/14639220412331303382

[10] Ismail, A.-R. (2014). Research Methodologies in Information Technology Research: A Comparative Study.

[11] Jones, L., Baxter, M., & Khanduja, V. (2011). A quick guide to survey research. Annals of The Royal College of Surgeons of Engl, 1-7. https://doi.org/http://dx.doi.org/10.1308/003588413X13511609956372

[12] Maa, Y., & Cai, W. (2023). Social media in ethnographic research: critical reflections on using WeChat in researching Chinese outbound tourists. Taylor & Francis Online, 26(20), 3275–3287. https://doi.org/https://doi.org/10.1080/13683500.2023.2175203

[13] Moahmmed, C. M., & Adham, A. M. (2021, April). Literature Review as a ResearchMethodology: An overview and guidelines. Research Gate.

https://www.researchgate.net/publication/350581402_Literature_Review_as_a_Research_Methodology_An_overview_and_guidelines

[14] Ngai, E., Moon, K.-l. K., Lam, S. S., Chin, E. S., & Tao, S. S. (2015). Social media models, technologies, and applications: An academic review and case study. Industrial Management & Data Systems, 115(5), 769-802. https://doi.org/http://dx.doi.org/10.1108/IMDS-03-2015-0075

[15] Nyabuto, G. M., & Nambiro, A. (2024). Using Machine Learning to Diagnose Depression: A Review of Research Trends and Algorithms. International Journal of Research and Scientific Innovation (IJRSI), XI(II), 84-94. https://doi.org/http://dx.doi.org/10.51244/IJRSI.2024.1102008

[16] Onwuegbuzie, A. J., Forzani, E., & Corrigan, J. A. (2023). A Fully Integrated Systematic Review of Mixed Methods Design-Based Research. Journal of Mixed Methods Studies(8), 24-51. https://doi.org/http://dx.doi.org/10.59455/jomes.34

[17] Opoku, A., Ahmed, V., & Akotia, J. (2016). Choosing an appropriate research methodology and method. In A. Opoku, V. Ahmed, & J. Akotia, Research Methodology in the Built Environment: A Selection of Case Studies. Routledge.

[18] Paré, G., & Kitsiou, S. (2017). Methods for Literature Reviews. In F. L. Kuziemsky, Handbook of eHealth Evaluation: An Evidence-based Approach. University of Victoria.

[19] Perifanis, N.-A., & Kitsios, F. (2023). Investigating the Influence of Artificial Intelligence on Business Value in the Digital Era of Strategy: A Literature Review. Information, 14(2). https://doi.org/https://doi.org/10.3390/info14020085

[20] Pilcher, N., & Cortazzi, M. (2023). Qualitative' and 'quantitative' methods and approaches across subject fields: implications for research values, assumptions, and practices. Springer. https://doi.org/https://doi.org/10.1007/s11135-023-01734-4

[21] Raffaetà, R., Santanera, G., & Esposito, F. (2023). Discussing the Future of Anthropological Collaborations with Data Scientists. Anthropology in Action, 30(3), 1-8. https://doi.org/https://doi.org/10.3167/aia.2023.300301

[22] Reeves, S., Peller, J., Goldman, J., & Kitto, S. (2013). Ethnography in qualitative educational research. Taylor and Francis, 35(8), 1365-1379. https://doi.org/https://doi.org/10.3109/0142159X.2013.804977

[23] Riedl, R., Stieninger, M., Muehlburger, M., Koch, S., & Hess, T. (2023). What is digital transformation? A survey on the perceptions. Information Systems and e-Business Management. https://doi.org/https://doi.org/10.1007/s10257-023-00660-0

[24] Ross, S. M., & Morrison, G. R. (2004). Experimental Research Methods.

[25] Sá, M. J., & Serpa, S. (2018). ransversal Competences: Their Importance and Learning Processes by Higher Education Students. education sciences, 8(126), 1-12. https://doi.org/https://doi.org/10.3390/educsci8030126

[26] Shaanika, I. N. (2022). The Use of Mixed-Methods as a Research Strategy in Information Systems Studies. Proceedings of the 13th International Conference on Society and Information Technologies . Windhoek. https://www.iiis.org/CDs2022/CD2022Spring/papers/EB075GX.pdf

[27] Sharma, L. R., Jha, S., Koirala, R., Aryal, U., & Bhattarai, T. (2023). Navigating the Research Landscape: A Guide to the Selection of the Right Research Design. International Journal of Multidisciplinary Research and Analysis, 4(1), 64-78. https://doi.org/https://doi.org/10.47191/ijmra/v6-i8-52

[28] Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. Journal of Business Research, 104, 333-339. https://doi.org/https://doi.org/10.1016/j.jbusres.2019.07.039

[29] Sørensen, F., Mattsson, J., & Sundbo, J. (2010). Experimental methods in innovation research. Elsevier, 39(3), 313-322. https://doi.org/https://doi.org/10.1016/j.respol.2010.01.006

[30] Stoner, J. L., Felix, R., & Blank, A. S. (2022). Best practices for implementing experimental research methods. International Journal of Consumer Studies, 47(4), 1579-1595. https://doi.org/https://doi.org/10.1111/ijcs.12878

[31] Voorst, R. v., & Ahlin, T. (2024). Key points for an ethnography of AI: an approach towards crucial data. Humanities and Social Sciences Communications, 1-5. https://doi.org/https://doi.org/10.1057/s41599-024-02854-4

[32] Wabwoba, F., & Ikoha, A. P. (2011). Information Technology Research in Developing Nations: Major Research Methods and Publication Outlets. International Journal of Information and Communication Technology Research, 1(6), 253-257.

[33] Wasti, S. P., Simkhada, P., Teijlingen, E. R., Sathian, B., & Banerjee, I. (2022). The Growing Importance of Mixed-Methods Research in Health. Nepal Journal of Epidemiology, 12(1), 1175-1178. https://doi.org/https://doi.org/10.3126/nje.v12i1.43633

[34] Wu, P. F. (2011). A Mixed Methods Approach to Technology Acceptance Research. Journal of AIS. https://doi.org/http://dx.doi.org/10.17705/1jais.00287

[35] Yavuz, E. (2023). A theoretical perspective on survey method from quantitative research methods. 4(106). https://doi.org/http://dx.doi.org/10.32743/UniPsy.2023.106.4.15254

[36] Zhang, J., Wolfram, D., & Ma, F. (2023). The impact of big data on research methods in information science. Data and Information Management, 7. https://doi.org/https://doi.org/10.1016/j.dim.2023.100038