

Exploring Pilot Study as a neglected part of Research Process in Quantitative Survey Research.

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Abstract. Every research activity wants to achieve its goals. Research serves as a process for acquiring new knowledge and expanding existing knowledge. Therefore, pilot study is part of the research process in management sciences. Pilot study is the pre-investigation of the identified problem using the research instrument administered to a small sample size. The paper explored pilot study in management sciences quantitative survey research as a neglected part of research process. Qualitative research approach was adopted with exploratory research design. The research instrument was observation to gather the opinions of the past studies on the subject matter and qualitative content analysis was used to establish a position. The study identified the purpose of pilot study, the limitations of pilot study and develop eight (8) steps or stages involved in conducting pilot study in the field of management sciences. The paper therefore concluded that the developed eight steps or stages are fundamental to appropriate conduct of pilot study in management sciences field. Also, 10% of the determined sample size for the main study is more appropriate for pilot study sample size. The paper is restricted to survey research and pilot study is the focus without capturing other areas of research designs. The paper will be useful to present and prospective researchers in the field of management sciences on the importance of pilot study. The paper demonstrated the purpose, limitations and steps in conducting pilot study which is lack in most past literature

Keywords: Pilot study, quantitative survey research; management sciences

1 Introduction

Research serves as the platform for creating new knowledge and extend the frontier of knowledge. Apuke (2017) mentioned that research is a complex process that leads to finding solutions to a specific problem. It involves finding and answering to unanswered question(s). This implies as mentioned by Wadoo, Akbar and Ullah (2021), research aids the discovery of a new truth and modification of existing truth. This is enhanced through instrumentation. Instrumentation is the research instrument that a researcher uses to collect data from the target respondents on a particular problem to be solved (Elgunde, Okunbanjo & Afolabi, 2024). In quantitative research, one of the vital research instruments is questionnaire which requires validation. According to Part and Park (2016), a pre-investigation is required to ascertain the appropriateness of the questionnaire as a research instrument.

Pilot study has been seen as an important component for a successful research study. It serves as a good element of design. Teijlingen and Hundley (2001) stated that pilot study does not guarantee the success of the main study. It does only enhance the likelihood of a study's success. Pilot study as mentioned by Wadood et al (2021) increases the practicability of the research instrument. Majid, Othman, Mohamad, Lim and Yusof (2017) pointed that pilot study is so important to research studies

to the extent that it could be applied in both quantitative and qualitative nature of research. It helps in structuring and restructuring the wordings in the research instrument for easier understandability of the respondents. It serves as tools that aid in preparing for the main study.

According to Malmqvist, Hellberg, Lla, Rose and Shevlin (2019), pilot study is to increase research quality. It is the procedural preparation of the research instrument for a full-scale research study (Tashakkori & Teddlie, 2003). It aids to identify likely practical issues or ambiguous wordings in the research instrument especially when it comes to questionnaire. Castillo-Montoya (2016) stated that pilot study helps to detect flaws, or limitations in the research instrument for modification to be made where it is necessary. It is conducted on a small scale. The pilot study allows gathering preliminary knowledge about the studied phenomenon (Mutz & Müller, 2016). Ismail, Kinchin and Edwards (2018) opined that pilot study helps to test the reality of a research study success before embarking on the final study. Researchers identify and refine the research questions, identify and readjust the approach to make the main study works out as well as ascertaining the resources that will be required or needed for the main or final study.

One of the purposes of such study is to collect information (implicitly incomplete, because only core studies allow collecting all the necessary data to verify the theses adopted in the work) to verify the chosen direction, formulate assumptions for the work, or check the correctness of the developed questionnaire – in the case of surveys (Kaur, Figueiredo, Bouchard, Moriello & Mayo, 2017). Pilot studies also serve to check the usefulness of the adopted research methods and tools to investigate a given problem (Thomas, 2017). By conducting preliminary research, the researcher gains confirmation or negation of the previously accepted connections between the studied phenomena.

The importance of pilot study has been adjudged to be significant to the attainment of a research study objective. Despite the roles of pilot study in achieving the final research study objectives, Arifin, Daud, and Husin (2022) expressed that pilot study is still being under-discussed, underused as well as probably under-reported in most literature in the field of management sciences. This is also posited by Aziz and Khan (2020) and Majid et al (2017). Malmqvist et al. (2019) posited that there has been probably neglect in pilot study in most research process. Most literature did not conduct and report their pilot study when attempting to solve a problem (Muresherwa & Jita, 2022; Dzwigol, 2020) while some of the few studies on that conduct and/or report pilot study attempted to use it to test the formulated hypotheses.

Inspite of pilot study being an integral part of a research procedure, there is an evident of dearth of literature on pilot study as far as management sciences field is concerned. In the view of Whitehead, Julious, Cooper and Campbell (2016), publication policies of journal outlets cause not reporting pilot study. According to the authors, when a journal outlet clearly specified that only manuscripts with significant results are allowed for publication. This discourages researchers in management sciences to detailed their pilot study reports.

Relatively, there has been issues on the appropriate sample size for pilot study. As noted by Wadood et al (2021), sample size for pilot study has been become a frequently question that is being raised in quantitative survey research because researchers especially in management sciences get confused. Ullah, Khan, Hakal and Hashmi (2023) pointed that pilot study is perceived to be a part of research process that is ambiguous and hard. Schachtebeck, Groenewald and Nieuwenhuizen (2018) stated that lack of information and training on the conduct of pilot study leads to its wrong application and selection of appropriate sample size. Westlund and Stuart (2017) mentioned that there is lack of adequate guidance when it comes to the use of pilot study. This could be made the whole research process to be inefficiencies. Thus, the appropriate use or application of pilot study is paramount and this forms the motivation for this current study. The main objective of the study is to exploring pilot study as a neglected part of research process in quantitative survey research. Specifically, the study assessed: (1) the purpose of pilot study in management sciences research (2) The limitations of pilot study in management sciences research (3) To identify steps for conducting pilot study in management sciences.

2 Literature Review

2.1 Conceptual Review

2.1.1 Pilot Study

Pilot study is also known as preliminary study. According to Majid et al (2017), pilot study is the study that is conducted prior to the main study when there is limited literature on a particular problem, issues, challenges, process or phenomenon in given aspect or discipline. This implied pilot study is carried out when little is known about a subject matter. Arifin et al (2022) viewed pilot study as a small-sample of a research process that serves as a prelude to a larger scale study. In the opinion of Dzwigol (2021), pilot study is a research study that is small-scale in nature conducted before the final study. Pilot study is a test that is done on small scale to ascertain the quality of a research instrument to be used for the actual study. (Sundram & Romli, 2023; Anupama, Chaudhary & Lakshmi, 2023). It is a preliminary and small-scale examination that is carried out prior to main research study (Chhetri & Khanal, 2024). It is a mini-version of a full-scale research study. It could be seen as trial research study conducted to prepare for the full research study. Anupama et al (2023) posited that pilot study is pre-testing of research instrument to identify the weaknesses and shortcomings of the instrument.

Peterson (2023) opined that pilot study is solely a try-out research techniques and methods through administration of questionnaires or interviews to a specific number of individuals that are not part of the target respondents but share the same characteristics. Arifin et al (2022) expressed that pilot study is similar to the main study in methods and procedures and it justifies why and how the main study could be carried out. A pilot study is not just a small exploratory study, but is designed to guide the future study (Cohen, Manion, & Morrison, 2013). Pilot study is both a feasibility study and pre-testing of research instrument (Peterson, 2023; Muresherwa & Jita, 2022).

The lessons learned in the pilot study can prevent major problems that could not be anticipated before conducting the main study. Pilot study allows for the selection of the information collected (Morris & Rosenbloom, 2017). This results in the rejection of information that is irrelevant to the problem under investigation or that is not present in the environment or population. Apart from checking the correctness of the developed questionnaire, it is also possible to obtain knowledge about the duration of basic research or a reliable random sample size (Mutz & Müller, 2016). Pilot study cannot be conducted without a problem identification, clear vision and techniques (Peterson, 2023). It is when these are in place, that is when pre-investigation could be done to ascertain the workability of the research instrument in a research study (Muresherwa & Jita, 2022).

Anupama, Chaudhary and Lakshmi (2023) explored pilot study focusing on medical sciences. The study identified that feasibility of the study protocol, randomisation and blinding, recruitment and consent and selection of appropriate methods are among the purposes of conducting a pilot study. Lee, Walters and Godbold (2022) looked at pilot study from the perspective of qualitative research study. The paper submitted that a pilot study reflects ethics in teaching and learning that must be considered when conducting the main study. Ismail et al (2018) took a look at pilot study in qualitative Ph.D. research study in the field of education. The paper pointed that pilot study involves ethical, cultural, social and professional. The paper concluded that pilot study proffers explicit guidance for researchers in qualitative research.

Peterson (2023) reported that in qualitative research study, pilot study should not be only for the purpose of testing the research instrument but also as part of the holistic research objectives for the main study. Sundram and Romli (2023) demonstrated that pilot study is meant to test the validity and reliability of the adopted research instrument. Dzwigol (2022) viewed how pilot study is an integral part of research process. The study was empirically collected and management scientists were captured as the respondents. Most of the respondents were of the opinions that in the field of management sciences, pilot study gives direction to a research process. Majid et al (2017) developed the following as the steps involved in pilot study as far qualitative research is concerned and they are construction of questions for the interview, reviewing the questions by expert, selection of participants, piloting for interview, and reporting the modified questions.

2.1.2 *Purposes of Pilot Study*

Pilot study is important when the field of study or a phenomenon is to be explored for the first time, when a new and uncommon methods and tools are employed in a research study and when the existing assumptions in past literature cannot be maintained (Dzwigol, 2022; Dzwigol, 2021). According to Dzwigol (2021), one of the purposes of pilot study is to guide researchers to make adjustments and to refine the methodology of the research study. Crossman (2007) stated that pilot study is meant to pre-test a research instrument (questionnaire and/or interview). pilot study is conducted to help researchers to estimate the time required and funding of a research study. To identify the feasibility of a particular research study (Dzwigol, 2021; Teijlingen & Hundley, 2001). According to Peterson (2023), pilot study is meant to pilot study gives advance warning to researchers on what can make the main research study to fail. It reveals the appropriateness or practicability of the research methods and/or instrument. A pilot study identifies items in the research instrument that are unclear or ambiguous (Murshera & Jita, 2022). Anupama et al (2023) expressed that pilot study makes researchers to identify the time and cost that will be involved in the main research study. Similarly, according to Peterson (2023) stated that testing the overall research methods, to refine the research instrument for the purpose of improvement, replicate the main study to objectively evaluate each research variable that might influence the results, to identify how data collect process could be enhanced.

2.1.3 *Limitation of Pilot Study*

The limitations of pilot study could be viewed from two main angles. According to Ismail et al. (2018), the limitations of pilot is centered on inclusion of pilot study participants in the main study and sample size identification. There has been an issue if the participants of pilot study should be among the respondents for the main or they should be disregarded. Pilot study is restricted to a number of participants that will not be part of the main study. Teijlingen and Hundley (2001) posited that participants of pilot study are selected to test run the research instrument that the researcher intends to adopt for its workability. The authors maintained, pilot study participant cannot be included because it will affect the sample size of the main study and this could affect the achievement of the research objectives. However, Janghorban, Latifnejad and Taghipour (2014) is of the view that capturing the participants of pilot study in the main study create familiarity between the researchers and the participants especially when the research instrument is interview. Ismail et al (2018) argued that using same set of individuals as participants for both pilot study and main study may result in loss of interest on both parts of the researchers and participants. This is because there will be an element of repetition of words, phrases or statements in the research instrument (Mellinger & Hanson, 2020; Junyong, 2017)

Sample size is one of the limitations of pilot study. This is because pilot study involves small size or number of participants. It is believed that there is no specific number or size of pilot study to test run a research instrument. According to Connelly (2008), 10% of the sample size for the main study has been postulated or positioned to be appropriate for pilot study. In the view of Sekaran (2003); Roscoe (1975) a sample size of 30 is seen as a rule of thumb for pilot study. This could be because 30 is seen as a large sample size according to principles of statistics.

Machin, Campbell, Tan and Tan (2018) asserted that sample size for pilot study could be categorised into two-flat rule and stepped rule. The flat category suggests that a single number is appropriate for pilot study size and 30 was emphasized on to be appropriate. The stepped rule states that sample size should be dependent on the information about the main study. Stepped rule does not specify the actual sample size for pilot study (Whitehead et al., 2016). Teijlingen and Hundley (2005) stated one of the limitations of pilot study is that it does not guarantee of success of the main study. Also, it involves small sample size that is too small to rely on to test the hypothesis. Chhetri and Khanal (2024) mentioned that determination of sample size for pilot study has no specific requirement and thus 30 was proscribed to be enough. Different sample sizes have been used for pilot study. Omar, Klawonn, Brand, Stiesch, Krettek, and Eberhard (2017) believed that pilot study sample size should be 10-40 participants. This is also shared by Lewis, Bromley, Sutton, McCray, Myers & Lancaster, 2021). Julious (2005) posited 12 participants for. All these summed the issues cum challenges of pilot study in today's literature.

2.2 Theoretical Framework

2.2.1 Constructive Theory

Constructive theory is a theory of knowledge that belongs to epistemology philosophy. The theory was brought to limelight by Jean Piaget in 1971. Constructive theory opined that an individual builds on existing foundation to form new information (Sundram & Romli 2023). The theory believed that knowledge and understanding are not acquired by traditional approach which is teaching but by interaction between the individuals' ideas and experiences that result in new knowledge, information and/or understanding. The integration of researchers' ideas and experiences form new knowledge. According to Adom, Yeboah and Ankrah (2016), constructive theory believed that learning, new information, understanding and knowledge acquisition do occur through teaching but through personal reflective.

As noted by Piaget (1971), constructive theory states how researchers use the relative experiences and ideas to form an information or a knowledge. Tebogo (2014) stated that constructive theory could be in two processes-accommodation process and assimilation process. Accommodation process involves conceptualisation of self-mental representation to fit the new information or knowledge. It is when a researcher accommodates new experience that new knowledge can be formed. The second process-assimilation is when a researcher incorporates new knowledge to the existing knowledge without altering the existing knowledge to form a new knowledge. Thus, the objective that the study intends to cover is capture in the constructive theory.

3 Methodology

The paper hangs on interpretivism philosophy of research. The paper is qualitative in nature which means that qualitative research approach was adopted. Exploratory research design was adopted because of the objectives that the study wants to achieve. The paper made use of observation as an instrument to gather the need facts or opinions of past related studies on pilot study as far as management sciences field is concerned and content analysis was utilised to report the position of this current paper.

4 Discussion of Findings

Pilot study is mostly conducted in medical sciences, social and management sciences. It is important for researchers to compile a list of prerequisites for a pilot study before it can be conducted. According to Anupama et al (2023), the list aids in determining to continue with the planned pilot study or change the design of the study. It is believed that when pilot study is conducted, it will make the researchers to decide if to continue or discontinue with the main study. If the decision is to continue, then, items, questions or design to be changed or restructured must be identified.

In the opinion of Teijlingen and Hundley (2005) posited the absence of full pilot study report in the main study does not really make readers to understand the purpose of conducting pilot study. Most assumption is that pilot study was conducted to test the reliability and validity of the research instrument. This paper does not see the purpose of pilot study to be for the test of reliability and validity but to identify the ambiguity in the wordings captured in the research instrument. This implies that pilot study is to ensure the respondents for the main study will understand the items in the research instrument. The findings on the conduct pilot study enable researchers to reconstruct the items that need to be touched in the research instrument and redeveloped the entire research instrument if it is useful.

Despite the importance of the purpose of questionnaire, it has its limitations. The limitations do not make pilot study to be irrelevance but to be in line with why it is being conducted. Pilot study is not meant for the test of formulated hypothesis, not meant to predict the outcomes of the main research study and not meant to form the a-priori expectation of the main research study and it does not give assurance for the success of the main research study. Also, it is limited or restricted to a small sample size because it is meant to test the understandability of the research instrument using set of individuals that will not be captured in the main study. It should be noted that the participants of pilot study are expected to share the same characteristics with the main study respondents but in different area of location. It is about what it cannot do or be extended to.

4.1 Conducting Pilot Study

It should be pointed that a pilot study is a pre-investigation of the items in the research instrument in order to confirm the relevance, clarity and understanding of the items in the research instrument prior to its proper administration to the target respondents. In management sciences, it is important and necessary to have determined the sample size of the main research study. The sample size will determine the number of individuals that will be captured in the pilot study. Connelly (2008) pointed that 10 percent of the sample size of a study is adequate for the conduct of pilot study respondents. Kothari (2008) mentioned that the choice of areas for pilot study should be away from the scope of the study. Thus, a study with 489 sample size will have approximately 49 individuals that will participate in the pilot study. This is the 10% of the sample size for the main study.

The pilot study is to be conducted in another geographical location that is not part of the main study. A study on determinants of small business survival in Lagos State will have its pilot study conducted in another State which could be Ogun State or another State with justification. Medium businesses in Lagos and other State cannot serve as the pilot study respondents. This implies pilot study and main study respondents must have shared characteristics but operate in different geographical area. Thus, the research instrument cannot be developed to suit the objectives of the study and administer.

The review, observations and comments from expert, fellow researchers and pilot study respondents on the items in the research instrument are to be looked into for appropriate corrections and this is one of the purposes of the pilot study. Expert and professional in the interest of study is required to review the items in the research instrument before being administered to the pilot study respondents. The review and observations of the professional and experts show the items that will be reconstructed, adjust and/or deleted. The data collected from the pilot study respondents will be subjected to validity and reliability test. At the stage, it will be ascertained if the research instrument could be used to conduct the main study so as to achieve the objectives of the study.

A study conducted among small businesses in Southwest Nigeria titled “determinants of small business survival. The researcher submitted the research instrument to the top members of Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) in the State chosen for the conduct of pilot study. The professionals identified items that will difficult for small business owners to easily understand and items that seems not to be relevance based on the nature of the respondents. After the review of the research instrument and corrections were made, the researchers proceeded to administration of the research instrument for the pilot study respondents. The researchers proceed to the conduct of reliability and validity in order to be ascertain if the research instrument could be relied on. Validity and reliability of a pilot study is demonstrated in the table below:

Table 1: Validity and Reliability Results of a Pilot Study

S/n	Variables	Kasier-Meyer Olkin	Bartlet Test of Sphericity	Cronbach Alpha
1	Entrepreneurial Leadership	0.714	87.758 (0.000)	0.706
2	Entrepreneurial Culture	0.730	75.959 (0.000)	0.702
3	Small Business Survival	0.617	154.752(0.000)	0.767

Source: Researchers' Demonstration

Table 1 showed the results of a pilot study as an illustration conducted. The Kasier Meyer Olkin (KMO) captures the adequacy of the items in the research instrument. KMO allows the researchers to ascertain if the number of items for a variable is adequate to serve as measurement. The rule of thumb is that KMO value must be higher than 0.50 before the items for a variable could be regarded to be adequate. The closer the value to 1, the higher the items adequacy. Bartlet test of sphericity indicated how valid the items in the research instrument. It shows the level at which the items are valid to its purpose. The p-value of less than 5% shows the level at which the items are valid. The Cronbach Alpha aids in determining the flow in the pilot study respondents' responses. It is how the responses are consistence with one another. This shows the level at which the main study respondents will understand the items in the research instrument. The rule of thumb is that reliability value that is above 0.60 to 0.70 is acceptable.

Based on the aforementioned and contextual observation of the researchers in the field of management sciences, the paper postulates the following steps to be crucial in pilot study as far as management science research is concerned.

Identification of Problem to be Solved: This is the stage where the aim of the main study will be identified and develop. The objectives and variables or measures of the identified problems will be explicitly expressed.

Developing Research Instrument-Questionnaire: This is the second step in pilot study plan. It is expected that the research instrument will be developed in line with the objectives of the study and/or the variables that serve as measures for the identified problem.

Conducting Face Validity: This third stage involves taking the developed research instrument to experts (professionals and/or academics) in the field for review if the items cover the ethics in the field,

Making Adjustment in Research Instrument: This stage is when changes are done as a result of the face validity and if there are no changes to be made, the next stage will be focused on.

Administration of the research instrument to pilot study participants: This is the proper stage of pre-testing the research instrument. This is when the questionnaire will be administered to the participants to ascertain if the items in the instrument are simple to understand. This is when the researchers will detect errors and items that need to be reconstructed.

Conducting Content Validity Test: This is when the researchers employ statistical tools to test the test the research instrument. At this stage, the responses of the pilot study respondents will be tested in order to be certain if the items measure what they are meant to measure which are the variables employed in the objectives of the main study.

Conducting Reliability Test: This is the stage that involves testing how the responses of the respondents could serve as reliable data. Here, the internal consistency in the responses will be ascertained through statistical tool(s). The level of the internal consistency will determine if the researchers should continue with the main study or discontinue. According to Field (2013), internal consistency that is above 0.70 is considerable good to proceed to the main study.

Begin the main study: This is the final stage of pilot study plan. It is the stage that marks the commencement of the final research study. It is where all observations in the pilot study will be corrected and applied to achieve its purpose(s).

2 Conclusions

It is observed from the aforementioned that a research study cannot be conducted without a preliminary study called pilot study. The purpose of conducting pilot study has been identified as posited by different scholars in social and management sciences field as well as in medical sciences. Giving advance warning of factors that could make the final study to fail; identification of unclear or ambiguous items in the instrument; identification of time and cost involved in the main research study among others are among the purposes of the conducting pilot study. The paper identified the restrictions of pilot studies which include small sample size; not usable for hypothesis testing; the participants cannot be captured for the main study among others. The paper pointed that pilot study has to be planned and the plan involved 8 steps which are problem identification, development of research instrument, conducting face validity, modifying the research instrument, administering the questionnaire conducting content validity and reliability tests and commencement of the main study.

The paper therefore concluded that the developed eight steps or stages are fundamental to appropriate conduct of pilot study in management sciences field. Also, 10% of the determined sample size for the main study is more appropriate for pilot study sample size. It is suggested that management sciences researchers should conduct pilot study when attempting to find solution to a research problem. The paper is restricted to survey research and pilot study is the focus without capturing other areas of research designs. The paper will be useful to present and prospective researchers in the field of management sciences on the importance of pilot study. The paper demonstrated the purpose, limitations and steps in conducting pilot study which is lack in most past literature.

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