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Quality Analysis of Low-Code No-Code Application Development Using ISO/IEC 25010 Standard: A Systematic Literature Review

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Abstract. *The acceleration of digital transformation has increased the demand for fast and efficient software development. This condition has led to the emergence of Low-Code/No-Code (LC/NC) approaches, which allow users with limited technical expertise to build applications through visual interfaces and pre-built components. This study aims to analyze the quality of Low-Code No-Code (LCNC) application development based on the ISO/IEC 25010 standard through a Systematic Literature Review (SLR) method, supported by bibliometric visualization using VOSviewer software. The reviewed articles were published between 2020 and 2024. The visualization results indicate that keywords such as context, development, and system are the primary focus in the study of LCNC application quality. Furthermore, the findings of Meira et al. (2020) demonstrate that the Analytical Hierarchy Process (AHP) method, when combined with the ISO/IEC 25010 standard, is effective in evaluating and comparing software system quality within an industrial context. This study concludes that a standards-based evaluation approach, complemented by bibliometric visualization, can provide valuable insights for decision-making processes related to the development and implementation of LCNC applications.*

Keywords: *ISO/IEC 25010; Low-Code No-Code; Software quality; Systematic Literature Review; VOSviewer.*

1. INTRODUCTION

In the rapidly evolving era of digital transformation, the demand for fast and efficient software development continues to rise. This has led to the emergence of Low-Code/No-Code (LC/NC) approaches, which enable users with limited technical expertise to develop applications through visual interfaces and pre-built components, without the need for traditional coding. This approach promises increased productivity, reduced development costs, and the empowerment of end users (citizen developers) to create their own solutions.

However, behind its ease of use, the adoption of LC/NC platforms presents new challenges, particularly in terms of software quality. Many LC/NC applications are developed without a systematic software engineering approach. Therefore, a quality assessment framework that accommodates the unique characteristics of LC/NC is needed one of which is the ISO/IEC 25010 standard, which provides a comprehensive model for software quality.

ISO/IEC 25010 defines eight primary quality characteristics: functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. In the context of LC/NC, certain characteristics such as maintainability and security often raise concerns, given users' limited understanding of software architecture and best practices in security.

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Assessments of LC/NC quality using the ISO 25010 approach indicate that although LC/NC platforms excel in usability, they often fall short in maintainability and security due to a lack of proper documentation and the inability of end users to fully customize the source code (Naqvi et al., 2025).

Testing in LC/NC environments is often limited and challenging to automate, thereby hindering the implementation of software engineering principles based on quality standards such as ISO/IEC 25010 (Khorram et al., 2020).

On the other hand, LC/NC platforms are not only utilized by small organizations but have also been adopted within enterprise environments, thereby increasing the demand for robust quality assurance (Azmy et al., 2023)

The greatest challenge currently faced is how to adapt the ISO/IEC 25010 standard originally developed for traditional software engineering systems so that it can be effectively applied within the dynamic and heterogeneous LC/NC ecosystem. In this context, insights derived from industrial case studies are essential, particularly in selecting LC platforms based on the quality attributes defined by ISO/IEC 25010 (Farshidi et al., 2021).

Meanwhile, the LC/NC approach offers significant potential for data and business process integration, but it must be accompanied by a robust quality evaluation framework to ensure that system resilience and reliability are not compromised (Saarinen, 2024).

In response to these concerns, several studies have attempted to develop testing methodologies and quality evaluation frameworks based on ISO 25010, specifically adapted for LC/NC platforms such as the development of no-code platforms for automated system integration (Oppel & Grechenig, 2025).

A decision-making model for selecting appropriate LC/NC solutions based on ISO 25010 quality dimensions highlights that functional suitability and interoperability are key to long-term success (Challakhi & Rosenberger, 2023)

With the increasing adoption of LC/NC platforms across various sectors, from public services (Losada, 2026) to education (Petrou, 2024), it is crucial to establish a quality evaluation approach that not only addresses technical aspects but also considers the perspectives of non-programmer users.

Therefore, this study aims to analyze the quality of Low-Code and No-Code application development using the ISO/IEC 25010 standard as the primary reference. It is expected that this approach will produce a practical and relevant evaluation framework that enhances the reliability and sustainability of applications developed through the LC/NC approach.

2. METHOD

This study employs a Systematic Literature Review (SLR) supported by bibliometric analysis using VOSviewer software. This approach enables an in-depth examination of the current literature to understand the quality analysis of Low-Code No-Code application development using the ISO/IEC 25010 standard. With the assistance of VOSviewer, thematic relationships can be visualized to provide a comprehensive overview of the topic. The SLR facilitates the identification of research trends, literature gaps, and recommendations for future research directions. Bibliometric analysis allows for the mapping of relationships between themes, topics, and keywords in literature related to the quality analysis of Low-Code No-Code application development based on the ISO/IEC 25010 standard.

The Systematic Literature Review (SLR) was conducted based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol. Data were collected from scientific databases such as PubMed, Scopus, and Springer. The inclusion criteria consisted of:

a) Articles published within the last five years (2020–2024).
b) Focused on quality analysis of Low-Code No-Code application development using the ISO/IEC 25010 standard.

VOSviewer was used to conduct the bibliometric analysis by identifying key keywords, relationships between topics, and research trends. Data extracted from the selected databases were processed to generate visual maps that reflect the quality analysis of Low-Code No-Code application development using the ISO/IEC 25010 standard

3. RESULTS & DISCUSSION

This study aims to present a quality analysis of Low-Code No-Code application development using the ISO/IEC 25010 standard, based on the Systematic Literature Review method and journal articles published between 2020 and 2024, with the support of the VOSviewer application. The visualization results generated by VOSviewer are as follows:

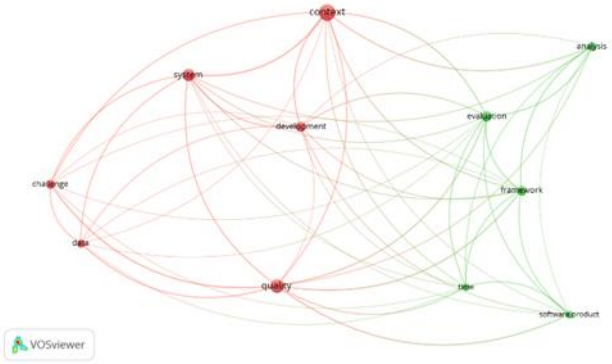

Figure 1. Network Visualization

Figure 1 presents a network visualization generated using the VOSviewer software. This visualization illustrates the relationships among key terms that frequently appear within a collection of academic documents or literature. In the figure, nodes (circles) represent keywords, while the lines connecting the nodes indicate relationships or associations based on their co-occurrence frequency.

The colors in the network represent clusters, which are formed based on contextual similarity or conceptual proximity between terms. For example, the red cluster includes keywords such as context, system, development, quality, data, and challenge, highlighting a focus on system development issues and contextual challenges. Meanwhile, the green cluster contains terms such as analysis, evaluation, framework, time, and software product, which emphasize evaluation processes and analytical frameworks in software product development.

The size of each node reflects the level of importance or frequency of occurrence of the keyword within the analyzed corpus larger nodes indicate more frequent occurrences. Additionally, thicker lines between nodes signify stronger associations between the respective terms. This figure is valuable for understanding the conceptual structure and thematic relationships within the specific field of study in a visual and intuitive manner.

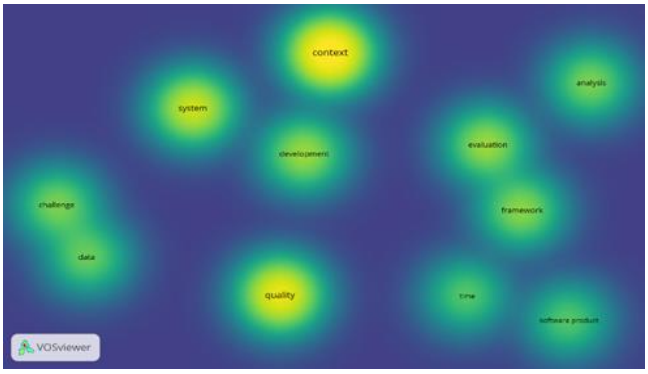

Figure 2. Density Visualization

Figure 2 presents a density visualization generated using VOSviewer software. This visualization illustrates the intensity or density of key term occurrences within a collection of scientific literature or data, based on their frequency and inter-term relationships. In this figure, areas with brighter colors typically yellow or light orange indicate regions with a high concentration of frequently occurring keywords that are also strongly connected to other terms. Conversely, darker areas such as deep red signify lower intensity or keyword density.

Each point or area in this visualization represents a specific keyword, where higher brightness and density indicate greater prominence or dominance of the keyword within the examined topic network. For instance, keywords such as context, development, and system generally appear at the center with the brightest coloration, indicating that these terms are central to many relationships and frequently occur across various documents. In contrast, terms such as challenge or software product may appear in darker regions due to their relatively lower frequency or connectivity.

This density visualization allows researchers to quickly identify the main focus or core areas of interest within the analyzed literature. As such, the figure serves as a valuable tool in bibliometric analysis for understanding the distribution and dominance of themes within a particular field of study.

A multi-criteria decision-making model based on the Analytical Hierarchy Process (AHP) was applied to perform a comparative evaluation of various Computerized Maintenance Management System (CMMS) alternatives (Meira et al., 2020). This method enables the assessment of CMMS quality levels based on a set of functional and non-functional features, structured into a hierarchical framework consisting of five main criteria and sixteen sub-criteria, aligned with the ISO/IEC 25010:2011 standard. The study demonstrated the application of the proposed method within a synthetic foam manufacturing company, allowing for an in-depth comparison among three potential CMMS candidates and the selection of the most appropriate system according to the specific needs and requirements of the organization. It was found that the overall quality levels of the three CMMS alternatives were nearly identical, thus requiring a cost-benefit analysis to refine the decision-making process. The proposed method proved to be practical for industrial use and can reduce the risk of failure often encountered by organizations during CMMS implementation.

Based on the results, it can be concluded that the quality analysis of Low-Code No-Code (LCNC) application development based on the ISO/IEC 25010 standard was conducted through a Systematic Literature Review (SLR) of academic articles published between 2020 and 2024. To reinforce the bibliometric analysis, the VOSviewer software was used, which

generated two types of visualizations: network visualization and density visualization. The network visualization (Figure 1) revealed strong associations among key terms in LCNC research such as context, system, development, quality, and data grouped into specific clusters based on contextual similarity. Meanwhile, the density visualization (Figure 2) illustrated the intensity of keyword occurrences, with terms like context, development, and system emerging as central themes with the highest density. This indicates that the primary focus of the analyzed literature revolves around LCNC system development and its quality challenges.

These findings are supported by studies applying the Analytical Hierarchy Process (AHP) approach to evaluate the quality of CMMS based on the ISO/IEC 25010:2011 standard (Meira et al., 2020). The evaluation was structured into five major criteria and sixteen sub-criteria, encompassing both functional and non-functional aspects. A case study in a synthetic foam manufacturing company demonstrated the effectiveness of the AHP method in comparing and selecting the most suitable CMMS for the organization's needs. However, given that the quality levels of the three CMMS options were relatively similar, a supplemental cost-benefit analysis was needed to achieve optimal decision-making. This highlights that the ISO/IEC 25010 standard is not only useful for assessing technical quality but also highly relevant for supporting strategic decision-making processes including within the context of LCNC application development.

Overall, this study confirms that quality evaluation methods based on ISO/IEC 25010, when integrated with bibliometric visualization techniques and decision-making models such as AHP, can provide a systematic and accurate framework for assessing and selecting software solutions even in the expanding landscape of LCNC platforms. This is especially important given the limited availability of quality assessment tools in LCNC development environments. Thus, a flexible yet standardized approach is essential to ensure successful system implementation across various sectors.

4. CONCLUSION

Based on the findings obtained through a Systematic Literature Review approach and visual analysis using VOSviewer, it can be concluded that the development of Low-Code No-Code (LCNC) applications is gaining increasing attention in scientific literature, particularly in the context of quality evaluation based on the ISO/IEC 25010 standard. Both the network and density visualizations reveal that terms such as context, development, and system are central points of focus in LCNC research, indicating that development context and system-

level considerations are dominant concerns in quality assessment. Furthermore, the study by Meira et al. (2020) demonstrates that the application of the Analytical Hierarchy Process (AHP), when integrated with ISO/IEC 25010, can support an objective and systematic decision-making process for selecting optimal software systems despite challenges that arise when the quality differences among alternatives are minimal. This underscores the importance of adopting adaptive and standards-based methods in evaluating the quality of complex and diverse LCNC applications.

Based on the results and findings of this study, it is recommended that developers and organizations adopting Low-Code No-Code platforms consider implementing ISO/IEC 25010-based quality models comprehensively, including often-overlooked non-functional aspects such as usability, maintainability, and portability. The use of visualization tools such as VOSviewer is also encouraged to better understand research trends and primary development focuses. In addition, decision-making methods like AHP should be combined with cost-benefit analysis to ensure that software selection is based not only on technical quality but also on implementation efficiency. Moving forward, the development of more flexible and LCNC-compatible quality assessment tools is urgently needed to enable more effective evaluation in non-traditional development environments

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