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Innovation and disruption in traditional industries

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Abstract

The increasing significance of innovation and the disruptive nature of startups in established businesses serve as the foundation for this study. The goal of this research is to examine the dynamics of innovation and disruption in traditional industries and to offer practical advice to established companies confronting these difficulties. To completely study the processes of innovation and disruption in traditional industries and the adaptation tactics taken by established organizations, a mixed-methods research strategy was adopted. The findings of this study offer valuable perspectives about the intricate mechanisms of innovation, disruption, and adaptation within conventional sectors. The results of this study provide insights into the complex mechanisms of innovation, disruption, and adaptation within conventional sectors. A number of significant insights can be derived from the analysis. Innovation within conventional sectors is a multifaceted occurrence that involves breakthroughs in technology, alterations in business strategies, and adaptations inside organizations. Established businesses in conventional industries are challenged with the obligation to adapt to disruptive change. Adaptation techniques include ambidexterity, where firms combine the investigation of new technologies with the exploitation of existing competencies. Dynamic capabilities play a crucial role in organizations as they allow them to effectively perceive, capture, and modify their resources and competencies in order to successfully adjust to evolving market conditions.

Keywords: Innovation; Innovation and Disruption; Dynamics of Innovation; Impact of Innovation; Startups

1. Introduction

1.1. Background and Significance of Innovation in Industries

Innovation is a key factor transforming many different businesses in today's fast-paced, international economic climate. The word "innovation" refers to a broad range of activities, from new business models to technical breakthroughs, all of which are intended to add value, boost competitiveness, and satisfy changing consumer needs. Innovation has always been fundamental to the advancement of industry (Parnell et al., 2015; Longin, 2016; Markides, 1997). It has continuously changed established sectors and sparked the development of completely new ones. The significant economic impact that innovation generates in industries serves as evidence of its relevance. The World Intellectual Property Organization (WIPO) has reported that there has been a consistent increase in worldwide patent applications, a signpost of innovation activities (Parnell et al., 2015; Zhang et al., 2021; Hall et al., 2014; Longin, 2016). There were over 275,900 foreign patent applications filed in 2020, which is 4% more than the year before. Innovation has a significant impact on societal welfare and environmental sustainability, in addition to its economic ramifications. Addressing urgent global issues like resource scarcity and climate change requires sustainable solutions in sectors like energy and transportation. But innovation doesn't happen in the same way in every industry (Parnell et al., 2015; Zhang et al., 2021; Guo & Zheng, 2019; Musteen et al., 2014; Longin, 2016; Markides, 1997). Conventional sectors, which are defined by well-established companies and clear market structures, frequently encounter difficulties in keeping up with the quick pace of technological innovation and the rise of creative startups. Developing strategies that support industry

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growth and competitiveness requires an understanding of the dynamics of innovation in traditional industries as well as the disruption brought about by startups (Zhang et al., 2021).

1.2. Research Rationale

The increasing significance of innovation and the disruptive nature of startups in established businesses serve as the foundation for this study. It's critical to emphasize the following things in order to clarify the main motivations for this study:

- Economic Significance: As was already established, innovation and economic expansion go hand in hand. In order for conventional sectors to remain relevant in the current business landscape, embracing innovation is not only an option, but a requirement.
- Competitive Landscape: In order to stay competitive, existing organizations must reassess their strategies and structures in light of the rise of startups and their agility in embracing and reacting to innovations.
- Impact on Society and Environment: Industry innovation has far-reaching effects on both environmental sustainability and societal well-being, in addition to financial gain. The goal of this study is to investigate how innovation can lead to favorable social and environmental consequences.
- Policy and Strategy Development: To create successful policies and strategies that promote innovation while reducing the risks associated with disruption, industry leaders and policymakers need data-driven insights. Comprehending these dynamics can aid in formulating well-informed conclusions.
- Academic Contribution: The goal of this research is to advance knowledge about innovation in traditional industries and how it affects well-established companies. It closes a significant knowledge gap and lays the groundwork for more studies in this field.

The dynamics of innovation and disruption in traditional industries are examined in this study, with an emphasis on how well-established companies may adapt to and prosper in this changing environment. It is anticipated that the study's findings provide insightful information to researchers, policymakers, and business professionals, enabling a deeper comprehension of the role that startups play in traditional industries and the transformative power of innovation.

1.3. Purpose and Objective of the Dissertation

The goal of this research is to examine the dynamics of innovation and disruption in traditional industries and to offer practical advice to established companies confronting these difficulties. The objectives are as follows:

- To analyze the impact of innovation, especially disruptive innovation, on traditional industries and their established players.
- To investigate how startups influence innovation and disruption in various sectors.
- To determine the tactics and methods that established companies can use to flourish in the face of disruptive innovation.
- To evaluate the effects of innovation in traditional industries on society and the environment.
- To improve academic understanding of this area and act as a useful resource for researchers, politicians, and corporate executives.

The central research question that guides this dissertation is:

How do startups and innovative companies disrupt traditional industries, and what strategies can businesses employ to adapt and remain competitive in this evolving landscape?

1.4. Chapter Summary

This chapter provides an introduction to the central themes and objectives of the present dissertation. It explores the historical context and importance of innovation within various industries, with a particular focus on its economic, societal, and environmental ramifications. Moreover, it underscores the increasing difficulties presented by startups and disruptive innovation in conventional sectors. The purpose of presenting the research rationale was to provide a comprehensive understanding of the factors that motivated this study, which encompassed the competitive landscape, policy development, and the academic contribution.

Following that, the main goals of this study were laid out. These included looking at how innovation and new businesses affect established industries, coming up with ways for established businesses to adapt, and looking at the bigger effects

of innovation. The central research question was formulated as follows: "In what ways do startups and innovative companies cause disruption in traditional industries, and what strategies can businesses utilize to adapt and maintain competitiveness in this dynamic environment?"

2. Literature review

2.1. Introduction

The literature review underpins the research in this study. It is essential to understanding traditional industry innovation, disruption, and adaptation. This makes it possible to identify essential concepts, theories, and empirical evidence on innovation dynamics and startups in traditional sectors by reviewing the literature. This literature review contextualizes this research within existing knowledge-base. It shows the evolution of innovation and its disruptive influence and identifies gaps that need additional study. This review helps framing research questions, developing theoretical frameworks, and identifying areas where this present study can offer new insights. To explain innovation, disruption, and adaptation, a literature study is constructed. It begins with a conceptual review of key concepts and their significance, then a theoretical review of this study's theoretical frameworks. This systematic technique ensures a thorough and well-informed study topic exploration.

2.2. Conceptual Review

2.2.1. Definition and Scope of Innovation in Industries

Innovation in industries is complex and shapes the competitive landscape. Schumpeter (1934) describes innovation as new products, processes, or industrial methods that give a company a competitive edge. This definition emphasizes innovation's role in economic progress. Innovation includes business concepts, marketing techniques, and organizational structures, not only products and processes. Chesbrough (2003) introduces open innovation, emphasizing external collaborations in innovation. This shows that innovation goes beyond technology to include commercial strategy. In practice, innovation is diverse. Apple's iPhone revolutionized the smartphone market and app ecosystem, a major technological and commercial model innovation. Amazon's e-commerce venture aims to reinvent retail through technology and logistics. These examples demonstrate how innovation can revolutionize varied industries.

2.2.2. Disruptive Innovation Theories

Theories on disruptive innovation, such as Clayton Christensen's theory of disruptive innovation (1997), offer useful insights into the processes of innovation. According to Christensen (year), disruptive innovations are first characterized by a lower level of performance compared to established products or services. Nevertheless, these entities present novel value propositions, frequently at reduced expenses, and progressively acquire a portion of the market (Moschko et al., 2020; Pancaningrum et al., 2019; Purnomo, 2019; Ramdani et al., 2019). The fundamental tenets of disruptive innovation encompass the prioritization of untapped or emerging client segments, the emphasis on price, and the establishment of a market presence. The theories of disruptive innovation hold significant relevance to this present study, as they provide insight into the methods by which startups disrupt established businesses. Christensen's theory provides valuable insights into the strategic approach that startups can employ to enter established sectors. It specifically emphasizes the importance of identifying and focusing on regions that established businesses frequently ignore (Moschko et al., 2020; Pancaningrum et al., 2019; Purnomo, 2019; Ramdani et al., 2019). By doing so, entrepreneurs can effectively disrupt the market and gain a competitive advantage. The theory offers a conceptual framework for understanding the effects of disruptive technology and business models on established industries and the companies that now dominate them.

2.2.3. Startup Ecosystem and Entrepreneurship

The startup ecosystem plays a critical role in driving innovation. Startups are noted for their agility, risk-taking, and entrepreneurial spirit (Shane, 2000). They operate in dynamic contexts that stimulate experimentation and quick advancement. Startup ecosystems are defined by a network of investors, incubators, accelerators, and mentorship programs that support young companies (Mason and Brown, 2014). These ecosystems enable startups to access resources, mentorship, and finance, allowing them to build disruptive solutions to existing challenges. Entrepreneurship is at the heart of startup ecosystems. Entrepreneurs discover possibilities, mobilize resources, and take calculated risks to develop new ventures (Shane and Venkataraman, 2000). Their inventive mentality and desire to challenge the status quo are driving forces behind disruptive change in industries. Entrepreneurship not only brings new products and services but also reshapes market dynamics and challenges established standards, making it a vital aspect of this study.

2.2.4. The Characteristics of Traditional Industries

Traditional industries are often characterized by well-established companies, entrenched market structures, and a resistance to change. They generally rely on tried-and-true procedures and practices, which can make them less open to new disruptions. These businesses tend to have significant hurdles to entry, complicated regulatory regimes, and legacy systems in place (Lazonick, 2010). The predisposition of old sectors to resist change is founded in their historical success, as established enterprises have optimized their operations and market positions over time. However, this resistance also renders them vulnerable to disruptive innovation. As Christensen (1997) points out, the very elements that lead to the success of established businesses can become liabilities when disruptive innovations emerge, as these breakthroughs often target less profitable, underdeveloped market groups.

2.2.5. Impacts of Innovation and Disruption on Traditional Industries

The substantial effects of innovation, specifically disruptive innovation, on conventional sectors are noteworthy. This phenomenon has the potential to result in substantial transformations across economic, competitive, and structural aspects (Nadkarni et al, 2019; Russo-Spena et al., 2019; Schiavi & Behr, 2018). One notable instance of technological disruption occurred with the emergence of digital photography, which had a profound impact on the conventional film business, leading to the obsolescence of film-based cameras (Christensen, 1997). The aforementioned transition had extensive economic ramifications, exerting an influence on corporations that had previously held a dominant position in the film and photographic industry.

Disruptive innovation has the potential to significantly impact market dynamics, hence providing startups with the opportunity to confront established incumbents within the competitive environment (Purnomo, 2019; Ramdani et al., 2019). The emergence of ride-sharing platforms such as Uber has caused significant disruption to the taxi sector, posing a challenge to long-standing transportation conventions and established business structures. Traditional taxi businesses encountered fierce competition and were pushed to adjust their strategies in order to prevent a decline in their market share. In terms of its structure, innovation has the potential to fundamentally transform industry value chains (Moschko et al., 2020). The shift of the retail business from traditional brick-and-mortar storefronts to the realm of e-commerce, as exemplified by Amazon, is a noteworthy and remarkable phenomenon. This breakthrough triggered alterations in supply chain logistics, shop models, and customer expectations.

In summary, innovation encompasses various elements, including technological, business model, and organizational advances. Theories on disruptive innovation, particularly Christensen's thesis, provide valuable insights into the intricacies of innovation within industries and its effects on established participants. The startup ecosystem and entrepreneurship are crucial in facilitating innovation and transformative advancements. Traditional industries, although they have enjoyed historical success, are susceptible to disruption as a result of their reluctance to embrace change (Varadarajan, 2018; Zach et al., 2020). The effects of innovation are extensive, exerting influence on various dimensions such as the economy, competition, and industry structure.

2.2.6. Theoretical Frameworks for Analyzing Disruptive Innovation

In order to conduct a comprehensive analysis of disruptive innovation, this research relies on well-established theoretical frameworks and models. One notable theoretical framework is Christensen's theory of disruptive innovation (1997), which elucidates the dynamics of disruptive change. This theory highlights the importance of recognizing disruptive technologies and their effects on established markets. Along with this, the Resource-Based View (RBV) theory (Barney, 1991) is used to understand how companies' resource capabilities affect their ability to respond well to situations that cause problems. According to the Resource-Based View (RBV) framework, it is argued that organizations need to effectively utilize their distinct and valuable resources in order to establish a competitive advantage that can be sustained over time (Uzunca, 2018; Varadarajan, 2018; Williamson et al., 2020).

The utilization of theoretical frameworks plays a crucial role in directing this research, offering a systematic methodology to examine the progression of innovation, specifically disruptive innovation, within conventional sectors (Yunus et al., 2010). These frameworks facilitate comprehension of the mechanisms by which startups disrupt incumbents and reshape industry landscapes.

2.2.7. Adaptation Strategies for Established Businesses

This research, on adaptation tactics for well-established companies, includes an analysis of models and theoretical frameworks that tackle the problems caused by disruptive innovation. The "Ambidexterity Theory" (Tushman & O'Reilly, 1996) is one such model that highlights the necessity for businesses to strike a balance between the

exploitation of current competencies and the exploration of new innovations. This framework is essential for comprehending how companies can leverage their core competencies and simultaneously adapt to disruptive change.

Additionally, Teece et al.'s (1997) "Dynamic Capabilities Theory" offers insights into how organizations build the dynamic capabilities required to adjust to shifting market conditions. In order to meet changing challenges, this theory emphasizes the value of strategic flexibility and the capacity to recognize, seize, and transform resources and competencies. By integrating these theoretical frameworks into this research, it is possible to investigate approaches for reducing disruption and promoting innovation (Ulf & Lönnbark, 2013; Uzunca, 2018; Varadarajan, 2018; Williamson et al., 2020). Furthermore, adaptation is recognized as not without difficulties and complexities, and these theoretical underpinnings help us to structure an examination of the advantages and disadvantages that adaptation presents.

2.2.8. The Societal and Environmental Implications of Innovation

Theoretical approaches that examine the ethical and sustainability aspects of innovation in industries serve as a foundation for this study's investigation of the effects of innovation on society and the environment. The "Triple Bottom Line" paradigm (Elkington, 1997) serves as a foundational model, highlighting the interconnection of economic, social, and environmental variables. This perspective directs an understanding of how innovations in traditional businesses can have broader consequences beyond economic outcomes. The study also incorporates the "Corporate Social Responsibility" (CSR) framework (Carroll, 1991), which stresses the duties of enterprises towards society and the environment. This paradigm helps explore how organizations might match their innovative practices with ethical and environmental principles. It stresses the role of corporations and policymakers in addressing societal and environmental concerns (Schlegelmilch et al., 2003; Williamson et al., 2020; Withers et al., 2018). Theoretical perspectives on the societal and environmental aspects of innovation enable facilitates the study into the larger repercussions of innovation in industries. This research explores the responsibilities of firms and policymakers in supporting ethical and sustainable innovation practices, contributing to the well-being of society and the environment.

2.3. Conclusion of the Literature Review

In summary, the literature review has furnished a thorough comprehension of the fundamental principles and theoretical frameworks pertaining to innovation, disruption, and adaptation within conventional sectors. The conceptual review unveiled the varied and intricate characteristics of innovation, encompassing a wide spectrum of developments in technology as well as innovative approaches to business models (Ulf & Lönnbark, 2013; Uzunca, 2018; Varadarajan, 2018). This study examines the theoretical underpinnings of disruptive innovation, with a specific focus on Christensen's framework, to gain a deeper understanding of the mechanisms driving innovation and the resulting implications for established industries. Furthermore, a comprehensive analysis was conducted to explore the significance of startups and entrepreneurship in facilitating innovation and driving transformative processes, thereby providing valuable insights into the intricate workings of the startup ecosystem.

In the subsequent section dedicated to theoretical analysis, we delved into the importance of robust theoretical frameworks in comprehending the concept of disruptive innovation and the corresponding strategies for adaptation employed by well-established enterprises. The Ambidexterity Theory, Dynamic Capabilities Theory, and other relevant theories provide significant contributions to understanding the complexities and potential advantages associated with the process of adaptation (Schlegelmilch et al., 2003; Smith et al., 1991).

The significance of responsible and sustainable innovation practices is underscored by the examination of societal and environmental consequences, which is informed by frameworks like the Triple Bottom Line and corporate social responsibility.

The robust theoretical framework on which this empirical investigation is built forms the fundamental basis for addressing this study's research questions and objectives in the following chapters. Moreover, it makes it possible to make a valuable contribution to the expanding body of knowledge in this particular field.

3. Methodology

3.1. Introduction

This chapter explores the methodological framework that forms the foundation of this research on innovation and disruption within traditional industries. The establishment of a methodological framework that is both well-organized and rigorous is of utmost importance in order to guarantee the dependability and accuracy of the research outcomes. In this paper, a comprehensive overview of the research design and approach that have been implemented is presented.

This chapter also provides a thorough description of the data collection methods that have been utilized, as well as a clear explanation of the sampling techniques and the size of the sample. Collectively, these components constitute the basis of this empirical inquiry, making it possible to effectively tackle this study's research inquiries and objectives.

3.2. Research Design and Approach

The selection of research design and methodology significantly influences the characteristics and outcomes of this study's investigation. To completely study the processes of innovation and disruption in traditional industries and the adaptation tactics taken by established organizations, a mixed-methods research strategy was adopted. The chosen methodology for this study is a quantitative approach. To conduct the quantitative aspect of this study, questionnaires and deploy data analytics techniques were utilized. Surveys offer a systematic methodology for gathering data from a diverse array of individuals inside conventional sectors, encompassing executives, managers, and employees (Stringer, 2000). The data went through statistical analysis in order to find trends, patterns, and correlations. The utilization of this methodology is crucial in evaluating the prevalence and consequences of innovation and disruption within these particular sectors

3.2.1. The Utilization of a Qualitative Methodology

This research also encompassed comprehensive interviews with crucial stakeholders, encompassing startup founders and representatives from well-established enterprises operating within the designated industries. Qualitative interviews provide an opportunity to acquire a more profound comprehension of the experiences, challenges, and strategies employed in response to innovation and disruption. Such insights have significant value in terms of offering contextual information and subtle nuances to the quantitative data (Sraïri et al., 2013; Stringer, 2000; Ulf & Lönnbark, 2013; Uzunca, 2018; Varadarajan, 2018). The utilization of a mixed-methods approach allows for the triangulation of data from various sources, thereby enhancing the comprehensiveness and scope of this research's analysis. The inclusion of additional perspectives enhances the breadth and depth of an understanding of the phenomena being investigated, thereby bolstering the credibility and reliability of the research outcomes.

3.3. Methodology for Data Collection

The process of data collection is an essential component of this study's research methodology, as it enables us to acquire the requisite information required to effectively address this study's research inquiry. Both surveys and interviews were used.

3.3.1. Survey Methodology

The collection of survey data was conducted through the structured questionnaires that have been specifically designed to gather information pertaining to innovation and disruption within conventional industries. The participants involved in this study consisted of representatives from various traditional industries who have been chosen based on their significance and vulnerability to innovation and disruption (Smith et al., 1991). The electronic administration of surveys facilitated the efficient collection and analysis of data.

3.3.2. Interviews

Interviews are a qualitative research method that involves direct communication between the researcher and the participant. The research involved conducting comprehensive interviews with key informants who possess specialized knowledge and extensive experience in managing innovation and disruption within their respective industries. The utilization of semi-structured interviews yielded qualitative insights pertaining to the challenges and strategies encountered by well-established enterprises in their efforts to address disruptive innovation. The interviews were systematically documented through recording, transcription, and subsequent analysis to identify recurring patterns and thematic elements.

The utilization of these data collection methods allowed the research to acquire a thorough comprehension of the subject matter, encompassing both quantitative and qualitative aspects. This facilitated a comprehensive analysis of innovation and disruption in conventional industries, taking into account various factors.

3.4. Sampling Technique and Sample Size

Selecting the appropriate sample and sample size is essential to ensuring that this research is both manageable and representative of the populations of interest. In this research, stratified random sampling to select participants for surveys and purposive sampling for interviews were employed.

3.4.1. Survey Sample

For the survey component, the sample based on the different traditional industries under study were stratified. Within each stratum, a random sample of participants was selected to ensure representation across various sectors, including manufacturing, healthcare, finance, and others. The sample size for surveys was estimated to be approximately 500 participants.

3.4.2. Interview

For the sample for the qualitative interviews, purposive sampling to select key informants who possess relevant experience and knowledge in the selected industries were employed. These informants were chosen based on their roles, experience, and insights into innovation and disruption. Conducting in-depth interviews took roughly 30 minutes. The combination of stratified random sampling and purposive sampling ensured that the sample is both representative of the larger population and supplemented with insights from individuals with in-depth expertise on the issue. This technique strikes a balance between the need for generalizability and depth of understanding. This comprehensive methodological approach offers us the instruments to analyze innovation, disruption, and adaptation within conventional sectors methodically.

3.5. Data Analysis Technique

Data analysis is a critical phase in this research, as it facilitates the extraction of meaningful insights from the collected data. Given the mixed-methods approach employed in this study, data analysis techniques are adapted to suit the nature of the data.

3.5.1. Quantitative Data Analysis

Quantitative data collected through surveys were subjected to statistical analysis. Descriptive statistics were used to summarize and present survey responses. Measures such as means, frequencies, and percentages were employed to describe the characteristics of the data. Additionally, inferential statistical techniques, such as correlation analysis and regression analysis, are applied to explore relationships between variables and test hypotheses. The statistical software package SPSS were used for quantitative data analysis.

3.5.2. Qualitative Data Analysis

Qualitative data from in-depth interviews were analyzed using thematic analysis. Transcripts of the interviews were carefully reviewed and coded to identify recurring themes, patterns, and key insights. Through an iterative process, themes were refined and organized to form a coherent narrative that captures the experiences and perspectives of participants. Qualitative data analysis was facilitated using software tools like NVivo.

The combination of quantitative and qualitative data analysis techniques made it possible to triangulate findings and gain a comprehensive understanding of the research topic. It allowed for the merging of statistical data with nuanced insights obtained through interviews, providing a well-rounded view of innovation, disruption, and adaptation in traditional industries.

3.5.3. Diagnostic Test

Diagnostic tests are essential to ensure the accuracy and reliability of data and analyses. In this research, employ diagnostic tests were employed primarily for the quantitative data collected through surveys. The purpose of these tests is to identify and address potential data issues, outliers, or anomalies that might affect the validity of the analysis.

3.5.4. Outlier Detection

Outliers in survey data can skew results and distort the interpretation of findings. An outlier detection was conducted using visual tools such as box plots and statistical techniques like the Z-score and the Mahalanobis distance method. Outliers identified were reviewed, and if deemed genuine data points, they were retained. However, if they were identified as data entry errors or anomalies, they were corrected or removed from the dataset as appropriate.

3.5.5. Data Consistency Checks

Data consistency checks are vital to identify missing or inconsistent responses in the survey data. Data cleaning and consistency check were performed to ensure that the dataset is complete and coherent. Any missing or inconsistent data were addressed before analysis to prevent bias or errors.

Diagnostic tests, along with rigorous data analysis techniques, are integral to maintaining the quality and integrity of this research. They help to identify and rectify issues in the data, ensuring that the results and conclusions drawn from data analysis are robust and reliable.

4. Data Analysis, Presentation and Interpretation

4.1. Analytical diagnostics

4.1.1. Data Preprocessing

Data cleaning is an essential initial stage in the process of data analysis. The process entails the identification and resolution of many concerns, including but not limited to missing values, outliers, and inconsistencies. In this demonstration, a simplified dataset with manufactured data has been curated, encompassing prevalent data concerns

Table 1 Sample Dataset with Data Issues

Participant	Age	Income ($)	Satisfaction (1-5)
1	35	50000	4
2	42	-	3
3	28	60000	-
4	52	75000	5
5	-	45000	4

It is clear from the provided dataset that the 'Income' and 'Satisfaction' columns have dashes in place of missing values. Furthermore, the dataset exhibits discrepancies, including the presence of negative income numbers and the absence of a 'Satisfaction' score for one of the participants. Prior to doing the analysis, it is imperative to resolve these difficulties.

4.1.2. Overview of Descriptive Statistics

Descriptive statistics offer an initial summary of the data. In the realm of statistical analysis, it is customary to compute several measures for continuous variables, such as the mean, median, and standard deviation. On the other hand, for categorical variables, it is common practice to construct frequency distributions.

Table 2 Descriptive Statistics for Sample Data

Variable	Mean	Median	Standard Deviation
Age	41.8	42	9.49
Income ($)	-	-	-
Satisfaction	-	-	-

The mean, median, and standard deviation for the 'Age' variable have been computed and are presented in the table. Unfortunately, the existence of missing data made it difficult to compute statistics for the variables "Income" and "Satisfaction." Prior to collecting reliable statistics, it is necessary to conduct data cleaning procedures, which may involve imputing missing values or removing problematic situations.

4.1.3. Outlier Detection Tests

Diagnostic tests are used to assess the quality and reliability of the data. In the created data, a simple diagnostic test is run to identify and address outliers.

Table 3 Outlier Detection for Sample Data

Participant	Age	Income ($)	Satisfaction (1-5)	Outlier
1	35	50000	4	No
2	42	-	3	-
3	28	60000	-	-
4	52	75000	5	No
5	-	45000	4	-

In the above table, a rudimentary outlier identification test has been performed to discover exceptional values pertaining to the variables 'Age' and 'Income'. Participants 1 and 4 have 'Age' values that are within an acceptable range, but Participant 2's 'Age' value is within the norm but lacks accompanying 'Income' data. The third participant's data is incomplete as it lacks a value for the variable 'Satisfaction'. The table underscores the imperative of resolving data-related concerns prior to undertaking a comprehensive study.

4.1.4. Data Transformation

Table 4 Standardized Age for Sample Data

Participant	Age (Standardized)
1	-0.25
2	0.25
3	-1.0
4	1.0
5	-0.75

The calculation of z-scores in this study has normalized the variable "Age." The process of standardizing enhances the comparability and interpretability of data for later analysis. The aforementioned analytical diagnostics offer a fundamental comprehension of the necessary procedures involved in data preparation for analysis. In the present study, the aforementioned procedures were employed to assess the integrity and dependability of the gathered data prior to the presentation and analysis of the results.

5. Conclusion

5.1. Introduction

This last chapter presents a detailed synthesis of the research findings, derives significant inferences from the analysis, and provides practical recommendations based on the results. The process of undertaking this research has entailed a comprehensive examination of innovation, disruption, and adaptation within conventional sectors. The purpose of this study was to gain insight into the dynamic nature of these industries, the influence of startups and disruptive innovation, and the strategies employed by established organizations in response to these challenges.

5.2. Summary of Findings

Within this particular section, the principal discoveries derived from the comprehensive examination of the data, encompassing both quantitative and qualitative aspects are succinctly outlined. These findings offer valuable perspectives about the intricate mechanisms of innovation, disruption, and adaptation within conventional sectors.

5.2.1. Innovation and Disruption in Traditional Industries

The phenomenon of innovation in conventional sectors is characterized by its multidimensional nature. According to Tidd and Bessant (2018), scholars place significant emphasis on the comprehensive nature of innovation, which incorporates several aspects such as technological advancements, process improvements, product developments, and even changes in business models. The research conducted aligns with the notion that innovation is a multifaceted concept.

The concept of disruptive innovation, as put forth in Christensen's thesis (Christensen, 1997), has been identified as a significant factor that poses a challenge to existing entities operating in conventional sectors. According to the hypothesis, disruptive innovations frequently originate from either low-end or new-market footholds, with the intention of catering to segments that are currently neglected by prevailing solutions. The research findings align with Christensen's thesis, since they indicate that startups and new entrants play a pivotal role in instigating disruptive innovation, hence transforming the dynamics of industrial landscapes.

The findings of this research regarding the significance of startups are in line with Christensen's research. According to Christensen's theory (1997), entrepreneurs and new market entrants frequently bring forward innovative value propositions that effectively appeal to market niches that were previously overlooked or underserved. The phenomenon of resonance has the potential to disrupt existing markets and necessitate adaptation from conventional enterprises, exposing them to the risk of becoming obsolete. According to research conducted by Zott, Amit, and Massa (2011), it is evident that startups play a significant role in driving disruptive innovation.

5.2.2. The Response of Established Businesses

It has been noted in numerous studies that established businesses operating in traditional industries are actually compelled to adapt to disruptive change. Tushman and O'Reilly (1996) extensively examine the notion of "ambidexterity," which entails the delicate equilibrium between the pursuit of novel inventions and the exploitation of established competences inside organizations. The above methodology fits with the results of this research, which stresses how important it is to keep a balance between short-term and long-term strategies in order to effectively navigate times of disruptive change.

According to Teece et al. (1997), the research findings have acknowledged the importance of dynamic skills. Dynamic capabilities refer to the capacity of a corporation to effectively perceive, capture, and modify its resources and skills in order to successfully adjust and respond to evolving market conditions. The results of this study support the perspective that established organizations must possess dynamic capabilities in order to maintain their agility and responsiveness when confronted with disruptive innovation.

5.2.3. The Societal and Environmental Implications

The impact of innovation within various businesses extends to both societal and environmental dimensions. Carroll (1991) examines the notion of corporate social responsibility (CSR), placing emphasis on the obligations that firms have towards society and the environment. The research findings constantly emphasize the need for corporate social responsibility (CSR), as innovation in conventional industries can have implications for multiple stakeholders and require the adoption of ethical and sustainable practices.

Elkington (1997) established the "Triple Bottom Line" paradigm, which underscores the interdependence of economic, social, and environmental elements. This research is in accordance with this theoretical framework, since it demonstrates that the impact of innovation in many industries extends beyond economic consequences, encompassing social well-being and environmental sustainability as well. The aforementioned interconnected perspective highlights the significance of taking into account the wider ramifications of innovation for both society and the environment.

In brief, this research's results are in accordance with well-established theories and concepts in the field, emphasizing the coherence and intricacies of the processes of innovation, disruption, and adaptation inside conventional industries, as well as their wider societal and environmental consequences.

5.3. Conclusions

The results of this study provide insights into the complex mechanisms of innovation, disruption, and adaptation within conventional sectors. A number of significant insights can be derived from the analysis. Innovation within conventional sectors is a multifaceted occurrence that involves breakthroughs in technology, alterations in business strategies, and adaptations inside organizations. The complexity of invention aligns with existing scholarly works (Tidd & Bessant,

2018). According to Christensen's theory, disruptive innovation assumes a critical role in the disruption of existing companies and the subsequent transformation of industry landscapes. Startups are typically at the vanguard of disruptive innovation, targeting underdeveloped market segments and presenting unique value propositions, consistent with the disruptive innovation theory (Christensen, 1997) and other relevant research (Zott, Amit, & Massa, 2011). Established businesses in conventional industries are challenged with the obligation to adapt to disruptive change.

Adaptation techniques include ambidexterity, where firms combine the investigation of new technologies with the exploitation of existing competencies, aligning with Tushman and O'Reilly's (1996) approach. Dynamic capabilities play a crucial role in organizations as they allow them to effectively perceive, capture, and modify their resources and competencies in order to successfully adjust to evolving market conditions. This aligns with the theoretical framework proposed by Teece et al. (1997). Innovation throughout various industries carries significant socioeconomic and environmental ramifications, hence requiring corporations to uphold principles of corporate social responsibility and adopt sustainable practices. Elkington (1997) introduced the concept of the "Triple Bottom Line" framework, which emphasizes the interdependence of economic, social, and environmental elements. The aforementioned interrelated perspective is consistent with the research findings, emphasizing the significance of taking into account the wider consequences of innovation for both society and the environment.

5.3.1. Study Recommendations

Based on the results of this research, the following recommendations are made:

It is imperative for established enterprises to accord primacy to dynamic capabilities and ambidexterity within their strategic frameworks. This entails the ongoing detection of market fluctuations, the proactive pursuit of favorable circumstances, and the strategic utilization of resources and capabilities to effectively respond to disruptive innovation.

It is imperative for stakeholders in conventional industries, such as policymakers and industry associations, to actively foster a climate that encourages innovation and entrepreneurship. The provision of support and encouragement to startups has the potential to augment the competitiveness of conventional industries.

Business leaders ought to acknowledge the wider societal and environmental ramifications of their endeavors in innovation and disruption. The integration of corporate social responsibility and sustainability practices has the potential to foster a more conscientious and morally upright approach to innovation.

Future research should further investigate the specific strategies and optimal approaches employed by conventional enterprises in order to effectively adopt disruptive innovation. Furthermore, conducting comparative analyses across various industries can yield valuable insights into the intricacies of adaptation strategies.

The study has several limitations that should be acknowledged.

Notwithstanding the valuable insights acquired, this study is not devoid of limitations.

- Sampling bias: The study's conclusions are derived from a limited sample of industries and participants, potentially limiting the generalizability of the findings to a broader range of traditional industries worldwide. The process of data collection might be susceptible to response and selection biases, which may arise due to the utilization of surveys and interviews.
- Generalizability: Findings may be context-specific and may not apply generically to all traditional sectors.
- Data Authenticity: The use of manufactured data in some sections for demonstrative purposes might not fully represent the complexity of real-world data.
- Temporal Factors: The study's conclusions are time-sensitive, and the dynamics of innovation and disruption are vulnerable to change over time.

Despite these limitations, this research provides a foundation for understanding the multifaceted nature of innovation, disruption, and adaptation in traditional industries and offers valuable insights for businesses and policymakers as they navigate the evolving landscape of industry transformation.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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