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Measuring Innovation in New Zealand Construction Organisations: Developing a Measurement Tool for New Zealand's Medium and Large Companies

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Abstract
New Zealand's construction industry is the cornerstone of economic development and the labour force but is slow in innovation when compared to other sectors. To minimise this problem, this research developed a comprehensive, multidimensional tool which measures and improves innovation inside medium and large construction companies of New Zealand. The developed tool measures innovation through two main dimensions: Innovation Potential - consisting of categories such as Workforce Skills, Organisational Structure, Business Strategy, Technology, and External Influences - and Business Innovation Score, which measures the actual innovation outputs of the company. A mixed-methods research approach was used for the development, testing, and validation of the tool, and includes case studies and expert feedback. results reflect the tool's ability to identify innovation barriers and drivers, and later demonstrates practical advice for industry users. The study demonstrates a new framework especially tailored for the New Zealand construction industry's environment. The tool allows innovation adoption while it improves the performance of the organisations. This research also demonstrates the adaptability of the tool for application in international construction environments. These characteristics make the tool it a significant contribution toward addressing innovation challenges in the today's construction industry.

Keywords
Innovation, Measurement, Tool

1 Introduction

1.1 Background: Importance of Innovation in Construction and its Impact

In the construction industry, innovation is the successful production and adoption of new processes, ideas, practices, or products , with the aim of boosting organisational efficiency and performance. Innovation also includes adopting better methods, that could be either technology-based or organisational, and that allow construction companies to manage growing complexities and to achieve improved project outcomes (Fei et al. 2022).

Innovation in the construction industry, especially through the implementation of new and emerging technologies such as automation, new construction techniques, and digital tools, has hugely changed how buildings are designed and built. The main benefits consist improvements in quality, work efficiency, productivity, and health and safety. Technologies like GPS, sensor technologies, BIM (Building Information Modelling), and UAVs (Unmanned Aerial Vehicles) are being used for design, data visualisation, and collaboration goals, and offer a competitive leverage to the companies that use them (Chen et al. 2022).

Collaborative relationships in construction projects significantly influence the innovation process. Factors such as reluctance, inexperience, and cost are considered barriers to innovation, while strong commitment and teamwork drive collaborative innovations in construction projects. The industry has also been negatively affected by low levels of digitalisation and inefficient project management, with many firms preferring traditional business procedures (Lo and Kam 2021).

The construction industry requires disruptive change to improve its outcomes, and this can be achieved through both technical and non-technical innovations. Fragmentation, in particular, creates barriers to innovation, as temporary project teams disband after project completion, making it difficult to retain and transfer knowledge (Adafin et al. 2022).

During this research, to reach a standard definition for innovation and to encompass a vast range of definitions from the extant literature, the definition given by the Oslo manual 2018 (OECD/Eurostat 2018), was chosen. The document defines innovation as: “A new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)”.

1.2 Challenges in Construction Innovation: Globally and in New Zealand

New Zealand’s small market size and limited competition are significant barriers to innovation. The conservative approach in procurement practices, coupled with a focus on the lowest bid rather than best value, negatively influences the adoption of innovative solutions in the construction industry (Ying et al. 2022).

The construction industry faces specific challenges in measuring innovation due to its heavily regulated environment and the unique nature of its products—no two construction projects are identical. This fact is the underlying cause of why it is difficult to apply standardized innovation metrics. These standard metrics are usually designed for industries with more consistent processes and products (Lo and Kam 2021).

It is common to see innovation in the construction industry as an enabler of better quality, productivity, and overall performance. This is while, the construction industry is usually reluctant towards novel approaches and demonstrates a high resistance to any change. This reluctance is to some extent a result of high risks that are inherent with innovation, especially when innovations are seen as possible failures instead of potentials for success (Er 2020).

2 Research Gap

The New Zealand construction industry deals with very specific problems such as low productivity rates, absence of competition, and very low investment in high-tech practices. Programmes like the BRANZ industry transformation agenda have been developed to help innovation, but the New Zealand construction industry is very slow in adopting new methods (Adafin et al. 2022).

The challenges of innovation measurement in construction industry of New Zealand are compounded by the need for ongoing innovation, which is necessary for companies to remain in the competition. We can tailor Key performance indicators (KPIs) to correctly measure innovation, and this would balance the need for innovation with the need for reaching sensible results in the organisation (Augustine and Imayavaram 2021). The need for New Zealand specific innovation measurement tools and the focus on measuring intangible results are important in the New Zealand construction sector.

By reviewing the previous literature, it becomes evident that there exists a huge gap in the field of innovation measurement within the construction industry of New Zealand. For example, there is very low empirical data on to what extent, internationally standard innovations, are adopted within New Zealand. This in turn, gives an opportunity for research to fulfil these gaps (Adafin et al. 2022).

Making a robust tool for measuring innovation inside the New Zealand construction industry needs a comprehensive approach that adopts both cultural and process indicators. This method will guarantee that the tool is useful for the special needs of the industry and provides meaningful results that can improve innovation within the industry (Augustine and Imayavaram, 2021).

The main purpose of this research is to help develop and validate a tool that measures innovation within New Zealand's construction industry. By utilising the existing research on measurement of innovation, this paper is an attempt to build a comprehensive understanding of how innovation can be quantified in an industry which is characterised by its special challenges. This aim is also supported by the Ministry of Business, Innovation and Employment (MBIE), in an attempt to improve sustainability and growth in infrastructure and technology developments (Ministry of Business, Innovation and Employment 2023).

This paper supports the development of a new tool to address these gaps for evaluating innovation in medium and large construction companies.

3 Research Aim and Objectives

In this research we aim to develop a comprehensive and diagnostic tool to practically measure innovation within medium and large construction organisations in New Zealand. This tool will support the identification and improvement of innovation abilities. It will also help address the current gaps in innovation measurement inside the construction sector.

To achieve this aim, this paper will address the following objectives:

1. We will conduct a comprehensive literature review of existing publications on the measurement of innovation.
2. We will develop a holistic and industry-tailored tool for measuring innovation within New Zealand construction organisations.
3. We will embed and test the diagnostic ability of the tool through case studies with selected medium or large construction organisations in New Zealand. This will evaluate the tool's application in real-life scenario.
4. We will investigate the tool's reliability and validity to measure innovation.
5. Finally, we will provide recommendations and advice to improve innovation measurement capability inside the New Zealand construction organisations.

4 Existing Innovation Measurement Frameworks and their shortcomings

Innovation measurement has seen growing attention because of its critical role to improve sustainability, competitiveness and productivity. Different frameworks, like the Oslo Manual and the Global Innovation Index, were developed for assessing innovation at different research levels. These tools and frameworks develop valuable advice for processes relating to innovation and its results. This is while they often fail to address the industry-specific problems of the construction industry. What follows are a number of existing innovation measurement frameworks from around the world. We will highlight their limitations and look at the gaps that define the necessity of a construction-specific tool that is all-encompassing.

The Oslo Manual innovation measurement framework categorises innovation into product and process innovation. While both types are essential for improving firm-level efficiency and productivity, but its application to the construction sector is limited. This fact makes it difficult to scale and standardise innovation adoption and development amongst different projects (OECD/Eurostat 2018).

International Standard, ISO 56000 series, (International Organization for Standardisation [ISO], 2025), are a series of publications developed by Technical Committee ISO/TC 279 Innovation management, which define terms for and establish the fundamental concepts and principles of innovation management. ISO/TC 279 attempts "Standardisation of terminology, tools, methods and interactions between relevant parties to enable innovation" (International Organization for Standardization [ISO], n.d.). It facilitates for the organisations to disseminate their innovation management's best practices. These standards are a collection of best practices beginning from the top management's leadership and leveraging on the support of the organization's strategy. The standard is designed to support innovation in organizations whatever origin, type, size etc are (ISO, n.d.). The issue with this set of documents, is that they mainly focus on long term companies. This series, comprising of 10 different documents comprehensively offer a tool for innovation, even within the construction industry. Considering the document's size and also recentness, it will be interesting to see its implementation in the coming years, especially in the temporary, short term construction projects.

The Innovation Process Model, which is originally developed for the Software Development industry, is used to manage technology development in construction materials. Its detailed process allows clarity but is better to be used within large companies. It relies on long cycles of development and consists of methods that are resource-intensive (Mishra et al. 2020). Simons' Levers of Control Framework has the ability to balance existing strategies and at the same time explore new opportunities. This is while its Diagnostic Control Systems could not fully capture sustainability-focused innovations, and its dependence on collaboration among the stakeholders results in alignment challenges, especially in industries like construction which are fragmented (Ruiter et al.2022).

The Dynamic Network SBM can measure innovations bearing green technology. This is achieved by incorporating spatial and dynamic factors. This tool effectively measures environmental impacts. But it relies on huge data which leads to difficulties in applying it to the construction industry, where data is scattered (Wang and Ren 2022). The Comprehensive Innovation Measurement Tool measures innovation within multiple dimensions. The dimensions include knowledge, education, technology outputs, and infrastructure. Its special focus on agricultural industry demonstrates its limited ability for addressing the wide range of challenges inside the construction industry (Farsani et al. 2024). The SIMM-Q has special attention on micro-level social innovations. This is done by collaboration and synchronised activity. The negative side of it is that not scalable for larger and more complex industries like construction (Ødegård et al. 2021).

The critical analysis of existing innovation measurement frameworks, tools, and models reveals significant gaps, particularly when applied to the construction industry. Despite the variety of approaches aimed at fostering and assessing innovation, these tools often fail to fully address the complexities of the construction sector. This highlights a clear gap in the literature and demonstrates the urgent need for the development of a comprehensive innovation measurement tool tailored specifically for the construction industry.

The New Zealand government has emphasized the need for innovation as a key driver for growth and sustainability in the construction sector, through agencies such as the Ministry of Business, Innovation and Employment (MBIE), which continues to invest in infrastructure and technology developments (MBIE 2023). However, current tools and frameworks for measuring innovation potential and outcomes, particularly those relevant to project-based industries like construction, do not fully capture the scope and impact of innovation activities.

5 Methodology

This research decided to benefit form a three-stage research methodology in an attempt to achieve triangulation. The first stage, being a literature review, gathered a number of indicators and questions using previously published research. These materials were used to comprehend a tool for measuring innovation in the construction organisations. During the second stage of this research, this tool was tested on two study case companies totalling 10 respondents. This allowed for gaining feedback from respondents, refining, and further developing the tool. For the third stage of the research, the tool was eventually shared with the subject matter experts for gaining their feedback, further developing the tool and also validating the findings of stage 1 and stage 2 by completing the third side of the triangulation.

5.1 Development of the Measurement Tool

This research developed a holistic and multidimensional innovation measurement tool for New Zealand's construction organisations. This developed tool is made up of two major sections addressing the diverse innovation-related issues in the New Zealand construction organisations. The first section measured the 'potential' of innovation in the company, and this was done by measuring the 5 categories as follows: Workforce Skills and HR Management, Organisational Structure, Business Strategy, Technology, and External Influences. The innovation measurement tool follows by measuring the 'actual' innovation of the case company under investigation. This score is known as the 'Business Innovation Score' of the company. Eventually, the 'overall Score' of the organisation under study will be produced. It is the average of potential score and actual score measured by responding to the "Business Innovation Measurement (Potential + Score)" questions of the innovation measurement tool.

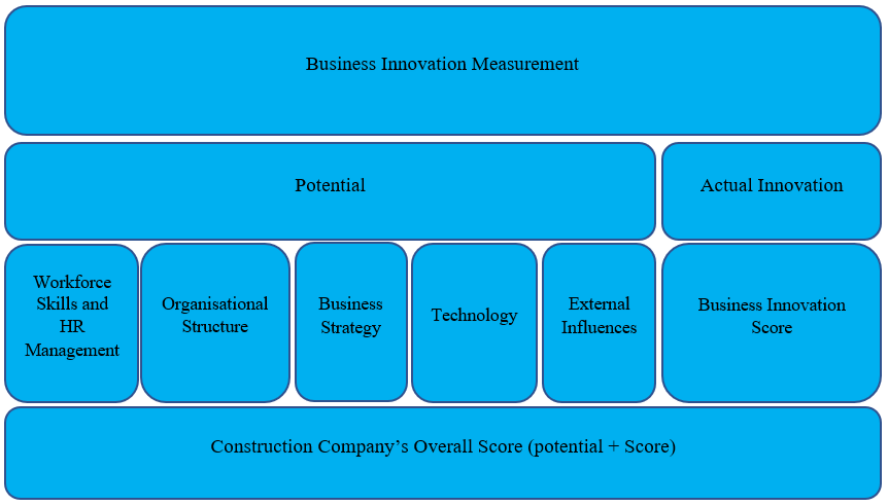


Figure 1: Business Innovation Measurement Framework

5.2 Case Studies

The case study research adopted a semi-structured, in-depth set of interview questions to collect qualitative and quantitative data from the respondents within two medium and large construction companies in New Zealand. These interviews permitted the detailed study of each organisation's innovation potential and also its business innovation capability.

After this stage, following the collection of data from the two study case organisations, the tool was given to the subject matter experts (SMEs) who reviewed the framework, gave insights, and evaluated its usefulness in the construction industry. This data led to further improvement of the innovation measurement tool and improved its practicality and also its validity.

6 Results

The results of the research demonstrated a detailed investigation of the indicators affecting innovation potential in the New Zealand construction industry, with a specific focus on five key categories given below. These indicators were developed to measure the "potential" for innovation in construction companies. They provide a comprehensive framework for measuring and improving innovation within the construction companies. Through the application of this framework to two organisations under study, data about the specific strengths and weaknesses of each category was found. This in turn led to practical recommendations for boosting innovation capabilities within the construction industry.

6.1 Workforce Skills and Human Resource Management

In this research, the indicators for workforce skills and human resource management category were found to be important components affecting the potential of construction organisations for innovation. These indicators are given in the table below:

Table 1: Indicators for Innovation Potential: Workforce Skills and HR Management

Cognitive abilities	Entrepreneurialism	Partnerships	Employee performance
Adaptability and flexibility	Creativity	Commitment	External involvement
Social skills	Autonomy	Innovation non-resistance	R&D capability
Systems skills	Collaboration	Not fearing from risking	Communication

The measurement from the two study cases demonstrated differences in how these indicators were. Case study 1 (CS1) showed high adaptability and collaboration, external involvement and effective communication, from its employees. This is while, low scores were measured in promoting creativity and entrepreneurialism. Case study 2 (CS2) showed great results in R&D capability while it depicted challenges in fostering employee autonomy. This data shows the importance of having a balance between technical skills and culture that supports and strengthens innovation.

6.2 Organisational Structure

The results of the case studies affirmed the fact that a company's structure has a great impact on its innovation ability. Key indicators are as follows:

Table 2: Indicators for Innovation Potential: Organisational Structure

Organisational support	Recruitment policies	Knowledge management
Upper management support	Employee recognition	Lessons learned
Innovation Champion	Incentives	Career development

The results of the two study cases showed different numbers within this category. CS1 has a strong upper management support for innovation and strong recruitment policies. This leads to a robust platform for innovation practices. At the same time, it scored low on comprehensive career development plans that could have had long-term benefits for the company. CS2's results found that there were problems in some areas, including mechanisms for lessons learned. This restricted CS2s capability to strongly innovate. These results demonstrate the important role of the indicators of the organisational structure category for fostering an innovation-supporting environment.

6.3 Business Strategy

A well designed and correctly applied business strategy was understood to be crucial for matching innovation with the plans of the organisation. The indicators for this category are as follows:

Table 3: Indicators for Innovation Potential: Business Strategy

Strategic Plan	Innovation Strategy	Multiple market focus
Strategy communication	Finish price focus	In-house sourcing
Progress monitoring	Quality focus	Lifecycle focus

The results demonstrated that CS1 has a robust lifecycle focus and effective progress monitoring mechanisms, which guarantee innovation to be within the company's business strategy. On the other

hand, CS2 scored lower in this category, due to its emphasis on quality and price. These results showcase the high impact of focusing on a strategic plan which fosters innovation.

6.4 Technology

Through this research, Technology was understood to be an important aspect of innovation potential. The indicators for this category are as follows:

Table 4: Indicators for Innovation Potential: Technology

Innovation awareness	Innovative designers	Presence of technology	Digital technologies
Problem-solving techniques	Design capabilities	Technical expertise	

The results from the research on the study cases showed that amongst the two companies, the level of technology usage was different. CS1 adopted technology to some extent. It scored well in digital tools and problem-solving techniques. Conversely, it scored low with technical expertise within the different departments of the company. CS2 scored high in design capabilities while it holds low awareness of the technical trends in today's construction world. This research found that technological investment must be together with the development of expertise within the organisation and accompanied with awareness to have the highest impact on innovation.

6.5 External Influences

It was also found that External factors have a high impact on the potential of the company to innovate. The indicators for this category are as follows:

Table 5: Indicators for Innovation Potential: External Influences

Product markets	Market demand	Subsidies
Labour market	Competition	External grants
Contractor's expertise	Standards	Contracts
Innovation demand	Finances	Tender process
Client's understanding	Jurisdiction	Society
Fragmentation	Tax	Social responsibility
Project-baseness	Infrastructure	Sustainability
High costs	Macroeconomy	Response to Environment
Suppliers	Government	Environmental barriers

The case studies found different outcomes to the indicators of external influences category amongst the two companies. CS1 was comfortable with the market demand and competition but it had issues related to standards and Finances. CS2 was happy with the level of external grants that it had access to and was also comfortable with meeting environmental expectations but scored low due to having problems with fragmentation and limited client understanding. These results demonstrate the necessity for construction organisations to synchronise their innovation strategies with external opportunities and barriers.

6.6 Business Innovation Score

The results from the Business Innovation Score (BIS) indicators demonstrated some differences and some similarities between the two construction companies. Case study 1 gained an overall score of 2.89, and similarly case study 2 gained a score of 2.87. although there was small difference in the scores, but the diagnostic analysis of the responses to the indicators showed great contrast in how the two companies viewed innovation.

The employees of CS1 were optimistic about their innovation output this is while they discussed the areas that need attention for the improvement of the company's innovation potential. These recommendations included but were not limited to improving the strategic focus of the company and more carefully distributing the resources of the company. The respondents of CS2 showed more optimism towards their company's innovation potential and thought that the company's innovation output should be higher in the future.

By conducting this research, the significance of the 36 questions of the Business Innovation Score were validated, and their relevance to measure innovation in the construction industry was approved. Respondents and subject matter experts (SMEs) approved the indicators' ability to diagnose a company's capabilities to innovate. In addition, the findings were consistent with existing literature and approved the importance of the tool's indicators.

6.7 Tool Diagnostics: Insights Gained

There was significant focus on the diagnostic capabilities of the innovation measurement tool during this research. Respondents agreed that diagnostics provide practical advice in the areas needing improvement within their companies. One respondent said that the tool allowed the diagnosis of trendy norms inside the organisation, and also measures the outcomes relevant to innovation. This further supports organisational research and results in alignment with the direction of the company's policies. The analysis of the collected data affirmed that the tool allows targeted improvements and permits organisations to focus on specific concerns which innovation can provide resolutions for.

Respondents also mentioned that the tool provides a platform to compare perspectives from multiple organisational levels and this can address discrepancies and can also potentially fulfil knowledge gaps. This process found to be beneficial for aligning senior management's support for innovation with the operational needs within all organisational levels.

In addition, the tool's design, that includes a structured set of questions and provides visual results, for instance spider diagrams, was found to be exceptionally useful for studying organisational readiness. Respondents approved that the tool is "thought-provoking," and noted that it allows a deeper perspective of how innovation synchronises with business-as-usual processes and wider organisation's strategic goals, simultaneously. These results allow management teams to prioritise resources to areas needing help in an attempt to foster innovation.

In conclusion, the results provided a strong platform allowing comparison of the innovation performance amongst multiple levels of the organisation and also guides future plans for innovation. By collecting comprehensive results from all of the respondents, the tool was endorsed for its ability to improve organisation's capability and innovation performance in a systematic way. The following spider diagram represents the category scores for CS1 and CS2.



Diagram 1: Category Scores for CS1 and CS2

7 Discussion

The innovation measurement tool developed through this research, addresses critical gaps in the construction sector's capability to measure and improve innovation. By focusing simultaneously on the business innovation score and the innovation potential score, the tool provides a comprehensive framework for evaluating organisational preparedness and actual innovation capability. Respondents affirmed that the tool not only measures innovation, but it also diagnoses areas needing actions for improvement.

An important benefit of the tool lies in its ability to fill the gap amongst innovation potential and actual innovation results. The tool eases the diagnosis of indicators that cause a barrier towards the company's innovation, while it offers advice about strategic areas for improvement.

The diagnostic capabilities of the innovation measurement tool also help create an data-cantered platform for making decisions. By assisting organisations to quantitatively measure their innovation practices, the tool helps a culture of continuous improvement and strategic collaboration. In addition, the tool's application in New Zealand's construction companies demonstrates its applicability and adaptability, while it provides a model that can be replicated for the use of other sectors and regions.

7.1 Relevance to Global Practices

While the developed innovation measurement tool, is initially designed for New Zealand's construction organisations, it holds great adaptability for broader application in other working environments. Due to the detailed development processes of this tool, it is easy to modify and apply to other construction industries around the world. In addition, the tool has the potential for application beyond the construction industry, as its questions can be changed to be suitable for other industries within New Zealand and in other parts of the world. This flexibility makes the tool a valuable instrument for the measurement of innovation in a diverse range of industrial environments.

The conducted interviews during the data collection process, supported that the tool can make use of periodic reviews, such as annual data collections. This can provide an understanding on how innovation-related strengths and weaknesses have been changing within time. This iteration-based study allows organisations to benchmark their innovation scores and compare them with previous

years' scores. This in turn will support company's continuous improvement and will provide valuable information for the policies and strategies of the organisation.

The comprehensively detailed design of the tool, with some modifications, supports its application at both industry and organisational levels of research. This capability is consistent with attempts around the world to standardise the measurement of innovation, and it offers a pathway and an opportunity for benchmarking and comparing data between different organisational mediums. The tool's emphasis on detailed diagnostics and strategic collaboration guarantees that the tool can improve innovation practices within different sectors or regions.

In addition, the results achieved from the tool's application inside case companies, confirm the potential for its use as an analysis-based and valuable instrument within industries facing similar challenges to the construction industry. Decision makers and managers from around the world can implement this tool to find solutions and respond to the gaps in innovation practices and to develop a stronger environment for continuous development.

This potential for adaptability, joined with with the tool's systematic approach, makes it a valuable instrument for improving innovation measurement practices, locally and internationally.

8 Limitations

The research had to deal with numerous limitations that shaped its results and demonstrated opportunities for further research. The research had its focus only on medium (20 to 49 FTE employees) and large (50 or more FTE employees) construction companies within New Zealand. Small companies that have less than 20 employees were not included within the scope of research. This limits the generalizability of the findings to small companies.

Research on innovation has its complexities that are exacerbated with not having a unanimous definition for innovation. Although in recent years, publications such as the Oslo manual 2018 (OECD/Eurostat 2018), and the ISO 56000 series (ISO, 2025), have made good progress into standardisation of innovation, including its definition and measurement, a unanimous agreement on this terminology is still not globally reached. During this research, the respondents were required to be acquainted with relevant definitions before the interviews, and this added an additional task during the preparation and was an attempt to avoid potential bias. In addition, the comprehensiveness of the "Business Innovation Measurement (Potential + Score)" tool needed the interviewees to answer to multiple detailed questions. This in turn extended the time required for collecting data. While the comprehensiveness of the tool is very beneficial, this fact enforced challenges in the moderation of the interview sessions to maintain the focus of the respondents.

9 Recommendations for Future Research

Future studies must consider studying a greater number of construction organisations to develop industry benchmarks. Future research must study how small construction companies adopt and measure innovation. This will improve the tool's usefulness and address the problems inherited by smaller companies. Although the tool covers a broad range of knowledge, future improvements can encompass specialised questions and indicators or even benefit from digital technology to minimise the time and effort needed for the collection of information. This will improve the tool's practicality for a larger study population. Using artificial intelligence and adopting advanced technologies and chatbot features for the collection of data, and also for diagnostics can lead to better data collection and user friendliness. Currently the tool gathers data at the organisational level. Future iterations can

expand the tool's scope to industry-wide or just project-level studies. This will provide further detailed insights into the dynamics of innovation in the industry. As innovation practices evolve and technologies improve, the tool must maintain its adaptability. Periodic updates and further studies will be necessary to guarantee the tool's continued compatibility in the New Zealand's construction industry and even beyond.

10 Conclusion

The presented research successfully developed a comprehensive innovation measurement tool for application in New Zealand's construction companies. The tool will address both Innovation Potential and the Business Innovation Score. This tool's validity was examined through detailed application in study cases and was also consulted with subject matter experts. This process confirmed the relevance of the tool and demonstrated its practicality for studying the potential for and the output of innovation in construction organisations. The findings demonstrated that the tool's indicators, present meaningful answers to innovation-related challenges that require attention. The tool also focuses on the potential to improve innovation activities. The tool's ability to diagnose has demonstrated to be essential for finding gaps that could improve innovation and support a systematic process for ongoing improvements in the company. The tool aims to help both construction companies and legislative bodies. Through giving detailed diagnostics, the tool allows organisations to find and respond to innovation deficiencies in a systematic process. This process will ensure coordination with the strategic targets of the organisation. Decision makers may use the tool for benchmarking industry-wide KPIs and support planned responses to strengthen innovation in the construction companies. In addition, the visual results of the tool, for example the spider diagrams, offer tangible advice for beneficiaries, and guarantee that the innovation strategies are both based on real results and are also practical.

The tool can be modified for other similar industries and locations. This potential offers a flexible possibility for the measurement of innovation. It is advised to apply this measurement tool periodically - perhaps even in a longitudinal study - to review improvements and deficiencies and improve on the needs of innovation-related activities. This approach will support and contribute towards a sustainable growth within the organisation.

In conclusion, this research improves the measurement of innovation within the construction industry of New Zealand. It also sets a foundation for broader applications in other parts of the world. By adhering to existing gaps and facilitating continuous improvement, the presented tool provides potential for the development of transformative strategies, and as a result will enhance innovation capabilities across a wide range of organisational environments.

11 References

Adafin, J., Wilkinson, S., Rotimi, J. O. B., MacGregor, C., Tookey, J., & Potangaroa, R., 2022. Creating a case for innovation acceleration in the New Zealand building industry. *Construction Innovation*, 22(1), pp.185–204. Available at: https://doi.org/10.1108/CI-10-2018-0081.

Augustine, R. & Imayavaram, V., 2021. Progressive action on measuring innovation in business. *IOSR Journal of Business and Management*, 23(11), pp.6–10. Available at: https://doi.org/10.9790/487X-2311030610.

Chen, X., & Chang-Richards, A., 2022. Technology implementation status and perceived benefits: A study of New Zealand construction organisations. *IOP Conference Series: Earth and Environmental Science*, 1101(8), 082020. Available at: https://doi.org/10.1088/1755-1315/1101/8/082020.

Er, M., 2020. A holistic view of barriers to innovation in Australian construction. *International Journal of Engineering and Technology*, 12(2), pp.22–26. Available at: https://doi.org/10.7763/IJET.2020.V12.1178.

Farsani, E. D., Choobchian, S., & Naghani, M. S., 2024. Comprehensive identification, localization, and validation of innovation measurement indices at the farm level in Iran. *Frontiers in Sustainable Food Systems*, 8, 1365687. Available at: https://doi.org/10.3389/fsufs.2024.1365687.

Fei, J. Y., Zhao, N., & Tookey, J., 2022. Achieving construction innovation in best value procurement projects: New Zealand mega projects study. *Construction Innovation*, 22(2), pp.388–403. Available at: https://doi.org/10.1108/CI-11-2020-0182.

International Organization for Standardization. (n.d.). *ISO/TC 279 – Innovation management*. ISO. Retrieved February 8, 2025, from https://committee.iso.org/home/tc279

International Organization for Standardization. (2025). *ISO 56000:2025 – Innovation management – Fundamentals and vocabulary* (2nd ed.). ISO. https://standards.iteh.ai/catalog/standards/iso/b60ef95d-dfdf-48bf-8b32-d9ba6d45abe7/iso-56000-2025

Lo, J. T. Y., & Kam, C., 2021. Innovation performance indicators for architecture, engineering, and construction organisations. *Sustainability*, 13(16), p.9038. Available at: https://doi.org/10.3390/su13169038.

Ministry of Business, Innovation and Employment (MBIE) 2023, *National Construction Pipeline Report 2023*, MBIE, Wellington, Retrieved 8 February 2025, https://www.mbie.govt.nz/dmsdocument/27910-national-construction-pipeline-report-2023

Mishra, D. K., Yu, J., & Leung, C. K. Y., 2020. An innovation process model for technology development and adoption in construction. *The Indian Concrete Journal*, 94(9), pp.44–53.

OECD/Eurostat 2018, *Oslo Manual 2018: Guidelines for collecting, reporting and using data on innovation*, 4th edn, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris, viewed 8 February 2025, https://doi.org/10.1787/9789264304604-en.

Ødegård, A., Waldahl, R., Willumsen, E., Iakovleva, T. & Strype, J. 2021, 'The conceptual and methodological development of the Social Innovation Measurement Model Questionnaire (SIMM-Q)', *Academic Quarter*, vol. 23, pp. 156–171, https://doi.org/10.5278/academicquarter.vi23.7035.

Ruiter, H., De Feijter, F., & Wagensveld, K., 2022. Management control and business model innovation in the context of a circular economy in the Dutch construction industry. *Sustainability*, 14(1), p.366. Available at: https://doi.org/10.3390/su14010366.

Stats NZ, 2023. New Zealand's construction industry: Key statistics. Available at: https://www.stats.govt.nz.

Wang, Q., & Ren, S., 2022. Evaluation of green technology innovation efficiency in a regional context: A dynamic network slacks-based measuring approach. *Technological Forecasting & Social Change*, 182, p.121836. Available at: https://doi.org/10.1016/j.techfore.2022.121836.

Ying, F. J., Zhao, N., & Tookey, J., 2022. Achieving construction innovation in best value procurement projects: New Zealand mega projects study. *Construction Innovation*, 22(2), pp.388–403. Available at: https://doi.org/10.1108/CI-11-2020-0182.