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Future research directions of information technology investment: a systematic literature review

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Abstract

Research aims: This study aims to conduct a systematic literature review on IT investment to answer the following research questions: 1) What are the current trends and future research directions in IT investment research? 2) What are the benefits and challenges of IT investments?

Design/Methodology/Approach: The authors collected 57 published articles from the Scopus database and analyzed them using a hybrid approach that integrates the principles of structured review and bibliometric analysis.

Research findings: Four current research trends have been observed in information technology investment: (1) IT investment, (2) sustainability development, (3) costs, and (4) profitability. The benefits of IT investment have become the primary driver of innovation, profitability, competitiveness, and performance within a business. IT investment has a negative effect in a stable environment, and companies with low levels of IT investment may be forced to choose between expanding revenue and reducing expenses.

Theoretical contribution/Originality: This study used a structured literature review and bibliometric analysis. The authors present a new method of reviewing literature that provides a more focused and comprehensive view of future research.

Practitioner/Policy implication: Three practical contributions are provided: (1) identifying trends and directions of IT investment research, (2) revealing the benefits and challenges of IT investment, and (3) integrating the principles of structured review and bibliometric analysis.

Research limitation/Implication: It only used data from the Scopus database, which may not encompass all relevant articles on the topic of IT investment. Additionally, the study only selected articles written in English, potentially overlooking articles written in other languages. There is also a potential subjectivity in the content analysis process and in naming each cluster.

Keywords: IT investment; Sustainability development; Cost, Profitability; Literature review

Introduction

Information technology (IT) investments account for a significant portion of capital expenditures for a number of organizations (Ren & Dewan, 2015), and firms continue to invest in IT to gain benefits such as quality enhancement, cost reduction, and enhanced customer value (Tavana et al., 2020). IT investment decisions are based on a thorough examination of each investment opportunity's potential benefits and risks. IT investment

is critical in addressing the root cause of poor security management (Li et al., 2023). Since IT investment has a significant impact on operational performance as well as company financing costs, senior management must consider the potential financial benefits of increasing IT capabilities (Kim et al., 2017). Despite the importance of IT investments in terms of monetary value as well as strategic implications, managers lack sufficient guidelines to determine the optimal level of IT investments. Managers frequently use the IT spending levels of competing firms as a reference point (Kobelsky et al., 2008). This, however, may not be the best way to allocate IT funds because different firms, even within the same industry, may use IT to develop different competencies. For example, one firm may use information technology to achieve cost leadership, whereas another firm may use information technology to differentiate its products from competitors (Behl et al., 2020). Therefore, taking industry benchmarks as a reference may result in suboptimal IT investments.

For that reason, this study provides three practical contributions. The first is identifying trends and directions of IT investment research. This study provides an overview of the development of IT investment research over the last decade, which is useful for novice researchers to understand the main issues in this field. This study also presents a map of future research directions that can be used as a reference for researchers who are interested in this topic. The second is revealing the benefits and challenges of IT investment. This study exhibits that IT investment has a positive impact on innovation, profitability, competitiveness, and firm performance. However, it also has challenges, such as security risk, alignment with organizational resources, and influence on the industry environment. This study provides insights for managers to make optimal IT investment decisions and avoid overinvestment or underinvestment. Third is integrating the principles of structured review and bibliometric analysis. This study used a hybrid approach combining the principles of structured review and bibliometric analysis to conduct a more focused and comprehensive literature review. This study revealed how to use VOSviewer software to analyze many published articles and describe the trends and citations of specific topics.

The following are some of the scientific advances made by this study. First, this study offers a comprehensive examination of the evolution of information technology investment research over the past decade, which is beneficial for new researchers in comprehending the primary research concerns in this field. The second section contains the data and the research design. The third section deals with the frequency distribution of articles. The fourth section discusses the current trends in information technology investment research. The fifth section focuses on future research directions in IT investment. The sixth section reviews the benefits and challenges of IT investments, and the final section is the conclusion.

Literature Review

Information technology investment, also known as IT investment, is defined as the acquisition of equipment and computer software that is used in production for more than

one year. It includes three components: information technology equipment (computer and related hardware), communications equipment, and software. This study discusses several issues related to IT investment. These encompass the challenge of over-investing in IT, which could lead to excessive IT investment and potential agency problems. There is also the issue of balancing IT investment with other organizational resources and the company's value creation focus. Another issue is that companies with low levels of IT investment may need to choose between revenue expansion and cost reduction. Furthermore, this study points out that increased competition within an industry is linked to greater IT productivity, lower IT profitability, and higher IT risk.

The debates surrounding IT investment often revolve around its impact on various aspects of a company. For instance, there is a debate on how much IT investment contributes to a company's innovation (Ravichandran, 2018; Karhade & Dong, 2021), performance (Ji et al., 2020), and profitability (Gupta et al., 2018). Some argue that while IT investment can increase a company's profitability and performance, it is not the sole factor responsible for improved company performance (Ahmad & Arshad, 2014; Ali et al., 2015; Dong et al., 2021). Others contend that IT investment is essential for reducing costs and increasing efficiency (Raguseo et al., 2021; Han et al., 2016). There is also a debate on the risk associated with IT investment, especially in a highly competitive industry (Zhang et al., 2021; Ren & Dewan, 2015). These discussions underscore the complexity of IT investment decisions and the need for companies to carefully consider a range of factors, including their industry environment, organizational resources, and strategic objectives, when making these decisions. It also highlights the importance of ongoing research in this field to help companies navigate the challenges and opportunities associated with IT investment. The value of IT investment is more likely to be seen in competitive industries and captured by trade partners or customers in the form of lower prices and higher quality.

On the other hand, losses from inappropriate IT investments made firms in highly competitive industries less motivated to invest in IT. There is evidence that a commodity manufacturer in a competitive industry decided not to follow its competitors' investment in state-of-the-art enterprise systems due to the uncertain return on such IT investment (Davenport et al., 2018). Previous empirical studies in IT investment have not explicitly considered the role of industrial competition and have yielded mixed results, with some suggesting no or negative association between IT investment and firms' profitability (Aral & Weill, 2007), while others suggest positive association (Mithas et al., 2016). Therefore, this study aims to conduct a systematic literature review on IT investment to answer the following research questions:

RQ1: *What are the current trends and future research directions in IT investment research?*

RQ2: *What are the benefits and challenges of IT investments?*

Research Method

The authors collected 57 published from 2014 to 2023 articles from the Scopus database and analyzed them using a hybrid approach integrating the principles of structured review and bibliometric analysis (Paul & Criado, 2020). A structured review is a review of scientific literature in which methods, theories, or constructs are presented in the form of tables or figures to help readers understand the valuable information contained in the reported data (Eck & Waltman, 2017). Because it is capable of reviewing vast amounts of research, guiding researchers to the most influential works, and mapping study areas with less subjective bias, bibliometric analysis is considered a lexical method for reviewing literature in accounting and auditing. Bibliometric analysis utilizes tools like VOSviewer to analyze many published articles to describe main trends and citations of specific topics (Eck & Waltman, 2017). Figure 1 illustrates the research methodology in three main stages: 1) Stage 1—defining the research questions and objectives; 2) Stage 2—formulating a research design by integrating the principles of structured study and bibliometric study; and 3) Stage 3—analyzing the results.

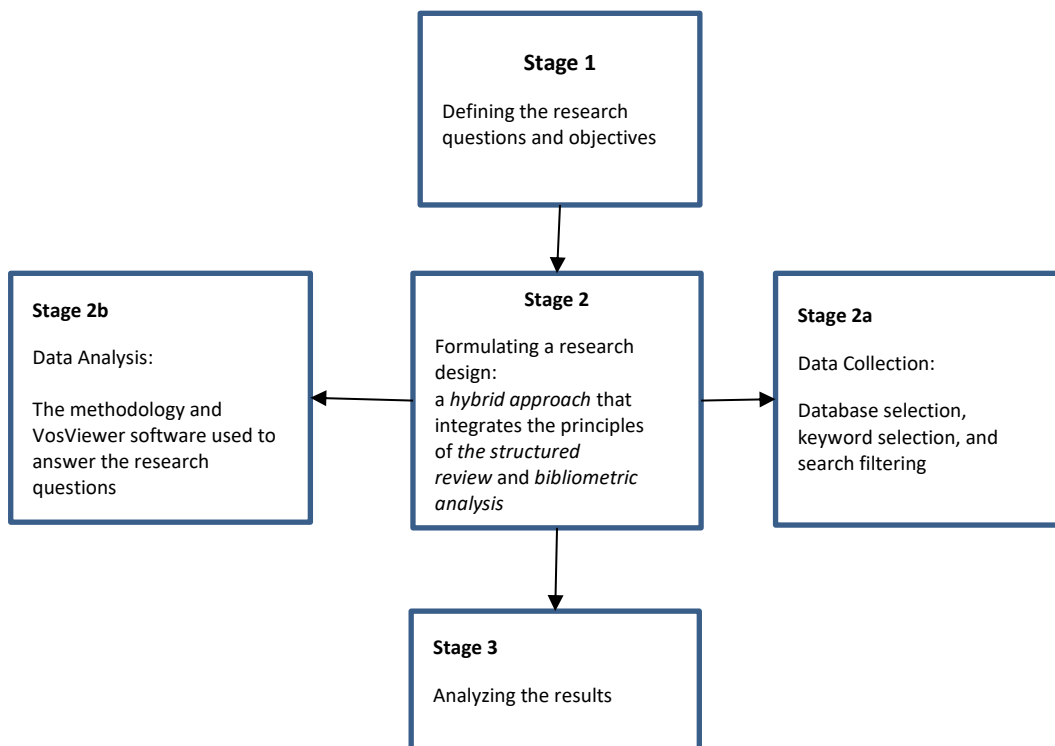


Figure 1 Research Methodology

Stage 2 is formulating a research design by integrating the principles of the structured review and bibliometric analysis. Stage 3 is analyzing the results to answer the research questions. Stage 2 began with selecting the Scopus database. The authors used the Scopus database because the authors' campus subscribed to it, which has a large selection of

high-quality articles. Following the authors' selection of the Scopus database, the next step was determining the following keywords: TITLE-ABS-KEY (information AND technology AND investment) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (EXACTKEYWORD, "Investments") OR LIMIT-TO (EXACTKEYWORD, "IT Investments") (EXACTKEYWORD, "IT Investment") OR LIMIT-TO (EXACTKEYWORD, "Information Technology Investment")) AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014)). Five types of filters were applied in searching for articles in the Scopus database: 1) research subject area; 2) article document type; 3) final publication stage; 4) journal sources; and 5) articles written in English. The authors employed those filters to ensure that all articles included in the analysis were relevant.

Result and Discussion

Frequency Distribution of Articles by Year and Publication Quality

Table 1 presents the frequency distribution of articles on the IT investment literature reviewed in this study by year and publication quality. Almost all articles (98.24%) were published in high-quality journals, indexed as Q1 by Scopus. The remaining 1.76% is indexed as Q3. In addition to Scopus, Table 1 includes journal rankings from the ABDC list of journals and SJR values obtained from SCImago to measure the impact factor of a journal reviewed in this study.

Table 1 Frequency Distribution of Articles by Year and Publication Quality

Publication Quality	2014-2015	2016-2017	Year 2018-2019	2020-2021	2022-2023	Total	Total (%)
Scopus							
Q1	9	16	5	16	10	56	98.24%
Q2	0	0	0	0	0	0	0%
Q3	0	0	0	0	1	1	1.76%
Q4	0	0	0	0	0	0	0%
ABDC List ^a							
A*	9	16	5	15	6	51	89.47%
A	0	0	0	1	4	4	7.01%
B	0	0	0	0	0	0	0%
C	0	0	0	0	1	1	1.76%
Not Covered	0	0	0	0	1	1	1.76%
SCImago Journal Rank (SJR) ^b							
≥ 3	2	12	5	8	5	32	56.14%
3 > x ≥ 2	5	3	0	7	3	18	31.58%
2 > x ≥ 1	2	1	0	1	1	5	8.77%
≤ 1	0	0	0	0	2	2	3.51%

^aABDC list journal is a list of journals compiled by the Australian Business Deans Council. This list can be used to check the quality of business journals. The ABDC list is based on four rating categories: A*, A, B and C. A* and A journals are the top-rated journals in business.

^bThe SCImago Journal Rank (SJR) indicator is a measure of the prestige of scholarly journals that accounts for both the number of citations received by a journal and the prestige of the journals where the citations come from.

The ABDC list publishes rating journals with ratings A*, A, B, and C, and the results (see Table 1) showed that 89.47% of articles discussing IT investments were published in leading and global journals with A* ratings. The remaining 7.01% were published in journals with an A rating, while 1.76% were published in journals with a C rating that is not on the ABDC journal list.

Seen from the impact factor of journals with an SJR value on SCImago, 56.14% of the journals used are included in the impact factor ≥ 3 groups, followed by an SJR with a value between 2 to 3, as much as 31.58%. Then, 8.77% of journals fell into the SJR impact factor group with a value between 1 and 2, while the remaining 3.51 had an impact factor ≤ 1 .

Frequency Distribution of Articles by Journals

Following Table 1, which shows the quality of journals that discuss IT investment studies, Table 2 displays the distribution of each journal when viewed from the intended journal. The findings revealed that management information systems journals were the authors' preferred venue for publishing articles on the topic of IT investment, with a total of 11 articles published. Furthermore, the information and management journal contributed nine articles, followed by the journal MIS Quarterly: Management Information System, which contributed eight articles. Meanwhile, when viewed by the year, 2018 and 2019 contributed the fewest articles, totaling 5 (8.77%).

Table 2 Frequency Distribution of Articles by Journals

Journal	Year					Total
	2014- 2015	2016- 2017	2018- 2019	2020- 2021	2022- 2023	
Journal of Management Information Systems	1	3	1	4	2	11
Information and Management	3	1	0	4	1	9
MIS Quarterly: Management Information Systems	1	2	1	2	2	8
Information Systems Research	0	4	1	1	1	7
Decision Support Systems	1	2	0	2	0	5
Journal of Information Systems	2	1	0	1	0	4
Journal of Strategic Information Systems	0	1	2	0	0	3
Others	1	2	0	2	5	10
Total	9	16	5	16	11	57
Total (%)	15.79%	28.07%	8.77%	28.07%	19.30%	100%

Frequency Distribution of Article by Research Topic

The literature review of these articles was grouped by VOSviewer (discussed further in this study). Then, each article was manually grouped into the topic mapping from VOSviewer. In general, the literature used (Table 3) discussed the topics of IT investment with a percentage of 36.84%. Then, 31.58% of the literature used reviewed sustainable development. Furthermore, 15.79% were for each topic of costs and profitability.

Table 3 Frequency Distribution of Articles by Research Topics

Topic	Year					Total	Total (%)
	2014-2015	2016-2017	2018-2019	2020-2021	2022-2023		
IT Investment	4	6	0	9	2	21	36.84%
Sustainability Development	2	5	4	2	5	18	31.58%
Cost	1	3	0	3	2	9	15.79%
Profitability	2	2	1	2	2	9	15.79%
Total	9	16	5	16	11	57	100%

Frequency Distribution of Articles by Research Setting

The United States is the most common country setting in IT investment studies, accounting for 40.35% (23 of 57 articles), as shown in Table 4. Even though the United States is the most common location for IT investment research, the trend continues to decline. For the most recent study, the country setting shifted to include India (5.26%), China (5.26%), countries in the European region (Denmark, Germany, and Spain, each with a percentage of 3.51%), and developing nations such as Indonesia (3.51%).

Table 4 Frequency Distribution of Articles by Country Setting

Country setting	Year					Total	Total (%)
	2014-2015	2016-2017	2018-2019	2020-2021	2022-2023		
United States	7	7	2	6	1	23	40.35%
International	0	0	0	1	3	4	7.02%
India	0	0	0	1	2	3	5.26%
China	0	1	1	0	1	3	5.26%
Denmark	0	0	0	0	2	2	3.51%
Germany	0	0	0	2	0	2	3.51%
North America	0	0	0	2	0	2	3.51%
Spain	0	1	0	1	0	2	3.51%
Indonesia	0	0	0	2	0	2	3.51%
Nil/not stated	2	4	2	1	1	10	17.54%
Other	0	3	0	0	1	4	7.02%
Total	9	16	5	16	11	57	100%

Furthermore, the use of international settings is becoming more popular. Differences between countries in IT investment studies are intriguing for future research. When considering the industrial settings used, the combination of various types of industries is widely used in research on IT investment, accounting for up to 40.35% of articles, followed

by the use of large firms to investigate the successful use of IT, making up to 14.04% of articles. Other industry settings were below 10%, such as manufacturing (7.02%), hospitals/health care/pharmaceuticals (7.02%), all except the public finance industry (3.51%) and the public sector (1.74%). Meanwhile, the industry that was not mentioned had a high rate of 26.32%. This is possible in survey and interview research methods to maintain the confidentiality of the primary respondents.

Table 5 Frequency Distribution of Articles by Industry Setting

Industry setting	Year					Total	Total (%)
	2014- 2015	2016- 2017	2018- 2019	2020- 2021	2022- 2023		
All firms	3	4	3	7	6	23	40.35%
Large firm	0	2	0	4	2	8	14.04%
Manufacturing	0	3	0	1	0	4	7.02%
Hospital/Healthcare/ Pharmaceutical	1	1	0	2	0	4	7.02%
All publicly listed firms except the financial industry	0	1	1	0	0	2	3.51%
Public Sector	1	0	0	0	0	1	1.74%
Nil/not stated	4	5	1	2	3	15	26.32%
Total	9	16	5	16	11	57	100%

Frequency Distribution of Articles by Research Method

The archival method was the most widely used research method (64.92%), followed by the survey method (17.54) and a combination of the two, which has recently increased quite significantly, accounting for 7.02% of articles (see Table 6). Other research methods, on the other hand, remain below 5%.

Table 6 Frequency Distribution of Articles by Research Methods

Research method	Year					Total	Total (%)
	2014- 2015	2016- 2017	2018- 2019	2020- 2021	2022- 2023		
Archival	6	9	3	12	7	37	64.92%
Survey	2	3	2	2	1	10	17.54%
Combination of Archival and Survey	0	0	0	2	2	4	7.02%
Interview	1	1	0	0	0	2	3.51%
Case/Field Study	0	2	0	0	0	2	3.51%
Nil/not stated	0	1	0	0	1	2	3.51%
Total	9	16	5	16	11	57	3.51%

Frequency distribution of articles by primary data analysis techniques

With 41 articles (71.94%), the data analysis was mostly regression/ANOVA/MANOVA. This was reasonable, given that the research methods used were still based on archives and surveys (see Table 7). The analysis technique that was frequently used was PLS/SEM/path analysis, which was used in seven articles (12.29%).

Table 7 Frequency Distribution of Articles by Primary Data Analysis Techniques

Primary data analysis techniques	2014-2015	2016-2017	2018-2019	2020-2021	2022-2023	Total	Total (%)
Regression/ANOVA/MANOVA	7	11	4	11	8	41	71.94%
PLS/SEM/path analysis	1	1	1	3	1	7	12.29%
Data development analysis	0	1	0	1	2	4	7.02%
Correlations	0	0	0	1	0	1	1.74%
Descriptive statistics	0	1	0	0	0	1	1.74%
Other	1	2	0	0	0	3	5.27%
Total	9	16	5	16	11	57	100%

The Current Trends of Information Technology Investment Research

To identify current trends in information technology investment research, the authors utilized VOSviewer software to perform Co-Occurrence analysis with keyword analysis units, which produced four clusters, as depicted in Figure 2.

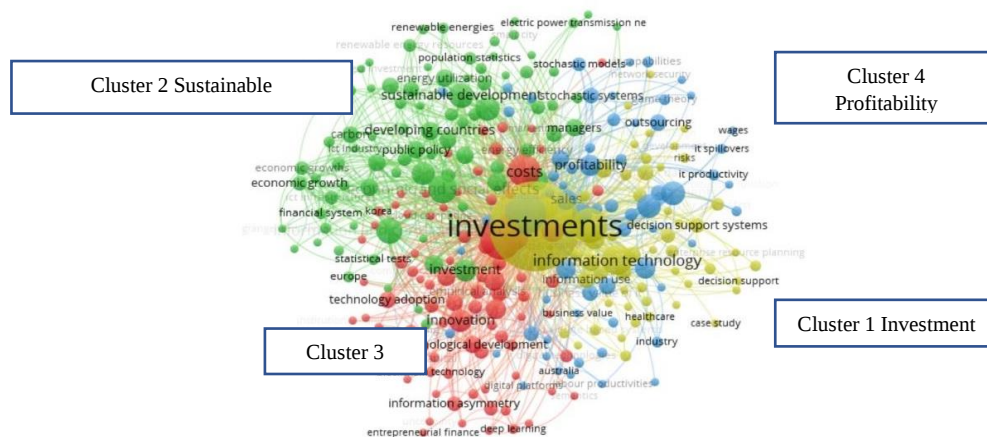


Figure 2 Cluster Network Visualization in VOSviewer

The content analysis performed by the researchers informed the naming of each of these clusters. The first cluster was titled “Investment” because the articles included in the first cluster addressed investment research. The second cluster was titled Sustainable Development, as the articles included in the second cluster were concerned with sustainable development. Because the articles in the third cluster addressed issues related to costs, the third cluster was dubbed the topic of “Costs.” The fourth cluster was titled

“Profitability” since it addressed company profitability. Compared to the other clusters, the first cluster contained the greatest number of article entries.

Cluster 1: Investment

IT investment is the primary driver of innovation, but the relationship between IT and innovation should serve as a warning signal to prevent managers from over-investing in IT (Karhade & Dong, 2021). There is a nonlinear relationship between IT investment and commercialized innovation performance (CIP) across a broad spectrum of industries, indicating that executives should not overinvest in IT. Knowledge of information technology is essential before a company decides to invest in information technology (Singh et al., 2015). Inadequate knowledge of information technology can lead to excessive information technology investment. Phenomena in the field exhibit that companies generally respond to performance deficiencies by increasing investment in information technology, but there are agency issues that cause excessive IT investment. The theory of behavioral agency explains the need for corporate governance that monitors and controls the tendency for excessive information technology investment (Dong et al., 2021).

IT business value creation can be understood as a positive feedback model in which IT investments over time build stocks of IT inputs, which then impact productivity, and productivity leads to future IT investments (Baker et al., 2017). Investors may require more time to recognize signals of increasing or decreasing value of information technology investments, where the impact of market reactions to IT investments is greater in the banking industry, small-sized companies, companies with a low competitive position, first-time IT adopters, and investment companies resource planning (Wijayana & Achjari, 2020). As digital technology advances, the likelihood of companies becoming victims of cybercrime increases. Therefore, companies should not only think reactively by increasing information technology investment in the security sector but also begin to cultivate awareness to overcome IT system problems that are the cause of data breaches (Li et al., 2023). However, investment in data security significantly reduces company risk, with the effect of systematic risk reduction being greater for non-big data analytics companies than for big data analytics companies.

Moreover, the business value of information technology investments (especially data security investments) is influenced by other information technology assets (Zhang et al., 2021). A longitudinal analysis of hospital data in the United States revealed that information technology security investments reduced security breaches in less digitized organizations but increased security breaches in highly digitized organizations (Li et al., 2021). Investing in technical network surveillance security systems (anti-virus and intrusion detection systems) reduced external security breaches, while implementing identity and access management security systems (biometric scanning and user authentication) reduced internal security breaches but increased external security breaches (Li et al., 2021).

Cluster 2: Sustainability Development

Companies should avoid the mistake that IT investments are the only ones responsible for better company performance (Peng et al., 2016). This is because information technology investments interact differently with other organizational resources depending on the focus of resources on value creation through innovation or value appropriation in the market, as well as industry turbulence (Havakhor et al., 2019). In a dynamic and complex environment, strategic IT alignment reflects capabilities that enhance the positive effect of information technology investment on company performance. However, in an unstable, simple, and generous environment, strategic IT alignment reflects rigidity that reduces the positive effect of information technology investment on company performance (Sabherwal et al., 2019). An increase in IT investment protects against negative external pressure, whereas a decrease in IT investment is associated with much greater negative pressure (Antons et al., 2021). Investment in information technology has also been shown to positively moderate the effects of open innovation on innovation performance by lowering the costs of identification, assimilation, and utilization (Gómez et al., 2017). Companies with superior information system capabilities and an aggressive information technology investment orientation create digital platforms that are more agile in the face of an unstable environment; in other words, organizational agility has a strong positive impact on company performance (Ravichandran, 2018).

Investment in information technology strengthens the organizational learning process from alliance experiences, which increases company competitiveness (Dong & Yang, 2015). Investments in information technology and skilled labor increase firm-added value through different channels, with general-purpose hardware primarily increasing efficiency alongside other input factors; in contrast, investment in application-oriented software and skilled labor generally works by raising the production frontier (Pedersen et al., 2022). Other studies have found that investing in information technology infrastructure can mature e-government even when no significant human resources are added (Das et al., 2017). Companies without experience, on the other hand, must exercise caution when deciding to invest in information technology infrastructure, as well as when outsourcing complex task execution to outsourced vendors who have previously failed (Mani & Barua, 2015). Another important factor to consider is the cultural dimension. Information technology reduces the negative impact of the cultural dimension related to procedural norms, formalities, and the structure of innovation while increasing the positive impact of the cultural dimension related to the pursuit of aggressive corporate goals on innovation (Saldanha et al., 2021).

Cluster 3: Cost

Information technology investments that affect product effectiveness have a greater impact on competitive advantage than information technology investments that affect process efficiency (Raguseo et al., 2021; Han et al., 2016). Hardware investment has a significant positive impact on efficiency, while the impact on production limits is deteriorating; conversely, software investment and skilled labor have a positive impact on production limits but not on efficiency (Pedersen et al., 2022). Nevertheless, when the

interaction effect is considered, the results reveal that the combination of investment in hardware and skilled labor complements efficiency (Pedersen et al., 2022). On the other hand, the impact of IT spillover on company efficiency is greater in industries that use information technology more intensively, in industries whose production is more dependent on suppliers or customers, and in industries that are more concentrated than their suppliers (Gong et al., 2022).

Low facility investment costs are crucial to the success of information technology services (Park et al., 2016). Information technology investment is positively associated with audit fees, the likelihood of an auditor issuing a going concern opinion, and the likelihood of a Type II auditor error in the auditing industry. Moreover, auditor tenure was found to moderate the relationship between IT investment and audit fees (Han et al., 2016)

Cluster 4: Profitability

The relationship between information technology (IT) investment and company profitability is very close. For companies that prioritize IT alignment, there is a positive relationship between IT investment and corporate income. Companies that focus on aligning IT changes or aligning IT delivery earn more than companies that focus on aligning IT investment plans at higher levels of IT investment; meanwhile, companies that focus on aligning IT investment plans outperform companies that focus on aligning IT delivery or aligning IT changes at lower levels of IT investment (Saldanha et al., 2020). Information technology (such as software investment, hardware investment, and total information technology investment) can improve company performance (Pan et al., 2015), but location and industry factors also affect the diversity of the impact of information technology investment. Companies operating in different industries display more diversity in terms of the impact of IT investment on IT performance and output when compared to companies located in different regions (Liu et al., 2022). Firms may have to choose between revenue growth and cost reduction at low levels of IT investment; nevertheless, at higher levels of IT investment, the dual emphasis in IT strategy or IT strategic ambidexterity is successful (Mithas et al., 2016).

While higher levels of industry competition are associated with higher IT productivity, lower IT profitability, and higher IT risk, higher levels of industry regulation are associated with lower IT returns in both productivity and profitability while lowering risk IT, resulting in a higher level of competitive advantage (Ren & Dewan, 2015). Market competition has a negative impact on firm profitability, which grows worse as R&D investment increases. However, as IT investment increases, the effect of competitive experience on firm profitability shifts from negative to positive, indicating that firms can combat the "dark side" of competitive experience through significant information from technology investments (Estrada & Dong, 2020). Currently, an increasing number of companies are investing in XBRL technology because it has been shown to significantly increase market liquidity and reduce information asymmetry (Liu et al., 2017). Information asymmetry can also be decreased by implementing government regulations (more information disclosure and stricter operating standards) to reduce the herding effect at the level of investment platforms (Jiang et al., 2018).

Future Research Directions in IT Investment

Opportunities for Future Research in Investment Research Stream

IT investment is a significant driver of innovation. Future research opportunities in the investment research stream include investigating the long-term impact of data privacy and security investments on the business value of big data analytics companies and non-big data analytics companies, as well as investigating the role of diverse types of IT in achieving competitive advantage and reducing costs associated with the company's horizontal and vertical boundaries. Then, to obtain a comprehensive explanation of corporate decisions related to IT investment allocation, researchers can also examine the limitations resulting from decision makers' bound rationality and issues resulting from decision makers' self-interested incentives. Researchers can also look into why investors need more time to notice signs of declining or increasing firm value as a result of IT investments, as well as the relationship between IT investments and intangible actions to further create intangible assets and a firm's competitive advantage.

Opportunities for Future Research in Sustainability Development Research Stream

Related to sustainable development, it is undeniable that IT investment will increase innovation, company performance, and the company's added value. There are several research opportunities, such as investigating customer relationship management (CRM) capabilities by comparing high-tech and low-tech companies in several countries and examining the impact of IT investment on risk measurement in the bond market. Future researchers may also investigate the relationship between product market competition and corporate venture capital as an enterprise IT innovation strategy for slow start-ups and examine the impact of blockchain IT investments on small-scale or start-up firms using indicators of R&D activity in patents. Furthermore, researchers can also investigate whether IT investments in hardware and software have substitutional or complementary effects in creating value for the firm.

Opportunities for Future Research in Cost Research Stream

Many believe that IT investments can be beneficial in reducing costs by increasing the efficiency and effectiveness of business processes. There are several opportunities for future research in the cost research stream, such as investigating the effect of IT spending and IT governance mechanisms on performance indicators in the public sector. Future researchers may also be able to detect input data to generate stock market price estimates in financial computing technology by applying the novel greedy heuristic optimized multi-instances quantitative (NGHOMQ).

Opportunities for Future Research in Profitability Research Stream

The study of the relationship between information technology (IT) investment and profitability in general indicates that IT investment can make a significant contribution to increasing profitability, increasing company efficiency, and decreasing information

asymmetry. Future research can take advantage of some of the opportunities presented by previous studies, such as investigating the types of government regulation that can reduce the herding effect, as well as whether a high level of industry regulation is associated with lower IT returns (IT productivity, IT profitability), and lower IT risk. Furthermore, future research should focus on the governance mechanisms required to achieve alignment during IT investment planning, IT delivery, and IT change. In addition, it is interesting to investigate how companies with low levels of IT investment choose between revenue expansion and cost reduction and how companies with higher levels of IT investment apply a dual emphasis in IT strategy (IT strategic ambidexterity).

The Benefits and Challenges of IT Investments

The Benefits of IT Investment

Previous research on the effect of IT investment on company performance found that IT investment and skilled workforce increase a company's added value, competitiveness, and performance in production-related matters (Pedersen et al., 2022; Antons et al., 2021; Tams et al., 2018; Dong & Yang, 2015). The findings of previous studies revealed that ICT was capable of improving organizational innovation and ensuring the future prosperity of its users (Saldanha et al., 2021; Das et al., 2017). Another study found that ICT can further strengthen the positive effects of aggressive goal pursuit on innovation (Jiang et al., 2018). In a turbulent environment, the interaction between IT and R&D has a positive effect on company performance (Gómez et al., 2017). Meanwhile, in a dynamic and complex environment, strategic IT alignment does reflect capabilities that increase the positive effects of IT investment on company performance (Sabherwal et al., 2019).

From another perspective, IT investment, especially data privacy and security investment, has proven to significantly reduce firms' systematic risk, which then creates business value (Zhang et al., 2021). Prior studies Liu et al. (2017) provide evidence that companies with high technology will reduce information asymmetry, which will benefit investors and creditors in obtaining information from companies. IT security investments reduce security breaches in companies with low digitization, but conversely, IT security investments can encourage increased security breaches in companies with very high digitization (Li et al., 2021).

IT investment also contributes significantly to increasing company profitability; the greater the investment made by a company in IT, the greater the income obtained (Saldanha et al., 2020; Ren & Dewan, 2015). A prior study provides evidence that when IT investment increases, the effect of competition experience on company profitability shifts from negative to positive, indicating that companies can fight the "dark side" of competition experience through substantial IT investment (Estrada & Dong, 2020). Previous research investigated how businesses can use IT for profitable productivity and discovered that understanding the impact of IT on company productivity allows policymakers to make better decisions about how much money to invest in IT (Pan et al., 2015). In terms of efficiency, for example, the use of production automation software reduces labor costs

and speeds up production time, resulting in increased productivity and efficiency, which increases company profitability.

Challenges of IT Investments

In today's information age, IT is essential because its positive impact on company outcomes has been well documented. Therefore, companies must invest in IT to gain and maintain a competitive edge. Increased competition within an industry is linked to greater IT productivity, lower IT profitability, and higher IT risk (Ren & Dewan, 2015). This aligns with the idea that competition leads to riskier IT investments, even though the returns are often reduced by competition. On the other hand, more regulated industries tend to have lower IT returns in terms of both productivity and profitability, as well as lower IT risk. Therefore, firms with low levels of IT investment may need to choose between revenue expansion and cost reduction, while firms with higher levels of IT investment succeeded in dual emphasis IT strategy (Liu et al., 2022; Mithas et al., 2016).

However, companies must recognize that IT investment is not solely responsible for improved company performance (Peng et al., 2016). High-level executives need to understand that investing in technology affects not only the operational efficiency of the company but also its financial expenses, along with all the resulting outcomes (Kim et al., 2017). IT investment made by the company as a reactive step toward declining performance creates agency problems that lead to excessive IT investment (Dong et al., 2021). For example, companies need to move beyond the reactive mindset of merely upgrading IT investment in security and start fostering both threat awareness and countermeasure awareness to address the fundamental IT system issues that cause data breaches (Li et al., 2023). It is important to note that the ability of management to handle both internal and external business processes fully mediates the effect of IT investment on company performance (Peng et al., 2016). Additionally, IT innovation, when connected to research and development (R&D), interacts differently with other organizational resources depending on the company's value creation focus (Havakhor et al., 2019; Dong et al., 2021).

In a stable environment, IT investment has a negative effect (Havakhor et al., 2019; Ravichandran, 2018; Kim et al., 2016). In line with that, it was discovered that strategic IT alignment reflects rigidity, which reduces the positive effect of IT investment on firm performance in a stable, simple, and generous environment (Sabherwal et al., 2019). From another perspective, family ownership can negatively impact IT investment (Kathuria et al., 2023). Family owners should be cautious of this potential shortcoming and make careful IT investments to support their objective of retaining control over their family-owned businesses. Future research could explore the phenomenon of platform-level herding, which is intensified by the platform's market share and the aggregate funding in IT investment, highlighting the need for investor vigilance (Saldanha et al., 2021).

Conclusion

The authors utilized VOSviewer software to identify the current trends in information technology investment research, which resulted in four clusters: Investment, Sustainable Development, Cost, and Profitability. The name of the cluster is determined by the researchers' content analysis. There are some benefits associated with IT investment, including becoming the primary driver of a company's innovation and increasing the company's profitability, competitiveness, and performance. However, IT investment is not without its challenges. IT investment has a negative effect in a stable environment, and firms with low levels of IT investment may have to choose between revenue expansion and cost reduction. In contrast, firms with higher levels of IT investment have been successful in implementing a dual-emphasis IT strategy. This study has some practical implications. It gives an overview of the current trends and future directions of IT investment research, which can help managers, practitioners, and policymakers make informed decisions about IT investment strategies, benefits, and challenges. This study also identifies the key factors influencing the value creation and appropriation of IT investments, such as industry competition, regulation, alignment, innovation, and security. This study also has some limitations. It only used data from the Scopus database, which may not encompass all relevant articles on the topic of IT investment. Additionally, the study only selected articles written in English, potentially overlooking articles written in other languages. There is also a potential subjectivity in the content analysis process and in naming each cluster.

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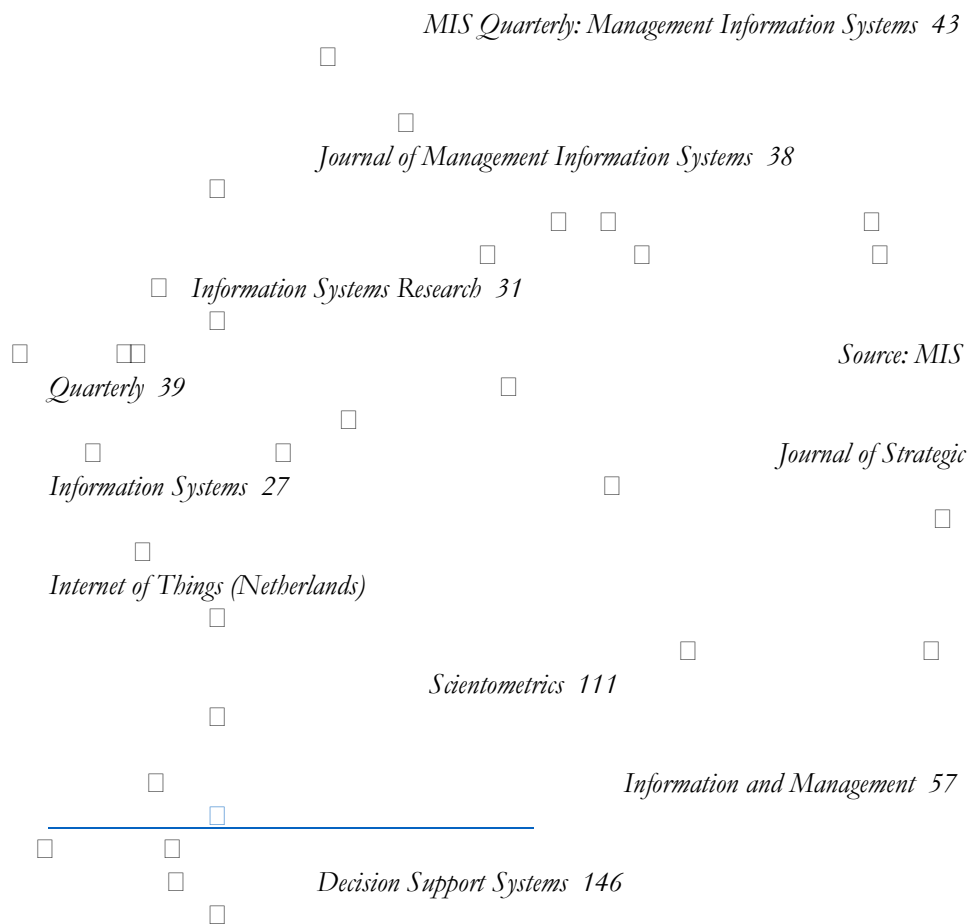
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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.



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