REVISTA eduCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

Design Science Research effectiveness: bridging theory and practice

Eficácia da Pesquisa em Ciência do Design: unindo teoria e prática

Eficacia de la Investigación en Ciencias del Diseño: tendiendo un puente entre la teoría y la práctica

DOI: 10.54901/educa.v9-153

Pr. Dr. Murillo de Oliveira Dias[1]
Pr. Dr. Dercio Santiago da Silva Junior[2]

ABSTRACT: This paper discusses design dimensions that influence the performance of Design Science Research (DSR) in design-oriented inquiry. Using content, thematic, and cluster analysis and expert interviews, it discusses the controversy of the time through various lenses. The results indicate that five design dimensions—rigor, utility, knowledge, engagement, and evaluation—constitute the core elements of Design Science Research effectiveness. The paper then develops a research framework by integrating various existing theories and research findings to study the impact of design science research performance on design-oriented inquiry. This research framework has the advantage of integrating the rigor and utility of research outcomes while connecting them to the needs of society and organizations. This research ultimately enhances design science theory, improves design science research methodologies, and examines the relationships between design science research and design-oriented inquiry.

Keywords: Design Science Research (DSR); design-oriented inquiry; rigor; utility; knowledge; engagement; evaluation.

1 INTRODUCTION

Design-oriented inquiry and applied contexts are critical to design-oriented environments (Dias and da Silva Jr., 2026; Gauss *et al*., 2024; Myers *et al*., 2026). Design Science Research (DSR) offers a structured approach to designing and evaluating artifacts that address complex managerial challenges (Dresch *et al*., 2020; Flores-Garcia *et al*., 2026). However, despite the growing number of studies, there is little consensus on how to assess the effectiveness of DSR systematically in research design. Research experts agree that new frameworks need to unite scientific rigor with real-world applicability, yet scientists have not thoroughly investigated what makes DSR successful (Peffers *et al*.,2007). DSR has gained widespread acceptance in design, management and organizational studies because it provides

[1] Doctor of Business Administration, Universidade Estadual do Rio de Janeiro (UERJ), Rio de Janeiro, Rio de Janeiro, Brazil. E-mail: agenda.murillo@gmail.com
[2] Doctor of Health Management, Universidade Estadual do Rio de Janeiro (UERJ), Rio de Janeiro, Rio de Janeiro, Brazil. E-mail: derciosjr@gmail.com

REVISTA eduCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

researchers with both theoretical foundations and practical solution development capabilities (Agnusdei *et al*., 2026; Baskerville *et al*.,2019; Dresch *et al*., 2020; Gauss *et al*., 2024; Gregor & Jones, 2007; Hevner *et al*.,2004).In light of this gap, this study addresses the following research question: what factors influence the effectiveness of Design Science Research in in design-oriented inquiry?

We first conducted a literature review which they merged with expert interview data to determine current knowledge deficiencies. The research studied DSR evaluation sources by performing content, cluster, and thematic analysis, following Miles *et al*. (2014); Saunders *et al*., (2009); Strauss & Corbin, (1990). Expert insights were then incorporated to refine and validate the categories, ensuring methodological precision and transparency. By integrating theoretical framework with the empirical evidence, the research converted raw data into identifiable patterns which expose the core components which enable DSR to succeed in design-oriented inquiry. This dual approach—literature-based inquiry combined with expert validation—provides a rigorous pathway for uncovering the attributes that underpin effective DSR in practice. Finally, this work is organized into sections covering theoretical background (Section 2), followed by methods (Section 3), results (Section 4), discussion (Section 5), research implications and limitations (Section 6), and conclusion (Section 7).

2 THEORETICAL FRAMEWORK

Design Science Research (DSR) originated in Simon's The Sciences of the Artificial (1969), which demonstrated how people create particular solutions to address specific problems by distinguishing between the natural and artificial sciences. Simon's research was further developed by March and Smith (1995), and Hevner *et al*. (2004) developed a method to connect assessment with artifact development and usefulness assessment. DSR is the discipline focused on the creation of problem-solving objects (Agnusdei *et al*., 2026; Dresch *et al*.,2020), following Bunge (1980), who explained that scientific inquiry shows us what exists in the world and teaches us how to use that knowledge. Eekels and Roozenburg (1991) and Takeda *et al*. (1990) described design processes that follow a pattern of issue evaluation followed by solution formulation and evaluation through multiple iterative cycles. The framework bases its scientific realism (Bunge, 1980) on multiple design method applications from engineering. Peffers *et al*. (2007) and Gregor & Jones (2007) created design theory through their analyses of artifact types that produce prescriptive knowledge. The DSR model serves as a fundamental research tool that allows scientists to study knowledge development in in design-oriented inquiry, and team-

REVISTA edUCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

based work (Gregor & Zwikael, 2024). DSR requires assessments that require both exact methodological approaches and functional application methods (Baskerville *et al*., 2009; Van Aken *et al*., 2012). The DSR system has become useful for various industrial applications, including engineering design, innovation management, production engineering, organizational systems (Dresch *et al*., 2020; Narazaki *et al*., 2020), and public administration (de Medeiros & Martins, 2024; Lacerda *et al*., 2013). March & Storey (2008) investigated DSR in information systems, while Marxt & Hacklin (2005) associated DSR with product development and innovation.

Winter (2008) investigated the enduring heritage of the DSR paradigm in Europe. Academic management requires researchers to shift from process and result description to developing directive recommendations that help practitioners execute their work in actual settings (Baskerville *et al*., 2019; Lacerda *et al*., 2013; Van Aken, 2004). The DSR framework enables researchers to develop operational tools, methodologies, and frameworks that unite theoretical knowledge with practical solutions for problem-solving and product development (Dresch *et al*., 2020). The current disparity between research and practice hinders the integration of the current knowledge base and the provision of reliable counsel, which might help practitioners achieve better project outcomes, a shortcoming this work addresses. Verma *et al*. (2026), Flores Garcia *et al*. (2026) investigated the influence of generative AI in DSR, while Myers *et al*. (2026) examined DSR in accounting settings, and Araujo *et al*. (2026) addressed how cryptocurrency could improve basic programs through DSR, whereas Dias and da Silva Jr. (2026) examined the DSR effectiveness with Brazilian managers, and Perossa *et al*. (2026) developed a tool for car electronics with DSR, and Diambu (2026) studied DSR applied to land-use planning.

3 METHODS

3.1 Research Design and Procedure

This study employed a two-stage methodological approach to explore the foundations of Design Science Research (DSR) effectiveness. The primary objective was to examine DSR as a research paradigm and identify the factors that emerge from its evaluation, with the intention that these insights may later be applied to design-oriented inquiry. The first stage required a comprehensive review of all existing research on DSR assessment methods in design and organizational studies. The research followed established content and thematic analysis

procedures (Miles *et al*., 2014; Saunders *et al*., 2009; Strauss & Corbin, 1990) to analyze their peer-reviewed article review for detecting repeated patterns and categories.

3.2 Expert Interviews

We conducted n=20 semi-structured interviews with Brazilian managers, experts in their fields. The research interviews provided essential information about researchers' actual application of theoretical concepts in their research activities. The expert input process confirmed and improved the categories which researchers extracted from their literature review to achieve both methodological accuracy and clear reporting.

3.3 Analytical Strategy

The research combined academic studies with professional opinions to develop conceptual structures from its gathered data. The patterns demonstrate which fundamental components lead to successful DSR implementation. The research took place under the larger scope of DSR but the discovered elements show promise for application in design sectors which need innovative solutions and excellent stakeholder interactions.

3.4 Sampling Technique

This work used two sample techniques: (a) purposive sampling, and (b) criteria sampling, since they were deemed the most suitable for the research, following Strauss & Corbin (1990). A purposeful sampling technique was used because data quality was prioritized above quantity. Criterion sampling was used to choose participants and interviews based on specific criteria, such as (i) different profiles of practitioners in DSR - High, Medium and Low-level managers, to avoid Elite Bias (Myers & Newman, 2007), (ii) working in the field of design research and practice (iii) with a minimum of 15 years of professional expertise, and (iv) minimum of post-graduation level of education.

3.5 Design of in-Depth Interviews and Protocol

For this study, we used qualitative, in-depth interviews as our research method. Furthermore, we used Myers and Newman's (2007) semi-structured interview approach, which

incorporates a pre-established set of questions and allows for spontaneous inquiries that may emerge throughout the interview.

Twenty invitations were sent via email, WhatsApp, or in person to executives with at least 10 years of experience, resulting in a 100% response rate. Individual online sessions were planned on the Zoom® platform and conducted in the interviewees' native language. The participants who actively participated in the session were selected for an interview based on their expertise and potential to provide significant and detailed insights for this study. To mitigate social dissonance (Myers & Newman, 2007), we prioritize creating a pleasant environment for the interviewee. The interviews were conducted from 20 December to 30 December 2025, with an average length of about 35 minutes. To minimize the potential impact of Social Desirability Bias, a naturalistic methodology was adopted. This approach included soliciting pertinent information from participants that directly aligned with the research objectives. As a result, steps were taken to reduce the chances of respondents giving answers that align with ethical and social standards (Myers & Newman, 2007). Moreover, a strategy to mitigate the Social Desirability Bias included conducting interviews anonymously and omitting participants' identities from the research, thus reducing the likelihood that participants would modify their answers out of fear of being judged or disapproved by their peers or superiors. To mitigate social desirability bias and encourage authentic responses, the questionnaire was intentionally crafted to avoid signaling any particular design methodology, thus minimizing automatic response patterns linked to everyday routines (Podsakoff *et al*., 2003).

4 DISCUSSION AND RESULTS

The findings of this study highlight the conceptual dimensions that underpin the effectiveness of Design Science Research (DSR). The evaluation of initial and contemporary research studies showed that scientists focus on five critical aspects: research rigor and practical value; knowledge acquisition; community participation; and assessment methods. The five dimensions establish an organized system that enables people to assess and quantify the success of DSR. Five themes emerged from the analysis. We followed Miles *et al*. (2014) in presenting in vivo codes, respecting the interviewees’ voices.

REVISTA eduCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

Figure 1 – Word cloud of Design Science Research (DSR) dimensions and related concepts

Sources: Created by the author from research data using NVivo (QSR International), 2026.

Figure 1 highlights the five core dimensions — Utility, Evaluation, Engagement, Knowledge, and Rigor emphasized. Surrounding terms such as innovation, methodology, stakeholder, validation, sustainable, strategy, and manage reflect recurring themes from interviews and literature.

4.1 Rigor

Evidence showed that practitioners should perform their methods correctly, while theories require the establishment of their core foundations. Van Aken *et al*. (2012) require mid-range theory to undergo strict evaluation procedures. Bunge (1980) establishes scientific realism as the basis for rigor. The research shows that rigor serves as the essential foundation for producing reliable results in DSR studies. I#18 stated that "all projects should be rigorous. Sometimes, the service provider tries to make things flexible to please stakeholders, internal clients, instead of being rigorous with the design conditions." I#7 told us that "rigor is essential to any design process."

4.2 Utility

The research lacks practical value as its main problem. Baskerville *et al*. (2019) emphasize systematic development, and Kuechler & Vaishnavi (2012) highlight cycles of

REVISTA edUCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

refinement. Peffers *et al*. (2007) examine organizational alignment, focusing on IT alignment. The research demonstrates how utility enables organizations to implement DSR artifacts and processes that they can apply in their real-world deployment environments. I#5 corroborated the opinion that "the solutions in design should always be practical ones, being useful to everyone."

4.3 Knowledge

The concept of knowledge contribution comprises two separate elements: theoretical aspects and practical applications. However, Gregor & Jones (2007) describe how artifacts increase system value, and Nunamaker *et al*. (1991) emphasize knowledge advancement. Bunge (1980) develops knowledge through philosophical principles that demonstrate the fundamental epistemological worth of DSR. Finally, I#19 stated that knowledge should be "acquired, stored, and shared throughout the organization."

4.4 Engagement

The entire text contains evidence that shows researchers working together with practitioners. Baskerville *et al*. (2009) support the use of participatory methods in research. According to Peffers *et al*. (2007), organizations must create appropriate communication networks to enable stakeholders to obtain vital information, while Kuechler & Vaishnavi (2012) explain that stakeholders need to take the initiative to detect problems. The engagement method enables DSR to maintain its importance for researchers in academic settings and practitioners in professional settings. To support Engagement, I#1 declared that "all the procedures (in DSR) should engage all parts, including stakeholders."

4.5 Evaluation

Research studies continue their operations through different evaluation methods, which they need to maintain. Van Aken *et al*. (2012) demonstrate their research findings through practical field applications, while Manson (2006) created assessment systems that evaluate performance through multiple evaluation standards. Walls *et al*. (1992) focus on theory testing. The evaluation approach developed by Peffers *et al*. (2012) and Bunge's (1980) realism framework demonstrate that multiple research approaches exist. Regarding Evaluation, I#8

REVISTA edUCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

said, "How can a practitioner not evaluate the process, to assess what is right or wrong?" Finally, Tables 1 and 2 summarize the thematic analysis from the interviews and literature:

Table 1 – Thematic Categories Emerging from Expert Interviews

Theme	**Theme 1**	**Theme 2**	**Theme 3**	**Theme 4**	**Theme 5**
Category	**Rigor**	**Utility**	**Knowledge**	**Engagement**	**Evaluation**
Subcategory	Theory	Relevance	Science	Practice	Cases
	Simulation	Testing	Validation	Modeling	Frameworks
	Balance	Alignment	Integration	Participation	Criteria
	Process	Development	Methodology	Communication	Stage
	Artifact	Prescription	Contribution	Context	Testing
	Criteria	Contexts	Frameworks	Perspectives	Performance
	Case	Application	Evidence	Collaboration	Balance
	Iteration	Cycles	Learning	Stakeholders	Iteration
	Design	Linkage	Formalization	Practice	Theory
	Requirements	Kernel	Processes	Alignment	Fit
	Frameworks	Solutions	Advancement	Integration	Application
	Methodology	Engineering	Principles	Collaboration	Application
	Logic	Artifacts	Creation	Needs	Outcomes
	Realism	Engineering	Philosophy	Science	Applicability

Source: Created by the authors, 2026.

Table 2 – Thematic Categories Emerging from Literature Review

Author	Rigor	Utility	Knowledge	Engagement	Evaluation
Van Aken et al. (2012)	Mid-range theory rigor	Rigor–relevance bridge	Scientific grounding	Practitioner orientation	Applied cases
Aturki et al. (2011)	Simulation methods rigor	Controlled testing utility	Artifact validation knowledge	Scenario modeling engagement	Simulation frameworks evaluation
Baskerville et al. (2009)	Rigor–relevance balance	Organizational alignment utility	Integrative evaluation knowledge	Participatory approaches engagement	Multi-criteria strategies evaluation
Peffers et al. (2007)	Process model rigor	Systematic development utility	Structured methodology knowledge	Communication & dissemination engagement	Explicit evaluation stage
Gregor & Jones (2007)	Artifact types definition rigor	Prescriptive categories utility	Artifact contribution clarity	Organizational context engagement	Instantiation & testing evaluation
Manson (2006)	Multi-criteria rigor	Diverse contexts utility	Evaluation frameworks knowledge	Multiple perspectives engagement	Performance relevance evaluation
Cole et al. (2005)	Case study rigor	Applied contexts utility	Empirical validation knowledge	Practitioner collaboration engagement	Balanced strategies evaluation
Vaishnavi & Kuechler (2004)	Iterative methodology rigor	Cycles of refinement utility	Embedded learning knowledge	Stakeholder problem identification engagement	Iterative evaluation
Walls et al. (1992)	Design theory rigor	Theory–artifact linkage utility	Formalized design theory knowledge	Practice alignment engagement	Theory testing evaluation
Kardas (1992)	Design requirements rigor	Kernel theory grounding utility	Structured design processes knowledge	Organizational alignment engagement	Theoretical–practical fit evaluation
Nunamaker et al. (1991)	IS design frameworks rigor	Organizational solutions utility	Knowledge advancement	Research–practice integration engagement	Organizational application evaluation
Eekels & Roozenburg (1991)	Design methodology rigor	Engineering practice utility	Formalized principles knowledge	Collaborative contexts engagement	Methodological application evaluation
Takeda et al. (1990)	Engineering logic rigor	Problem-solving artifacts utility	Structured knowledge creation	User needs alignment engagement	Problem-solving outcomes evaluation
Bunge (1980)	Scientific realism rigor	Practical engineering utility	Philosophical foundations knowledge	Applied science context engagement	Realism applicability evaluation

Source: Created by the authors, 2026.

The findings demonstrate that organizational management levels hold separate opinions about the effectiveness of Design Science Research (DSR). Senior executives (high management) tend to emphasize rigor and utility more strongly. They highlight the importance

REVISTA eduCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

of methodological soundness and practical relevance, reflecting their strategic role in ensuring that projects are credible and aligned with organizational goals (see Table 3). Middle management maintains a balanced approach that is dedicated to performing knowledge assessment and evaluation tasks. The interviewees prioritize both knowledge creation and integration, and they also support organized assessment systems. The interviewees operate between strategic leadership and operational teams, focusing on methods for applying knowledge and procedures for performance assessment. Lower-level managers and operational leaders need to focus their work on two essential duties: maintaining employee involvement and conducting performance assessments. The team members who work directly with customers and handle operational activities emphasize that organizations need to engage all stakeholders during ongoing evaluations. The two groups require engagement because it helps them create solutions that work in practice and that people will accept. The evaluation process serves two purposes: it helps organizations stay accountable and improve performance. The assessment levels serve their primary purpose because experts agree that they enable DSR outputs to be useful for actual implementation. The organization assigns different levels of importance to its dimensions based on its hierarchical structure because top managers emphasize rigor. However, middle managers focus on knowledge, and bottom-level staff members focus on engagement, as depicted in Table 3:

REVISTA eduCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

Table 3 – Cluster Analysis

Mgt Level	Theme	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
	Interviewee	Rigor	Utility	Knowledge	Engagement	Evaluation
H	I#1	●●●	●●●	●●●	●●	●●●
H	I#2	●●	●●	●●●	●●●	●●
H	I#3	●	●●●	●●●	●●	●
H	I#4	●●●	●●●	●●	●●●	●
H	I#5	●●	●●	●●	●●●	●●
H	I#6	●●	●●●	●	●●	●●
H	I#7	●●	●	●●	●●●	●●●
M	I#8	●	●●●	●●●	●	●●●
M	I#9	●●●	●●	●●●	●●●	●
M	I#10	●	●●●	●	●●	●●
M	I#11	●●	●●●	●●	●●●	●●
M	I#12	●	●●●	●	●●●	●●●
M	I#13	●●	●●	●●	●●●	●●●
L	I#14	●●	●●	●●●	●●●	●●
L	I#15	●●●	●●	●	●●	●●●
L	I#16	●●	●●●	●●	●●●	●●
L	I#17	●●	●●●	●	●●	●●●
L	I#18	●	●●●	●●	●	●●
L	I#19	●●●	●●●	●	●●	●●●
L	I#20	●	●●●	●●	●●●	●

Note: Management level (H=High; M=Medium; L= Low)
Note[2]*:* (●) = Relevant; (●●●) = Extremely Relevant; (-) = non-relevant
Source: Created by the authors, 2026.

Answering the research question, the analysis of DSR literature shows that its effectiveness depends on five interconnected elements: Rigor, Utility, Knowledge, Engagement, and Evaluation (see Table 3). These five dimensions operate as a unified system, producing results that both researchers and practitioners can trust. The core requirement for DSR is rigor, which serves as its essential foundation. Design work must be grounded in theoretical foundations, methodical approaches, and logical reasoning. The design-oriented inquiry use rigor to prevent superficial innovation through their requirement for systematic problem-solving methods, including design cycle repetition and simulation testing. This evidence shows that solutions remain valid and verifiable by others. Utility complements rigor by emphasizing the practical relevance of research outputs. Design practice and focus on artifact creation achieve utility by creating products that fulfill both business needs. DSR has moved beyond purely theoretical research, as utility enables operational improvements that enhance system performance and customer service quality. Knowledge serves as the organized contribution that DSR makes to both theoretical development and practical applications.

REVISTA eduCA
REVISTA MULTIDISCIPLINAR DA FACULDADE CATÓLICA PAULISTA
ISSN 2674-8460

The cluster analysis reveals that managers at different organizational levels focus on these dimensions at varying speeds because their job duties differ. The interviewees all work in retail and consumer services, which shapes their views while also highlighting the operational challenges of implementing DSR in fast-changing, customer-focused settings. Senior executives emphasize rigor and utility, underscoring the need for methodological soundness and practical relevance. The organization requires all projects to demonstrate their dependability and authenticity to achieve current organizational objectives. The organization continues to develop DSR initiatives that merge academic principles with operational business value to achieve competitive success in retail markets.

Middle managers spend their time on knowledge management and evaluation. The team functions between strategic leadership and operational teams because they require both functional knowledge and established assessment systems. The team must unite their collective expertise with methodical assessment methods to confirm that their developed solutions will sustain themselves when operating across different retail and consumer service settings. The lower levels of management and operational leadership focus more on employee engagement and performance assessment. The team members who work near customers and in operational activities believe that team members should work together to serve customers and operational needs, while keeping stakeholders involved and actively seeking customer feedback. The team works on this problem because operational verification of solutions is necessary to succeed in customer service operations. The fundamental element that enables DSR output to be useful for real-world implementation is present at every assessment stage. The organization determines which dimensions matter most through its management structure: executives choose methodical approaches, middle managers focus on learning new things, and base-level employees focus on employee engagement. The distribution shows how organizational structure affects how people view DSR performance, while demonstrating the need for a complete system that unites strategic, tactical, and operational viewpoints in retail and consumer service organizations.

The retail industry tests new concepts through pilot programs, customer feedback, and performance metrics, which help validate new ideas and improve them during successive development stages. This dimension helps researchers maintain accountability while they improve their work, enhancing the reliability and usefulness of research results produced through DSR. The research by Walls *et al*. (1992) explains that information systems design theory development requires scientists to follow strict testing procedures while monitoring the evaluation process, as theory validation is the fundamental requirement for successful DSR. Peffers *et al*. (2012) argue that applied research requires structured evaluation systems to

develop practical methods that yield significant results. The research by Nunamaker *et al*. (1991) builds upon previous research by developing systematic procedures to verify artifacts, which supports the idea that evaluation functions as an ongoing process rather than a single concluding phase.

The five dimensions demonstrate that DSR effectiveness in retail and consumer settings depends on their successful integration and balance. The pursuit of rigor becomes meaningless when it serves no purpose, yet strict adherence to it without practical value makes education seem shallow. Knowledge development requires active participation, with the results verified through evaluation methods to ensure advancement. The framework shows that DSR connects innovation with customer-oriented approaches, creating solutions that are rigorous, useful, knowledge-based, collaborative, and accountable.

5 RESEARCH IMPLICATIONS AND LIMITATIONS

5.1 Theoretical Implications

This research contributes to the Design Science Research (DSR) literature by empirically generating significant academic value that enables retail and consumer management operations to acquire vital knowledge. The research establishes five essential elements that determine the effectiveness of Design Science Research (DSR) through the identification of Rigor, Utility, Knowledge, Engagement, and Evaluation. (Baskerville *et al*. 2009; Dresch *et al*., 2020; Gregor & Jones, 2007; Gregor & Hevner, 2013; Van Aken, 2004). The theoretical framework combines various research findings into a single, systematic framework that establishes its core dimensions. The framework allows researchers to evaluate DSR effectiveness by analyzing how methodological strength, practical value, and knowledge development interact to produce important research results. The research develops new theoretical foundations for DSR by demonstrating that both engagement and evaluation must become essential components rather than additional elements.

5.2 Practical Implications

Evidence shows that organizations should link their knowledge development activities with their customer interaction and assessment systems to create continuous innovation alongside superior customer service and enhanced organizational accountability. The research

uses published studies to develop its theoretical framework, but lacks deployment statistics from DSR systems operating in the retail and consumer service sectors. The framework was derived from general DSR studies and then interpreted in light of retail and consumer contexts, showing broad applicability but with implementation patterns that differ between different business sectors and environments. The research used previous-stage thematic clusters for illustrative purposes because they did not yield direct results, limiting their potential for universal application. The retail and consumer sectors operate in a state of constant change due to technological advancements, consumer market trends, and international business operations. The framework requires continuous adaptation to remain relevant in such evolving conditions.

5.3 Limitations

The research bases its findings on existing academic studies, which provide a strong theoretical foundation but lack real-world implementation data from DSR systems used in the retail and consumer service sectors. The research used previous-stage thematic clusters for illustrative purposes rather than collecting new data, which limited their potential for universal application. The retail and consumer sectors operate in a state of constant change due to technological advancements, consumer lifestyle transformations, and global market influences. The framework needs ongoing modifications to remain effective in these changing circumstances.

5.4 Future Research Directions

Future research should focus on three main directions. The first requirement is to empirically validate the proposed framework to demonstrate its effectiveness in retail and consumer environments. The second step involves creating and testing the Design Science Research Effectiveness Scale (DSRES), which functions as a measurement system to evaluate DSR results. The research examines variations in DSR performance between developing and established markets by assessing market characteristics.

6 FINAL CONSIDERATIONS

In conclusion, this research investigated which factors affect the success of Design Science Research when applied to retail and consumer environments. The research findings

showed that DSR produces results through five essential elements – Rigor, Utility, Knowledge, Engagement, and Evaluation – that together form a coherent framework for effective DSR. Rigor ensures methodological soundness and theoretical grounding. Utility guarantees that research outputs deliver practical value to organizations and customers. Knowledge advances both theory and practice, strengthening competitiveness and adaptability. Engagement fosters collaboration among stakeholders, leading to sustainable solutions. Evaluation verifies outcomes through systematic testing and accountability measures. By integrating these five dimensions, DSR functions as a bridge between academic inquiry and practical product development that meets customer needs. Ultimately, the success of DSR in retail and consumer contexts hinges on the balanced integration of these five dimensions. When combined, they enable organizations to design solutions that are valid, meaningful, and capable of producing valuable outcomes. The study contributes to the literature by offering a coherent framework to analyze DSR in retail and consumer services, and provides foundation for future empirical and theoretical investigations. The writing must be clear, cohesive, and analytical, avoiding the mere repetition of previously presented excerpts and prioritizing a critical interpretation of the results and their scientific relevance.

REFERENCES

AGNUSDEI, Giulio Paolo *et al*. Unveiling circular ecosystems in the wine sector: A design science application. **Business Strategy and the Environment**, v. 35, n. 2, p. 1756-1773, 2026.

ALTURKI, A.; GABLE, G. G.; BANDARA, W. A design science research roadmap. In: INTERNATIONAL CONFERENCE ON SERVICE-ORIENTED PERSPECTIVES IN DESIGN SCIENCE RESEARCH, 6., 2011, [local]. **Proceedings of the 6th International Conference on Service-Oriented Perspectives in Design Science Research**. Springer, 2011.

BASKERVILLE, R.; PRIES-HEJE, J. Projectability in design science research. **Journal of Information Technology Theory and Application (JITTA)**, v. 20, n. 1, p. 3, 2019.

BASKERVILLE, R.; PRIES-HEJE, J.; VENABLE, J. Soft design science methodology. In: INTERNATIONAL CONFERENCE ON DESIGN SCIENCE RESEARCH IN INFORMATION SYSTEMS AND TECHNOLOGY, 4., 2009, [local]. **Proceedings of the 4th International Conference on Design Science Research in Information Systems and Technology**. p. 1-11, maio 2009.

BUNGE, M. **Epistemologia**. São Paulo: T. A. Queiroz/EDUSP, 1980.

DIAMBU, Shams Mbudi. A Decision-Ready Framework for Sustainable Land-Use Planning Using Design Science Research. **Scientific Research Communications**, v. 6, n. 1, 2026.

DIAS, M.; SILVA JUNIOR, D. S. From Explorer to Leader: The DSRES Index as a Framework for Design Science Research Maturity. **Advances in Social Sciences Research Journal**, v. 13, n. 02, p. 229–245, 2026. DOI: https://doi.org/10.14738/assrj.1302.20062.

DRESCH, A.; LACERDA, D. P.; JUNIOR, J. A. V. A. **Design science research: método de pesquisa para avanço da ciência e tecnologia**. Porto Alegre: Bookman Editora, 2020.

EEKELS, J.; ROOZENBURG, N. F. M. A methodological comparison of the structures of scientific research and engineering design: Their similarities and differences. **Design Studies**, v. 12, n. 4, p. 197–201, 1991. DOI: https://doi.org/10.1016/0142-694X(91)90025-U.

FLORES-GARCÍA, Erik *et al*. AI-enabled vision systems for human-centered order picking–A design science research approach. **International Journal of Production Research**, v. 64, n. 5, p. 1785-1812, 2026.

GAUSS, L.; LACERDA, D.; ROMME, A. G. L. Mecanismos como objetos de fronteira para conectar o design à ciência na pesquisa em gestão operacional. **Pesquisa em Gestão Operacional**, v. 17, n. 1, p. 291–306, 2024. DOI: https://doi.org/10.1007/s12063-023-00431-7.

GREGOR, S.; HEVNER, A. R. Positioning and presenting design science research for maximum impact. **MIS Quarterly**, p. 337-355, 2013.

GREGOR, S.; JONES, D. The anatomy of a design theory. **Association for Information Systems**, 2007.

GREGOR, S.; ZWIKAEL, O. Design science research and the co-creation of management knowledge. **International Journal of Management**, v. 42, n. 3, p. 102584, 2024.

HEVNER, A. R. *et al*. Design science in information systems research. **MIS Quarterly**, v. 28, n. 1, p. 75–105, 2004. DOI: https://doi.org/10.2307/25148625.

KUECHLER, W.; VAISHNAVI, V. A framework for theory development in design science research: multiple perspectives. **Journal of the Association for Information Systems**, v. 13, n. 6, p. 3, 2012.

LACERDA, D. P.; DRESCH, A.; PROENÇA, A.; ANTUNES JÚNIOR, J. A. V. Design Science Research: método de pesquisa para a engenharia de produção. **Gestão & Produção**, v. 20, p. 741-761, 2013.

MANSON, N. J. Is operations research really research? **ORION**, v. 22, n. 2, p. 155–180, 2006. DOI: https://doi.org/10.5784/22-2-16.

MARCH, S. T.; SMITH, G. F. Design and natural science research on information technology. **Decision Support Systems**, v. 15, n. 4, p. 251-266, 1995.

MARCH, S. T.; STOREY, V. C. Design science in the information systems discipline: An introduction to the special issue on design science research. **MIS Quarterly**, v. 32, n. 4, p. 725–730, 2008. DOI: https://doi.org/10.2307/25148869.

MARXT, C.; HACKLIN, F. Design, product development, innovation: All the same in the end? A short discussion on terminology. **Journal of Engineering Design**, v. 16, n. 4, p. 413–421, 2005. DOI: https://doi.org/10.1080/09544820500131169.

MEDEIROS, M. S. de; MARTINS, T. C. Design Science Research (DSR) como método de pesquisa em políticas públicas. **Missões: Revista de Ciências Humanas e Sociais**, v. 10, n. 3, 2024.

MILES, M.; HUBERMAN, A.; SALDAÑA, J. **Qualitative data analysis: a methods sourcebook**. 3. ed. Thousand Oaks: Sage, 2014.

MYERS, M. D.; NEWMAN, M. The qualitative interview in IS research: Examining the craft. **Information and Organization**, v. 17, p. 2-26, 2007.

MYERS, Noah *et al*. Improving the production and reviewing of design science research in accounting. **Review of Accounting Studies**, p. 1-32, 2026.

NARAZAKI, R. S.; SILVEIRA CHAVES, M.; DREBES PEDRON, C. A project knowledge management framework grounded in design science research. **Knowledge and Process Management**, v. 27, n. 3, p. 197-210, 2020.

NUNAMAKER, J. E.; CHEN, M.; PURDIN, T. D. M. Systems development in information systems research. **Journal of Management Information Systems**, v. 7, n. 3, p. 89–106, 1991. DOI: https://doi.org/10.1080/07421222.1990.11517998.

PEFFERS, K. *et al*. A design science research methodology for information systems research. **Journal of Management Information Systems**, v. 24, n. 3, p. 45–77, 2007. DOI: https://doi.org/10.2753/MIS0742-1222240302.

PEFFERS, K.; ROTHENBERGER, M.; TUUNANEN, T.; VAEZI, R. Design science research evaluation. In: INTERNATIONAL CONFERENCE ON DESIGN SCIENCE RESEARCH IN INFORMATION SYSTEMS, 2012, Berlin, Heidelberg. **Proceedings of the International Conference on Design Science Research in Information Systems**. Berlin, Heidelberg: Springer Berlin Heidelberg, maio 2012. p. 398-410.

PEREIRA, M. G. A seção de discussão de um artigo científico. **Epidemiol. Serv. Saúde,** Brasília, DF, v. 22, n. 3, p. 537-538, set. 2013b. Disponível em: http://scielo.iec.gov.br/scielo.php?script=sci_arttext&pid=S167949742013000300020&lng=pt&nrm=iso.

PEREIRA, M. G. A seção de resultados de um artigo científico. **Epidemiol. Serv. Saúde, Brasília**, DF, v. 22, n. 2, p. 353-354, jun. 2013a. Disponível em: http://scielo.iec.gov.br/scielo.php?script=sci_arttext&pid=S167949742013000200017&lng=pt&nrm=iso.

PEROSSA, Daniele; ROSA, Paolo; TERZI, Sergio. Corporate raw materials criticality assessment: A novel tool for car electronics value chains developed with design science research methodology. **Journal of Environmental Management**, v. 398, p. 128555, 2026.

PODSAKOFF, P. M.; MACKENZIE, S. B.; LEE, J. Y.; PODSAKOFF, N. P. Common method biases in behavioral research: a critical review of the literature and recommended remedies. **Journal of Applied Psychology**, v. 88, n. 5, p. 879, 2003.

SAUNDERS, M.; LEWIS, P.; THORNHILL, A. **Research Methods for Business Students**. 5. ed. Prentice-Hall, 2009.

SIMON, H. A. **The sciences of the artificial**. Cambridge: MIT Press, 1969.

STRAUSS, A.; CORBIN, J. **Basics of qualitative research**. Thousand Oaks: Sage, 1990.

TAKEDA, H. *et al*. Modeling design processes. **AI Magazine**, v. 11, n. 4, p. 37–48, 1990. DOI: https://doi.org/10.1609/aimag.v11i4.854.

VAN AKEN, J. E. Design science: valid knowledge for socio-technical system design. In: EUROPEAN DESIGN SCIENCE SYMPOSIUM, 2012, Cham. **Proceedings of the European Design Science Symposium**. Cham: Springer International Publishing, dez. 2012. p. 1-13.

VAN AKEN, J. E. Management research based on the paradigm of design science: The quest for field-tested and grounded technological rules. **Journal of Management Studies**, v. 41, n. 2, p. 219–246, 2004. DOI: https://doi.org/10.1111/j.1467-6486.2004.00430.x.

VERMA, Dhruv *et al*. Toward an artifact that designs itself: generative design science research approach. **AI and Ethics**, v. 6, n. 1, p. 104, 2026.

WALLS, J. G.; WIDMEYER, G. R.; EL SAWY, O. A. Building an information system design theory for vigilant EIS. **Information Systems Research**, v. 3, n. 1, p. 36-59, 1992.

WINTER, R. Design science research in Europe. **European Journal of Information Systems**, v. 17, n. 5, p. 470-475, 2008.