

Quantitative and Qualitative Research in Business & Technology: Justifying a Suitable Research Methodology

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ABSTRACT

The right choice of a suitable research methodology is a crucial decision to perform effective scientific research and is mainly based on linking research objectives to the characteristics of the available research methodologies. Based on the notion that researchers in the fields of Economics, Business and Technology have to choose among multiple methods and techniques the selection of an appropriate research approach that might support cross-disciplinary research is one of the most difficult decisions for a researcher. For that reason, the aim of this paper is to provide issues related to: (a) Quantitative Research, (b) Qualitative Research and (c) Strategic Management of Digital Systems in order to investigate a suitable research methodology for identifying and analyzing key strategic management factors and phases. The publication of this paper has been partly supported by the University of Piraeus Research Center.

Keywords: Quantitative Research, Qualitative Research, Strategic Management, Digital Systems.

1. INTRODUCTION

Digital systems have been characterized as social systems where technology is only one aspect of them (Land, 1992). The study of Business and Technology is a multidisciplinary research object and as the literature review shows, there is a lack of a single global research approach that includes all the necessary areas of knowledge required for an efficient study (Galliers, 1992; Walsham, 1995). Strategic Management of Digital Systems is based on the understanding of various variables and key strategic factors related to: (a) business, (b) technology, (c) people, (d) enterprises, (e) economy, (f) law and (g) politics. Research in Business and Technology is characterized by methodological pluralism and the assortment of an appropriate research methodology is a crucial topic that attracts researchers' attention (Galliers, 1992; Miles & Huberman, 1994; Yin, 2011). Therefore, in research issues that combine Economics, Business and Information and Communication Technology (ICT) aspects, researchers has to choose among a variety of research methods, approaches and techniques to develop an appropriate research framework.

Research encompasses creative work undertaken on a systematic basis in order to increase knowledge and to use this knowledge to establish or confirm facts, solve problems, develop new theories and provide innovative solutions. There are two key categories of research design: (a) qualitative research and (b) quantitative research. Researchers choose quantitative or/and qualitative research methods according to the research aim, the objectives, the nature of the topic and the research questions, to identify, collect and analyze information to increase our understanding of an issue. The research process usually consists of research stages such as: define research questions, collect data, data processing, answer the research questions and present the findings (Goertz & Mahoney, 2012).

In the following sections of this paper the quantitative approach is presented and analyzed, the qualitative approach is described and analyzed, the differences and similarities between the two research approaches are identified and described and the choice of a suitable research methodology to test a strategic management framework for Digital Systems is justified based on the purpose and the specific objectives of the research.

2. QUANTITATIVE RESEARCH

Quantitative research usually involves systematic and empirical investigation of phenomena through statistics and mathematics and the processing of numerical data. The process of estimating numbers in quantitative research provides the fundamental link between empirical observation and mathematical expression of quantitative relations. In quantitative research data is typically selected and analyzed in a numerical form (Singh, 2006; Goertz & Mahoney, 2012).

Statistics, used in quantitative research, are an important area of mathematics and is widely used when: (a) there is a need to analyze and process large volumes of quantitative data to verify hypotheses and to test a theory, (b) there is uncertainty related to theories under consideration, (c) research might be effectively carried out with questionnaires containing simple questions and short answers and (d) the data obtained can be quantified and compared. In quantitative research, data processing is typically performed using distinctive statistical software (Martin & Bridgmon, 2012; Singh, 2006).

Certain advantages of the quantitative research approach mentioned in the literature are: (a) the result is numerical (quantitative) and therefore research might not be influenced by personal feelings or opinions in considering and representing research and facts, (b) the quantitative approach simplifies the processing of a large amount of data, (c) quantitative research approaches allow easier comparison of data and (d) quantitative research enables the development of quantitative valuation indicators (Martin & Bridgmon, 2012; Black, 1999; Balnaves & Caputi, 2001).

Basic characteristics of quantitative research approaches related to specific research objectives are among others: (a) the association of research with experiments, (b) the investigation of phenomena; (c) the use of advanced tools of statistics, (d) the use of questionnaires (usually with closed questions), (e) the quantification of relations and

features and (f) the collection, procession and presentation of quantitative data (Goertz & Mahoney, 2012; Newman, 1998; Singh, 2006).

The key features of quantitative research approaches are presented in Table 1 for a better understanding.

Table 1: Key Features of Quantitative Research Approaches

Quantitative Research	Brief Description	Literature
<i>EXAMINES</i>	Phenomena: A fact or situation that is observed to exist or happen, particularly when the cause or explanation is in question.	Singh, (2006); Goertz & Mahoney, (2012); Dawson, (2002); Kothari, (1985); Kumar, (2005).
<i>INTERPRETATION</i>	The quantitative research approach usually refers to the systematic investigation of phenomena through statistical and mathematical analysis and the processing and analysis of numerical data.	Bhattacharjee, (2012); Kumar, (2005).
<i>USUALLY SELECTED WHEN:</i>	<ul style="list-style-type: none"> ➤ It is necessary to analyze and process a large amount of quantitative data to verify hypotheses and / or test the theory. ➤ There is no uncertainty about the conceptions under consideration. ➤ The research can be carried out with questionnaires that include simple questions and short answers that can easily be quantified and compared. 	Dawson, (2002); Kothari, (1985); Kumar, (2005); Bhattacharjee, (2012); Singh, (2006); Goertz & Mahoney, (2012).
<i>GENERAL CONTEXT</i>	<ul style="list-style-type: none"> ➤ Correlation with experiments ➤ Testing of hypotheses related to phenomena. ➤ Use of advanced statistical tools ➤ Using questionnaires 	Martin & Bridgmon, (2012); Black, (1999); Balnaves & Caputi, (2001).
<i>QUESTION FORM</i>	Closed Questions	Balnaves & Caputi, (2001); Singh, (2006).
<i>DATA FORMAT</i>	Numeric data (quantified) usually obtained by questionnaires.	Miles & Huberman, (1994); Goertz & Mahoney, (2012).

Quantitative Research	Brief Description	Literature
<i>ADVANTAGES</i>	<ul style="list-style-type: none"> ➤ The result is numerical (quantitative) and is therefore often considered objectively (fact-based, measurable and observable). ➤ The quantitative research approach facilitates the processing and analysis of large volumes of data. ➤ Quantitative data makes it easier to highlight changes and differences. ➤ In quantitative research it is easier to compare numerical data. ➤ The quantitative approach facilitates the development of quantitative valuation indicators. 	<p style="text-align: center;">Martin & Bridgmon, (2012); Black, (1999); Balnaves & Caputi, (2001); Goertz & Mahoney, (2012); Newman, (1998); Black, (1999); Singh, (2006.)</p>

In the next Section of this paper (Section 3) the qualitative research approach is described and analyzed.

3. QUALITATIVE RESEARCH

Qualitative research is a very broad term that embraces research methodologies that deal with phenomena by analyzing experiences, behaviors and relations without the use of statistics and mathematics and the processing of numerical data (Merriam, 2009; Hennink et al., 2010). The qualitative approach usually gives answers to research questions such as: (a) what, (b) how, (c) when and (d) where and is described as a word-based research approach (Miles & Huberman, 1994). Qualitative research, among others, could be defined as a sequence of interpretive techniques that try to describe, decode and translate concepts and phenomena rather than to record the frequency of certain phenomena in society (Maanen, 1983).

Denzin & Lincoln, (1994) report that quality research is a naturalistic approach and a complex and multiple method of focusing. According to Benbasat et al., (1987), qualitative research might provide benefits such as: (a) supporting the researcher to understand the nature and complexity of the phenomenon being considered, (b) enabling research in relative new areas of research and (c) supporting the investigation of a phenomenon in its natural environment. The supporters of qualitative research claim that the quality of recording, comprehension and analysis of a phenomenon is drastically reduced when the texts are quantified (Kaplan & Maxwell, 1994).

According to Lincoln & Guba, (1985), qualitative research approaches are more natural, as the researcher is challenged to interpret the data and to draw the final conclusion on the basis of his observation. A researcher, who follows a qualitative research approach observes, interviews, summaries, describes, analyses and interprets phenomena in their real dimension. A basic advantage of qualitative research is that it supports in depth research (Goertz & Mahoney, 2012; Miles & Huberman, 1994). Even though, a possible subjectivity of the researcher should be avoided since qualitative

research might be influenced by the attitude, culture and ethos of a researcher (Eisner, 1991).

The key components of qualitative research are presented in Table 2.

Table 2: Key Features of Qualitative Research Approaches

Qualitative Research	Brief Description	Literature
<i>EXAMINES</i>	Phenomena	Singh, (2006); Goertz & Mahoney, (2012); Dawson, (2002); Kumar, (2005).
<i>INTERPRETATION</i>	Qualitative research includes a sequence of interpretative techniques that seek to describe, decode and translate concepts and / or phenomena instead of capturing the frequency of certain phenomena in society.	Maanen, (1983); Miles & Huberman, (1994); Merriam, (2009); Hennink <i>et al.</i> , (2010).
<i>USUALLY SELECTED WHEN:</i>	<ul style="list-style-type: none"> ➤ An interpretation is required ➤ Research is needed in relative new research areas. ➤ Answers are required for research questions related to "what", "how," "when," and "where". ➤ There is uncertainty about the conceptions under consideration. 	Merriam, (2009); Hennink <i>et al.</i> , (2010).
<i>GENERAL CONTEXT</i>	<ul style="list-style-type: none"> ➤ Related to observation ➤ Uses flexible questionnaires ➤ Investigates phenomena ➤ Uses methods such as interviews for in-depth research. 	Miles & Huberman, (1994); Merriam, (2009); Hennink <i>et al.</i> , (2010); Kaplan & Maxwell, (1994).
<i>QUESTION FORM</i>	<ul style="list-style-type: none"> ➤ Open Questions 	Goertz & Mahoney, (2012); Kumar, (2005).
<i>DATA FORMAT</i>	<ul style="list-style-type: none"> ➤ Usually text or spoken words that changes into text. 	Miles & Huberman, (1994); Newman, (1998).
<i>ADVANTAGES</i>	<ul style="list-style-type: none"> ➤ Allows to understand the nature and complexity of the phenomenon under consideration. ➤ Facilitates research in new areas ➤ Supports the examination of a phenomenon in its natural environment. ➤ Supports in depth research 	Denzin & Lincoln, (1994); Lincoln & Guba, (1985); Benbasat <i>et al.</i> , (1987).

Section 4 of this paper summarizes the findings from the literature review related to: (a) quantitative and (b) qualitative research to better understand the similarities and differences of the two approaches.

4. SIMILARITIES AND DIFFERENCES OF QUANTITATIVE AND QUALITATIVE RESEARCH APPROACHES

The review of the literature suggests that both quantitative research approaches and qualitative research approaches explore phenomena (Goertz & Mahoney, 2012). Though, there are significant differences between the two research approaches related to the: (a) objectives, (b) types of questions, (c) methods of data collection, (d) format of the data and (e) flexibility of research (Newman, 1998). The main difference between the two approaches is that quantitative research usually refers to systematic investigation of phenomena through statistics and mathematics while qualitative research examines phenomena by analyzing experiences, behaviors and interactions without the help of statistics and mathematics (Merriam, 2009; Hennink et al., 2010; Singh, 2006).

In addition, qualitative research is more flexible than quantitative research as the qualitative approach offers flexibility to the researcher (the researcher determines in detail the development of the research approach) and flexibility to the participants (face to face problem solving in the interview, open questions to provide information in detail) while quantitative research is usually more inflexible since it is implemented with questionnaires that include specific, standardized and closed questions (Goertz & Mahoney, 2012; Miles & Huberman, 1994).

For a better overview, comparison and understanding of the two research approaches (quantitative and qualitative research), their key features are presented, matched and compared in Table 3.

Table 3: Similarities and Differences of Quantitative and Qualitative Research Approaches

Key Features	Qualitative Research	Quantitative Research
<i>EXAMINES</i>	Phenomena	Phenomena
<i>INTERPRETATION</i>	Qualitative research includes a sequence of interpretative techniques that seek to describe, decode and translate concepts and / or phenomena instead of capturing the frequency of certain phenomena in society.	The quantitative research approach usually refers to the systematic empirical investigation of phenomena through statistical and mathematical analysis and the processing and analysis of numerical data.

Key Features	Qualitative Research	Quantitative Research
<i>USUALLY SELECTED WHEN:</i>	<ul style="list-style-type: none"> ➤ An interpretation is required ➤ Research is needed in relative new research areas. ➤ Answers are required for research questions related to "what", "how," "when," and "where". ➤ There is uncertainty about the conceptions under consideration. 	<ul style="list-style-type: none"> ➤ There is a need to analyze and process a large amount of quantitative data to verify hypotheses and / or test the theory. ➤ There is no uncertainty about the conceptions under consideration. ➤ The research can be carried out with questionnaires that include simple questions and short answers that can easily be quantified and compared.
<i>GENERAL CONTEXT</i>	<ul style="list-style-type: none"> ➤ Related to observation ➤ Uses flexible questionnaires ➤ Investigates phenomena ➤ Uses methods such as interviews for in-depth research. 	<ul style="list-style-type: none"> ➤ Correlation with experiments ➤ Testing of hypotheses related to phenomena. ➤ Use of advanced statistical tools ➤ Using questionnaires
<i>QUESTION FORM</i>	Open Questions	Closed Questions
<i>DATA FORMAT</i>	Usually text or spoken words that chances into text.	Numeric data (quantified) usually obtained by questionnaires.
<i>ADVANTAGES</i>	<ul style="list-style-type: none"> ➤ Allows to understand the nature and complexity of the phenomenon under consideration. ➤ Facilitates research in new areas. ➤ Supports the examination of a phenomenon in its natural environment. ➤ Supports in depth research 	<ul style="list-style-type: none"> ➤ The result is numerical (quantitative) and is therefore often considered objectively (fact-based, measurable and observable). ➤ The quantitative research approach facilitates the processing and analysis of large volumes of data. ➤ Quantitative data makes it easier to highlight changes and differences. ➤ In quantitative research it is easier to compare numerical data. ➤ The quantitative research approach facilitates the development of quantitative valuation indicators.

5. JUSTIFYING A SUITABLE RESEARCH APPROACH FOR BUSINESS & TECHNOLOGY

To investigate key factors and phases across disciplines and in research areas such as: (a) Economics, (b) Business, (c) Strategic Management and (d) Technology, mixed-methods of qualitative and quantitative approaches might be used. For instance, to identify, understand and analyze key strategic management factors and phases in a relative new research area that combine elements from different research areas, a qualitative research approach could be used. Then, to express the importance of each strategic factor and to prioritize key strategic factors, a quantitative research approach might be useful. In some research issues a combination of words (qualitative research) and numbers (quantitative research) are needed to investigate effectively a research subject (Miles & Huberman, 1994).

As business strategy remains an important research area (Iamratanakul, 2017) the study of key strategic factors and stages influencing the adoption of ICT in multinational organizations requires an in-depth understanding of different fields such as: (a) Economy, (b) Business, (c) Technology, (d) Communication, (e) Sociology and (d) Politics. For that reason, qualitative research is recognized as one of the appropriate approaches. A researcher who follows a qualitative research approach observes and collects data, interviews with people, keeps notes and describes and interprets phenomena in their true dimension. One of the main advantages of a qualitative research approach is the opportunity to deepen research (Goertz & Mahoney, 2012; Miles & Huberman, 1994). Since the study of strategic management in digital systems related to innovative pay-tv services through multiple digital platforms takes place for the first time and the complexity of this issue requires an in-depth understanding of different fields, it is estimated that a qualitative research approach that favors deepening is an appropriate approach for this study.

Literature review indicates that qualitative research significantly facilitates research in new areas (Themistocleous, Basias & Morabito, 2015; Benbasat et al, 1987) and the synthesis and testing of a new methodological strategic management framework for innovative pay-tv solutions via multiple digital platforms is placed into this classification.

In addition, since: (a) there is uncertainty about the concepts, factors and phases under consideration, (b) the interpretation of factors and phases is required, (c) there is a need to understand the nature and complexity of the phenomenon under consideration, and (d) there is a need to understand the interaction of key factors and phases, qualitative research might be a suitable research approach to meet the objectives of a study related to Business, Strategic Management and Technology and to answer research questions such as: “Which strategic key factors are crucial for the decision making process in innovative pay-tv?” and “What are the dimensions and stages of innovative pay-tv?”.

Qualitative research approaches are often used to analyze and evaluate: (a) technology and (b) business issues (Baskerville et al., 2010) as an in-depth study in their natural environment is required for deeper understanding. This is in line with the obligation to investigate a little-known research area with complex combinations such as the study of strategic management factors and phases related to innovative pay-tv solutions via multiple digital platforms.

The choice of qualitative research is based on: (a) the complexity of the methodological framework, (b) the need to test the methodological framework based on qualitative characteristics in a real environment and (c) the need to explore parameters and correlations. In addition, a quantitative approach might be used complementary to analyze and present the ranking of the most important key strategic factors.

This research will be conducted in an interpretive manner and a case study strategy will be employed. Such approaches are used to study Business and IT adoption in its natural setting and to learn from practice. Qualitative research is often linked to an interpretive approach. Some reservations exist against such views and for that reason other approaches are introduced and analyzed below.

Philosophical Stance in research might be considered as a division of philosophy that studies the philosophical principles, claims, and implications of science, is associated with epistemology and tries to analyze issues such as: (a) the principles of scientific statements and thoughts, (b) the meanings to measure the reliability of the information and (c) the impact of scientific methods. The choice of the appropriate philosophical stance is an important and complex research process due to the existence of many different philosophical stances (Walsham, 1995; Goertz & Mahoney, 2012).

Though, literature review indicates many philosophical approaches in research such as: (a) instinctualism, (b) constructivism, (c) empiricism and (d) pragmatism with significant variations in the number and content of the approaches, most researchers focus on three basic philosophical stances: (a) positivism, (b) the interpretive approach and (c) the critical approach (Orlikowski & Baroudi, 1991; Denzin & Lincoln, 1998).

The above philosophical approaches, which have been widely discussed and analyzed, have a significant impact on research strategy and the choice of an appropriate philosophical stance is critical for successful research. Gill & Johnson, (1991) suggests to adopt a philosophical stance that allows researchers to closely examine the participants for understanding their internal logic. A positive and critical approach might be used in the fields of Economics, Business and Technology, but there are limitations during the research. For Instance, the main limitation of a critical approach is that it is usually used in areas of intense research activity to criticize the weaknesses of the research results. Since this research takes place for the first time and there is no empirical data from previous surveys a critical approach might not be relevant.

As the proposed research: (a) is not based on measurable and quantitative data and therefore positivism is not considered to be the most appropriate philosophical stance and (b) is relative new and the critical approach seems to be inappropriate for the purpose of this research an interpretive research approach is chosen to explore and understand the phenomenon through the active participation of the researcher. An interpretive research approach might be helpful as the study of strategic management of ICT adoption in multinational organizations is related to: (a) technologies, (b) people, (c) economy and (c) multinational organizations. For in-depth analysis of many different variables, it is estimated that a flexible interpretative approach is appropriate.

The interpretive approach attempts to interpret and understand: (a) life, (b) the world, and (c) the person through the understanding of written texts and / or spoken words. Researchers usually combines individual, psychological, social, historical and economic analysis to gain greater knowledge about the research field. Advocates of the

interpretative approach argue that truth can only be fully understood through interpreting (Kaplan & Maxwell, 1994; Merriam, 2009).

As Strategic Management of Digital Systems remains an important research area under investigation an interpretative qualitative research method seems to be an appropriate approach to investigate and analyze the current research area (Yin, 2011). The main focus in qualitative research is to understand, explain, explore, discover and clarify situations, feelings, perceptions, attitudes, values, beliefs and experiences. Key strategic factors that influence pay-tv through multiple digital platforms cannot be separated from its organizational, technical and cultural context and there is therefore a need for a qualitative research approach that allows us to understand the process of ICT adoption and the key strategic factors.

A case study strategy will be used to test the proposed strategic management framework as such an approach seems more appropriate for the digital systems sector. A case study offers a 'holistic' view of the processes involved, as well as a realization of the topic under research. Case studies facilitate multi-perspective analyses that lead to a holistic understanding of cultural systems of action, providing the insight that satisfies exploratory questions. Considerable work on ICT adoption takes the form of case studies to identify digital systems success (Baskerville et al., 2010). The need for rich empirical data indicates that the use of a case study approach is appropriate, since it allows examining in depth processes. An important aspect of a case study is the use of multiple methods to collect data that leads to obtain rich empirical data for this research.

The proposed strategic management framework that is build and published in a previous paper (Basias et al., 2016a) is planned to be tested in a multinational media organization. Various data collection methods such as interviews, documentation and observation will be used. An interview agenda will be developed to ensure desired coverage of the areas of enquiry and comparability of information across respondents. A predefined interview protocol will be used to collect the data required for this research.

Interviews will be conducted with the employees who played a key role in a recent innovative pay-tv project. In doing so, we will interview many professionals including: (a) the project manager, (b) the IT manager, (c) a manager from business and (d) the HR Director. Interviews will be lasted for around 40-60 minutes, they will be digitally recorded and transcripts will be prepared as soon as possible after each individual interview.

Telephone, Skype and e-mail communication will also be used to clarify and probe unclear issues. In addition to this, the data will be crosschecked several times to overcome the contradiction associated with data gathering across multiple sources. Interviews will be the main data source that we will use to collect data and to capture the verbatim. In most of the cases structured and/or semi-structured interviews will take place in the office of the interviewees. Structured interviews will be based on the interview agenda designed for this research. Using this agenda, the interviewees will reply to specific questions related to pay-tv through multiple digital platforms.

Semi-structured interviews will take place without the use of an interview agenda and will be conducted during breaks. These will involve a series of open-ended questions based on the topic areas we want to cover. The open-ended nature of the questions

supports them to define the topic under investigation. Moreover, it provides the opportunity for both interviewer and interviewee to discuss the topic in more detail.

Empirical data derived from the case will be triangulated and then analyzed to draw empirical conclusions. The purpose of triangulation in qualitative research is to increase the credibility and validity of the results. As mentioned before, a quantitative approach might be used complementary to analyze and present the ranking of the most important key strategic factors.

The strategic management framework is planned to be tested in an American commercial broadcast television network, using the research methodology described above. Due to confidentiality restrictions we are not allowed to disclose the real name of the organization at this stage of research.

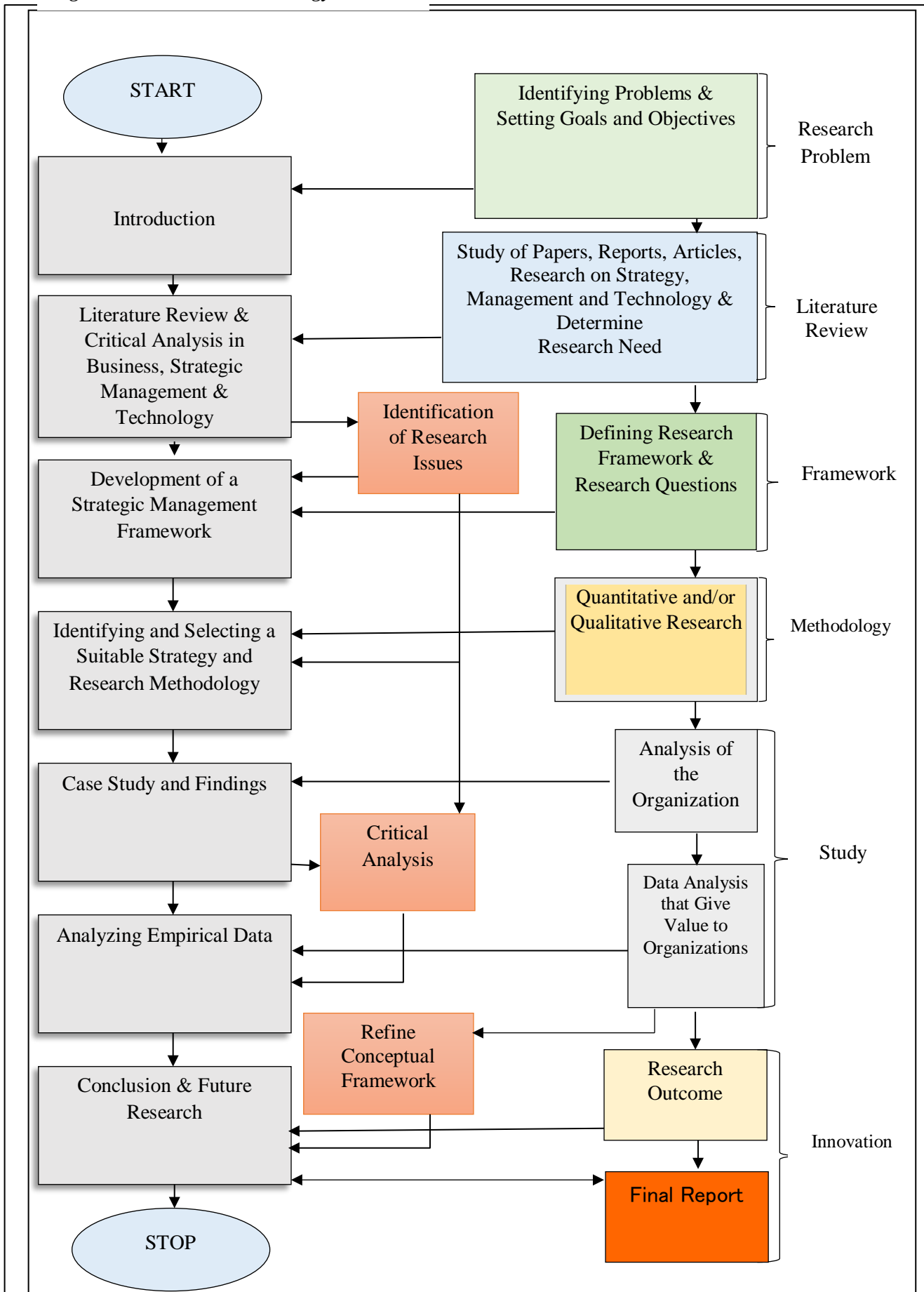
The researcher applied a set of criteria proposed by Miles and Huberman (1994) as a checklist, to identify the case organization. The main reasons for selecting the specific case organization are listed below. The organization: (a) is a big successful American commercial broadcast television network, (b) holds excellent reputation of the specialized services it provides, (c) recently implemented video on demand and pay-tv approaches via multiple digital platforms such as: pc, mobile phone, tablet, laptop, TV, (d) is one of the biggest player in the world based on total revenues, assets, and international coverage and (e) operates many entertainment channels in many international markets.

The case organization is an entertainment company that operates through four segments, mainly filmed entertainment, television stations, television broadcast networks and cable network programming. With more than 10,000 entrepreneurs, innovators and risk takers with a passion for film, television and sports the examined organization is a diverse group that spreads around the world by a shared set of values and goals.

The entertainment company has recently launched innovative video on demand services via multiple digital platforms. Video on demand is a system that allows users to select and watch video content of their choice on their TVs, computers, tablets, smart phones and lap tops whenever they want. For that reason, the selected case corporation is an interesting research object for the purpose of this research.

To better understand the whole selected research approach that is described in this Section the research methodology is graphically presented in Figure 1. The presented research methodology was successfully used in previous research related to Business and Technology in Banks (Basias et al., 2015a, 2015b, 2014, 2013, 2012) and is planned to be used for developing, examining and testing a strategic management framework related to pay-tv services through multiple digital platforms (Basias et al., 2016a, 2016b).

Figure 1: Research Methodology



6. CONCLUSION

New research ideas across disciplines such as: Economics, Business and Technology need a quantitative, qualitative, or mixed approach for effective research. Since there is a lack of a single global research approach that includes all the necessary areas of knowledge, researchers choose quantitative or/and qualitative research methods according to the research aim, the objectives, the nature of the topic and the research questions to identify, collect and analyze information. For that reason, this paper presents quantitative and qualitative research theory and provide a suitable research methodology to build, test and revise a methodological strategic management framework.

The presented research methodology was successfully used in previous interdisciplinary research related to Business and Technology in Banks and is planned to be used for developing, examining and testing of a strategic management framework related to pay-tv services through multiple digital platforms.

We believe that the proposed research methodology might be used by other researchers, particularly with cross-disciplinary interests in Economics, Business & Technology. In addition it will: (a) help researchers to understand better qualitative and quantitative research approaches, (b) help researchers to choose a suitable research method that is fundamental to obtaining accurate results and (c) enrich the academic literature.

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