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A Quantitative Perspective of Systematic Research: Easy and Step-by-Step Initial Guidelines

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Abstract

The objective is to present a quick overview of systematic research design and methods with special considerations of quantitative research in business research. Later, this study recognized the levels and implications of theory in academic literature. The techniques have been discussed in the accession with critical issues in determining the sampling method and sample size. Further, the review on sample size was meticulously supported by various authors. The measurement scale has also been addressed and supported by previous literature. Finally, this study will guide the new researchers by providing a handful of knowledge about research concepts. The study has summarized the essential concepts with citations of key authors in business research to find much more on research topics.

Keywords Sampling, Research Paradigms, Research Philosophy, Research Strategy, Sample Size, Quantitative Method; Quantitative Approach, Methodology.

1. Introduction

The researcher defines the word paradigm as an essential set of logical beliefs, a set of agreements on how problems should be interpreted, and thus conduct research (Creswell, 2003). Thereby, these paradigms comprise an underlying belief system or assumptions that guide our research investigations (Guba & Lincoln, 2005). Because of this, scholars such as Myers and Avison (2002) argued that the recommended method for defining research is to follow the research paradigm. This is essential because the choice of a specific paradigm does not reside in the researcher's philosophic knowledge. Mainly four paradigms have been broadly used, including positivism, interpretive, advocacy, and pragmatism (Willcocks & Mingers, 2004). These paradigms are further discussed below and listed in Table 1.

1.1. The positivist paradigm

This paradigm advocates that real understanding can be gained through observation and experimentation. Positivists typically use a logical approach to generate information. Positivism is also known as a quantitative study, post-positivism, empirical analysis, and scientific method. According to Levine, Sober, and Wright (1987), in positivism, the reality remains constant and can be observed or represented by an objective. Further, there is a significant debate about the positivist model, whether it is sufficient for the social sciences or not (Hirschheim, 1985).

1.2. The interpretive paradigm

This paradigm is also known as qualitative research, social constructivism, and constructivism. The interpretive paradigm assumes that real understanding lies in a deep interpretation of the subject. The interpretive paradigm believes in a profound interpretation of a concept and explores the world in which they reside. Researchers in this paradigm establish subjective interpretations of their experiences or towards specific things or objects (Creswell, 2003).

1.3. The advocacy/participatory paradigm

The advocacy or participatory paradigm is also referred to as a critical paradigm. The discussion started in the 1980s and 1990s, who thought that the positivist paradigm does not address political and social issues properly. Writers such as Fay (1987), and Kemmis and Wilkinson (1998), have demonstrated the significance of the advocacy paradigm in their research and suggested that the Inquiry requires to be entangled with social and political issues. Besides, the research should comprise the agenda of reforms by addressing alienation, suppression, domination, oppression, inequality, and empowerment.

1.4. The pragmatism paradigm

Pragmatism is not associated with any sort of philosophy. This paradigm aims to recognize the research's weaknesses and strengthen it by utilizing a mixed-method approach (Johnson & Onwuegbuzie, 2004). The adherents of this paradigm believe that specific knowledge could be obtained from a mixed-method approach. According to Tashakkori and Teddlie (1998), the problem is the most crucial part rather than the method, and researchers are free to use both qualitative and quantitative approaches. The key is to find the best research procedure and techniques to resolve the problem.

Table-1: Key functionalities of paradigms

Research paradigm / Knowledge claim positions			
Positivist	**Constructivism**	**Advocacy**	**Pragmatism**
Determination	Understanding	Political	Consequences of actions
Reduction	Multiple participant meanings	Empowerment issue-oriented	Problem-centered
Empirical observation and measurement	Social and historical construction	Collaborative	Pluralistic

Theory verification	Theory generation	Change-oriented	Real-world practice-oriented

Source: Creswell (2003)

2. Philosophical Assumptions

According to Creswell and Clark (2007), seven common philosophic assumptions follow all four paradigms. These seven philosophical assumptions are ontology, epistemology, axiology, rhetoric, methodology, strategies of Inquiry, and methods. Ontology deals with the essence of existence (reality), whereas epistemology discusses the distinction between vindicated beliefs and opinions and deals with the knowledge, methods, validity, and scope.

3. Levels of Theory

The theory is an identical standard, which provides a foundation in explaining the relationship between variables. There are two levels of theory. The first is the empirical level, which follows the deductive theory approach. The second is the abstract level, which follows an inductive theory approach (Creswell, 2003).

3.1. Deductive level

According to Collis and Hussey (2013), the deductive approach relies upon already existing and proven theories. This approach is generally recommended for those studies where test assumptions are based on a conceptual and theoretical framework.

3.2. Inductive level

Collis and Hussey (2013) elaborated that the inductive level observes and investigates the relationship between human subjects' actions and meanings. The inductive approach explains a process where observations of the researcher develop theory. Further, it may also be referred to as the inferences of thoughts about a particular variable or object.

4. Research Methods

Despite several research methods, qualitative and quantitative methods are the most dominant and common methods. A brief explanation is given below.

4.1. Qualitative method

According to Creswell (2014), the qualitative approach is used to gather in-depth information on a particular topic. This approach suggests that a single person reflects an individual's collective thoughts and sentiments are equally important to understand, whereas the quantitative method overlooks this aspect. Tashakkori and Creswell (2007) explained that the qualitative method is used when an environment is needed to be observed to develop a theory.

4.2. Quantitative method

The quantitative method is empirical, and its logic can be defined in the positivist paradigm (Grinnell & Unrau, 2010). This approach relies on data collection from a large population. Besides this method, measure the objectives through actions and opinions to help in describing the data rather than interpret.

5. Research Objectives and Classification

There are three forms of research objectives, including exploratory research, descriptive research, and explanatory research (Creswell, 2014). The explanation is given below:

5.1. Exploratory research

Exploratory research aims to seek new insights and to find out what is going on. This kind of research is typically carried out at the early stages, where the theory is not sufficiently explicit about developing an operational definition. A qualitative approach often underpins this type of investigation and focuses on new insights into current situations and issues (Creswell, 2014).

5.2. Descriptive research

Descriptive research aims at collecting information on the present state of the phenomenon. This approach intends to provide an accurate profile of events, people, or situations. According to Polit et al. (2001), descriptive research observes and documents an occurring phenomenon.

5.3. Explanatory research

Cohen, Manion, and Morrison (2013) argued that explanatory research helps determine the cause of occurrence for a specific phenomenon. This research usually explains a situation or problem in casual relationships and is much relevant to the quantitative method. This method allows a fresh insight to expand, develop, build, or test a theory. The primary objective of explanatory research is to identify issues and key variables in a specific problem.

6. Research Strategy

The research strategy describes the method of data collection and its interpretation with a distinct set of objectives. According to Easterby-Smith, Thorpe, and Jackson (2012), a research strategy is a general plan, like answering the research question. Yin (1994) argued that there are five main research strategies in social sciences, i.e., case studies, histories, archival analysis, surveys, and experiments. These five strategies depend on three conditions, first is focus on contemporary events, second is control on behavioral events, and third is the research question.

6.1. Case study

This strategy is a written description of a situation or a problem. The case study focuses on a specific issue. Case study analysis is favored when the researcher has not had enough control over events (Creswell, 2014).

6.2. History

This research strategy is being used to explore past issues. This technique shall be followed in particular where no appropriate person is alive to respond or comment on a specific issue (Creswell, 2014).

6.3. Archival analysis

This strategy reports the prevalence and incidence of a specific phenomenon. However, it is difficult to follow this technique in the research area (Creswell, 2014).

6.4. Survey

This strategy is associated with the deductive approach and is common in the social sciences (Mark, Philip, & Adrian 2009). In this approach, the data is obtained through structured questionnaires or interviews (Creswell, 2014; Rashid, Amirah, Yusof, & Tawfiq, 2020).

6.5. Experiments

This strategy involves the process of testing variables to evaluate the impact of one variable on other variables. Further, this strategy explores the cause and effect relationship between variables (Malhotra, Agarwal, and Peterson, 1996).

7. Population and Sampling

A population may be described as all objects or persons that a researcher wishes to learn. At the same time, sampling is the procedure of selecting a portion of the population for examination to measure people's attitudes, beliefs, and characteristics (Hair, 2003). A sampling survey conducts through a pre-designed questionnaire to test people's views and attitudes. Collected data using a pre-designed questionnaire can provide an enumeration of the identified population or subgroup. Authors such as Malhotra and Birks (2007) have demonstrated that a sample can conclude the whole population. The sampling is beneficial in reducing the costs and workload that would have been involved in studying the whole population.

Similarly, sampling increases the speed of data collection and brings accuracy in results (Cooper, Schindler, & Sun, 2003). When it comes to selecting the sampling method, it depends on the nature of the study and may include practical and theoretical implications. Generically, there are two types of sampling techniques: probability sampling and the second is non-probability sampling (Hashmi & Tawfiq, 2020; Rashid et al., 2020; Alrazehi et al., 2021; Das et al., 2021; Haque et al., 2021; Rashid, Qadri, & Rasheed, 2021). The following explains the key sampling techniques and methods in the field of business studies.

7.1. Probability sampling

A sampling method, where each unit has the same chance of being chosen, is called probability sampling. Probability sampling is divided into four types: simple random sampling, systematic random sampling, stratified random sampling, cluster sampling, and multi-stage cluster sampling (Hashmi, Amirah, & Yusof, 2020a).

7.1.1. Simple random sampling. This is a sampling procedure where each population unit has the same chance of being included in the sample randomly (Rashid, 2016; Rashid & Amirah, 2017; Hashmi et

al., 2020). This method follows a numeric list of respondents and generates random numbers using a computer program.

7.1.2. Systematic random sampling. In this technique, all cases are picked at regular intervals with a random selection of the initial sample point (Creswell, 2014). For example, a researcher systematically chooses the first five numbers and then selects the other cases at regular intervals, i.e., 25, 35, 45, 55, and so on.

7.1.3. Stratified random sampling. This is a sampling process in which each subgroup called strata is given an equal probability of being picked at random. It gives equal representation to every stratum. Further, this type of sampling considers homogeneity within subgroups and heterogeneity between subgroups (Hashmi et al., 2020a).

7.1.4. Cluster sampling and multi-stage cluster sampling. Sampling method, where the study extracts a sample from aggregations of the population and the population is widely dispersed (geographically) and hard to reach at the same time. The cluster sampling technique considers heterogeneity within subgroups and homogeneity between subgroups (Hashmi, Amirah, & Yusof, 2020b). Moreover, multi-stage cluster or multi-stage sampling requires a series of stages (Hashmi et al., 2021). The first step is to choose a sample randomly from the entire region in a cluster. The second stage is to select a specific region, and at the final stage, adequate objects must be selected to constitute a sample size.

7.2. Non-probability sampling

This is a sampling technique where the probability of each unit being chosen is not confirmed or known. Non-probability sampling is divided into four types, including convenience sampling, snowball sampling, quota sampling, and judgment sampling (Hair et al., 2010).

7.2.1. Convenience sampling. Convenience sampling is a data collection method where the data is readily available at the researcher's convenience. This method helps researchers get responses or complete interviews in a cost-effective way but is normally criticized for biased selection due to the disparity in the target population (Hair et al., 2010).

7.2.2. Snowball sampling. In this technique, at the first point, the researcher contacts a small group of people who are important to the research subject and later utilizes them as referrals to contact others (Hair et al., 2010).

7.2.3. Quota sampling. The quota sampling technique defines the strata of the population and sets the quota for the sample element from each stratum. This sampling technique is criticized as the findings from this method could not be generalized because the selected element is not equally probable to be selected (Hair, 2003).

7.2.4. Judgment sampling. The judgment sampling technique is based on the own judgment to select a group of people who are aware of the problem. Because of a particular purpose, this technique is often called purposive sampling and is considered convenient and cost-effective (Hair, 2003).

7.3. Sampling frame

The sampling frame describes a frame in which a sample of the target population can be drawn. Creswell and Clark (2007) argued that a sampling frame could be identified as listing population units from which the sample could be chosen.

7.4. Determine sample size

There has been a wide-ranging debate on sample size in academic literature. Choosing the right sample size is still challenging for researchers as the statistical techniques are significantly sensitive to sample size and need to be carefully selected (Collis & Hussey, 2013). For example, while examining structural equation modeling (SEM), recommended heuristics for determining adequate sample size are: the rule of thumb (Krejcie & Morgan, 1970), further, a sample size of 50 is very poor, 100 is poor, 200 reasonable, 300 is good, 500 is very good, and 1000 is excellent (Comrey & Lee, 1992). Besides, Hair et al. (2010), Afthanorhan (2013), and Awang (2015) urged that for SEM analysis, a minimum of 200 samples is imperatively required. Whereas, to determine the dimensions of used items in factor analysis, a maximum of ten times or a minimum of five times of indicators constitutes a sample size (Hair et al., 2010). Besides, 300 valid cases are required (Tabachnick & Fidell, 2007), fifteen cases per construct for multiple regression analysis (Schikorski & Stevens, 1997). Eventually, depending on the type of methodology and analysis, other methods also determine the appropriate sample size and should be selected carefully.

8. Data Type and Sources

According to Schutt (2006), and Yin (2017), generically, there are three types of data sources, including primary, secondary, and tertiary. Out of which, the primary data is the most persuasive in quantitative research. Further, primary data is collected directly from primary sources; in other words, data is collected from first-hand sources through experiments, interviews, or surveys. At the same time, secondary data is collected from experiments, studies, or surveys conducted for other research purposes or by other people and may include organizational records, government publications, and censuses. Tertiary data is a collection of both primary and secondary sources. The sources may include bibliographies and indexes, almanacs, directories, guidebooks, manuals, dictionaries, encyclopedias, and textbooks. Besides, sometimes textbooks are deemed as secondary sources. Usually, research starts with secondary data to understand the issues and formulate the research questions before collecting the primary data to save cost and time.

9. Instrument and Development of Items

If the researcher uses positivist philosophy, then the quantitative method applies. For data collection, a survey questionnaire could be used as an effective technique to measure respondents' responses. According to Churchill (1979), items could be developed in two phases; firstly, defining the domain of construct (to ensure the content validity), secondly, the development of items scale (item scale selected from literature review). Besides, Pinsonneault and Kraemer (1993) expressed three critical objectives for researching with a survey questionnaire. Firstly, research data is quantitative; secondly, the instruments used are pre-defined. Thirdly, research work is required to analyze the result of a sample for the entire population.

10. Measurement Scale

Likert-type scales are widely used in survey questionnaires to assess attitudes and observations (Buttle, 1996). Such rating scales include either five or seven answer categories and have pros and cons of their own. Supporters of the five-point Likert-type scale suggest that it was used to improve the response rate and efficiency with a particular emphasis on reducing the level of frustration of the respondents (Rashid & Amirah, 2017; Rashid, Amirah, & Yusnita, 2019). Literature indicates that a five-point scale is easily understood by respondents and allows them to respond to their views in a better way (Cox & Isham, 1980). Nonetheless, few researchers favor a seven-type Likert scale analysis. Symonds, Oxon, and Lond (1924) were the first to suggest that seven-type Likert scales are reliable and optimized. Miller (1956) expressed that the human mind has an absolute judgment that can distinguish objects up to seven categories, which may be useless beyond seven. According to Thomas and Lewis (1993), the seven-point scales showed better correlations with the results of the t-test and tended to be more suitable to the online survey (Finstad, 2010). Literature indicates that the Likert item data is substantially less reliable when the scale exceeds seven or drops five (Johns, 2010). Authors such as Hair, Black, Babin, Anderson, and Tatham (2010) have claimed that if the study focuses on individual behavior, five to seven-point Likert may be chosen to measure items. However, the five-point Likert scale tends to be less justified, whereas a seven-point scale is more likely supported (Hair, 2010; Saunders, 2011; Tashakkori & Creswell, 2007).

11. Conclusion

This paper offered a quick review of the research design and methodology, especially the quantitative viewpoint, to guide new researchers. Later, the study discussed different beliefs of researchers on research paradigms, research methods with various supporting arguments. For quantitative studies, the level of theory is the most critical factor, so that in this regard, the researcher has highlighted deductive and inductive approaches. Sampling is vital and discussed with primary data sources and suggested common heuristics for determining the sample size. Besides, views of various scholars on the collection of sample sizes have been cited. Lastly, the measurement scale and the method of developing items have also been conferred, which will help obtain an accurate image of quantitative studies.

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