International Journal of Scientific Research and Modern Technology (IJSRMT) ijsrmt.com
Volume 5, Issue 11, 2026
DOI: https://doi.org/10.38124/ijsrmt.v5i11.1821

Risk Management Improvement Priorities for Sustainable Building Project Delivery in Port Harcourt Metropolis, Nigeria: An Urban and Regional Planning Perspective

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Publication Date: 2026/11/26

Abstract

Building construction projects are important components of urban development because they shape the physical environment, support economic activities and influence the quality, safety and sustainability of urban settlements. However, construction projects are exposed to financial, technical, organisational, environmental and regulatory risks that can undermine sustainable project delivery. This study assessed building professionals' priorities for improving risk management practices in building construction projects in Port Harcourt City and Obio/Akpor Local Government Areas of Rivers State, Nigeria, with particular attention to the implications for urban and regional planning. A quantitative cross-sectional survey was conducted among quantity surveyors, builders, architects, engineers and project managers. Of the 298 questionnaires administered, 291 were returned, representing a response rate of 97.65%. The data for the improvement measures were analysed using mean scores and the Relative Importance Index (RII). The results showed that all twelve measures were considered useful, with mean scores ranging from 4.06 to 4.36 and RII values from 0.812 to 0.873. Training professionals and site staff ranked first (mean = 4.36; RII = 0.873), followed by the adoption of formal risk management procedures (4.32; 0.864), improved funding and prompt payment (4.29; 0.858), and regular audits and post-project reviews (4.28; 0.856). The findings also identified the need to strengthen development control, improve the efficiency of building approval processes, involve stakeholders early and integrate environmental and social considerations into project planning. The study concludes that improving construction risk management requires coordinated action by construction professionals, clients, developers and public institutions responsible for physical planning and development control. The findings provide practitioner-based evidence for strengthening the contribution of building project management to sustainable urban development.

Keywords: *Building Construction; Risk Management; Sustainable Project Delivery; Development Control; Urban and Regional Planning; Port Harcourt.*

I. INTRODUCTION

Building construction is an important component of urban development. Buildings provide residential accommodation, commercial premises, institutional facilities and other structures required to support the social and economic activities of urban populations. The location, design, construction and management of these buildings influence land-use patterns, infrastructure demand, environmental quality, public safety and the overall character of urban settlements. Consequently, the delivery of building projects is not exclusively a technical

Ekekezie , C. U., Ofoezie, P. U., Nzekwe , J. U., & Amaifeobu, C. O. (2026). Risk Management Improvement Priorities for Sustainable Building Project Delivery in Port Harcourt Metropolis, Nigeria: An Urban and Regional Planning Perspective. *International Journal of Scientific Research and Modern Technology*, *5*(11), 54–62. https://doi.org/10.38124/ijsrmt.v5i11.1821

or professional concern; it also has implications for urban and regional planning.

Sustainable urban development requires the coordination of physical development, infrastructure provision, environmental management, institutional arrangements and the needs of different urban stakeholders. The United Nations Human Settlements Programme (UN-Habitat, 2015) identifies integrated planning, effective implementation and coordinated institutional action as important elements of sustainable urban and territorial development. Similarly, the New Urban Agenda emphasises the importance of well-planned and well-managed urbanisation in achieving inclusive, safe, resilient and sustainable human settlements (United Nations, 2017). These planning objectives depend partly on the quality and reliability of individual development projects, including building construction.

Building projects are, however, exposed to several forms of risk. These include inadequate funding, delayed payment, fluctuations in material prices, design and construction uncertainties, inadequate professional competence, weak supervision, poor communication, approval delays and weaknesses in regulatory enforcement. When these risks are not adequately identified, assessed and managed, they can contribute to cost overruns, delays, disputes, rework, environmental problems and unsatisfactory project outcomes. Such consequences extend beyond individual project sites because poorly delivered buildings can affect neighbourhood safety, infrastructure coordination, environmental quality and the orderly development of urban areas.

Risk management provides a structured approach to identifying, analysing, evaluating, treating, monitoring and communicating risks. ISO 31000:2018 presents risk management as an integrated organisational process that should inform decision-making and the achievement of objectives (International Organization for Standardization [ISO], 2018). In construction, risk management involves the identification of potential threats, assessment of their likelihood and consequences, selection of appropriate responses, allocation of responsibilities and continuous monitoring throughout project implementation. Its effective application therefore requires the participation of clients, consultants, contractors, regulators and other stakeholders.

The relationship between construction risk management and urban planning is particularly important in rapidly developing urban areas. Building projects operate within a spatial and regulatory environment governed by land-use arrangements, development plans, building approval procedures, infrastructure systems and environmental requirements. Planning authorities influence where and how development takes place, while building professionals are responsible for translating project requirements into physical structures. The two functions are connected: weaknesses in project-level risk management can undermine the objectives of development control, while delays and uncertainties in the regulatory environment can create additional risks for construction projects.

The planning dimension of risk is also reflected in research on urban resilience. Sáenz de Tejada et al. (2024) identify urban planning, design, governance, infrastructure and building-related interventions as important components of strategies for improving urban resilience. Wyndham et al. (2021) similarly demonstrate that land-use planning and regulatory arrangements can influence the construction or reduction of disaster risk in urban areas. These perspectives suggest that sustainable building delivery should be understood within the wider context of urban development management.

Port Harcourt metropolis provides a relevant setting for examining these issues. The metropolis comprises Port Harcourt City and Obio/Akpor Local Government Areas and accommodates substantial building development associated with residential, commercial, institutional and industrial activities. Building professionals operating in the metropolis must respond to project-specific risks as well as the financial, environmental and regulatory conditions within which construction takes place. The original study identified delayed payment, unstable funding, material-price increases, delays in building approval and weak enforcement of building regulations among the major challenges affecting risk management implementation.

Although these challenges have been identified, improving risk management requires more than recognising the existence of risks. It also requires an understanding of the measures that practitioners consider most useful for addressing them. This is important because improvement strategies must respond to the weaknesses identified in actual project practice and must also recognise the responsibilities of the different institutions and professionals involved in urban development.

Against this background, this study assesses building professionals' priorities for improving risk management practices in building construction projects in Port Harcourt metropolis. It further interprets the findings from an urban and regional planning perspective, particularly in relation to development control, regulatory coordination, stakeholder participation, environmental management and sustainable urban development.

II. LITERATURE REVIEW AND PLANNING PERSPECTIVE

- *Risk Management in Building Construction*

Risk management is a systematic process for dealing with uncertainty that may affect project objectives. ISO 31000:2018 provides principles and guidelines for integrating risk management into organisational activities and decision-making (ISO, 2018). In building construction, the process commonly involves risk identification, analysis, evaluation, treatment, monitoring and communication.

Construction projects are particularly exposed to uncertainty because they involve several participants, interdependent activities, financial commitments, technical decisions and changing site conditions. Risks may originate from clients, consultants, contractors, suppliers, regulatory institutions, project environments and wider economic conditions. Iqbal et al. (2015) identify risk management as an important aspect of construction project management, while Wang et al. (2004) emphasise the need for a structured risk management framework that responds to the conditions of construction projects in developing countries.

The effective management of these risks requires more than the identification of possible problems. Project organisations must establish procedures for assessing risks, assigning responsibilities, making adequate contingency provisions, monitoring emerging conditions and recording lessons from completed projects. Where these processes are absent or inconsistently applied, construction teams may respond to problems only after they have occurred.

- *Improvement Measures for Risk Management*

Risk management improvement measures involve organisational, financial, professional, technical and regulatory interventions intended to strengthen the way project risks are handled. Professional training is important because the identification and assessment of risks require relevant knowledge and practical competence. A formal risk management procedure provides a consistent framework for identifying, recording, assigning and monitoring risks. A risk register can support this process by providing a documented record of identified risks, their possible consequences, assigned responsibilities and proposed responses.

Adequate funding is also important. Risk management activities require financial resources for professional services, monitoring, training, investigations, safety provisions and contingency planning. Delayed payment and unstable funding may weaken the ability of project participants to respond to identified risks. Similarly, contingency allowances should be informed by assessed project risks rather than determined solely by arbitrary or fixed percentages.

Regular audits and post-project reviews can help organisations identify weaknesses in project implementation and retain lessons for subsequent projects. Stakeholder participation is also important because clients, consultants, contractors, host communities and regulatory agencies may possess different information about project risks. Early involvement can improve communication, clarify expectations and reduce avoidable disagreements.

Other improvement measures include stronger supervision, enforcement of building regulations, efficient approval processes, environmental and social safeguards, insurance arrangements and the use of digital tools for project monitoring and documentation. These measures are complementary rather than mutually exclusive. Their usefulness depends on the nature of the project, the institutional environment and the capacity of the organisations responsible for implementation.

- *Risk Management and Urban and Regional Planning*

Urban and regional planning provides the framework through which land use, physical development, infrastructure, environmental protection and settlement growth are coordinated. Building construction takes place within this framework and is subject to planning requirements, development control procedures and applicable building regulations. Consequently, project-level risk management has implications for the achievement of wider planning objectives.

First, development control and building approval processes influence the location, design and implementation of building projects. Uncertainty or delay in approval procedures can affect project schedules, costs and the coordination of development with infrastructure provision. Strengthening the efficiency and consistency of these procedures can therefore support more predictable and orderly urban development.

Second, environmental and social risk management contributes to the protection of neighbourhoods and urban communities. Construction activities can generate waste, noise, dust, pollution, traffic disruption and other effects that extend beyond project boundaries. Integrating environmental and social requirements into project planning can help reduce adverse effects on surrounding land uses and communities.

Third, stakeholder participation is relevant to both project management and planning practice. Early engagement with clients, host communities, professionals and relevant public institutions can improve information exchange and help identify risks that may not be visible to individual project participants.

Fourth, urban resilience depends partly on the capacity of buildings and infrastructure to withstand, adapt to and recover from hazards. Planning and building decisions that ignore exposure, site conditions, drainage, environmental constraints and regulatory requirements may contribute to vulnerability. Urban resilience literature therefore supports the integration of risk considerations into planning, design and development management (Sáenz de Tejada et al., 2024; Wyndham et al., 2021).

This study does not directly measure the performance of planning authorities, the effectiveness of development control or the spatial distribution of building risks. Rather, it uses building professionals' assessments of risk management improvement measures to identify priorities with implications for the management of the built environment.

- *Conceptual Position of the Study*

The study adopts the position that improved risk management in building construction can support sustainable project delivery and contribute to wider urban

development objectives. The relationship can be understood through three connected levels.

At the project level, professionals and organisations are responsible for risk identification, assessment, planning, monitoring, funding, supervision and documentation. At the institutional level, clients, developers, professional bodies and regulatory agencies influence the availability of resources, the coordination of responsibilities and compliance with relevant requirements. At the urban development level, the combined quality of project decisions affects the safety, environmental performance, infrastructure coordination and orderly development of urban settlements.

The planning relevance of the study therefore lies in the implications of the identified improvement priorities for the management of physical development. It does not assume that respondents' ratings establish the actual effectiveness of the measures or prove that implementing them will automatically produce sustainable urban development.

III. RESEARCH METHODOLOGY

- *Research Design and Study Area*

The study adopted a quantitative cross-sectional survey design. The research was conducted among building professionals involved in building construction projects in Port Harcourt City and Obio/Akpor Local Government Areas of Rivers State, Nigeria. The study area is an urban environment characterised by continuing building development and the involvement of professionals from different construction disciplines.

The study focused on five categories of building professionals: quantity surveyors, builders, architects, engineers and project managers. These professionals were considered relevant because their responsibilities involve different aspects of project planning, costing, design, construction, coordination and supervision.

- *Population, Sample and Data Collection*

The sampling frame used in the original study comprised 735 professionals across the five categories. This figure was derived from a reported Rivers State-wide professional population and was used as a preliminary basis for sample-size determination. It was not a verified count of eligible professionals practising exclusively in Port Harcourt City and Obio/Akpor. This geographical limitation is recognised in interpreting the findings.

Using the sample-size procedure adopted in the original study, 298 questionnaires were administered through stratified sampling and proportional allocation among the five professional categories. A total of 291 questionnaires were returned, representing a response rate of 97.65%. The returned questionnaires formed the basis of the analysis.

The questionnaire was structured into sections addressing respondents' characteristics, construction risks, application of risk management activities, perceived effectiveness of risk management practices, sustainable project delivery, implementation challenges and measures for improving risk management. The present article focuses on the improvement measures assessed in Section G.

- *Validity and Reliability of the Instrument*

The original research instrument was subjected to expert review for face and content validity. The panel comprised eight experts drawn from academics in building and construction management and practising professionals with relevant experience in risk management. Their assessments informed revisions to the questionnaire.

A pilot study involving eight professionals outside the two study Local Government Areas was conducted to identify problems relating to wording, order, layout and completion time. Cronbach's alpha was calculated for the relevant reflective scales measuring the five risk management practices, producing a value of 0.70. The reliability coefficient is reported for those practice scales and is not presented as a separate reliability estimate for the improvement-measure items or the sustainability indicators.

- *Method of Data Analysis*

The improvement measures were analysed using mean scores and the Relative Importance Index (RII). Respondents assessed the usefulness of each measure on a five-point Likert scale, ranging from 1 (not useful) to 5 (extremely useful).

The Relative Importance Index was calculated using the following formula:

$$RII = \frac{\Sigma W}{A \times N}$$

Where:

W = the weight assigned to each response;
A = the highest possible weight on the rating scale (5); and
N = the number of valid responses (291).

In this expression, ΣW represents the sum of the weights assigned to all valid responses for a particular improvement measure. The RII therefore expresses the weighted score for each measure as a proportion of the maximum possible score.

The mean scores and RII values were used to rank the measures according to their perceived usefulness. The rankings were subsequently interpreted alongside the findings on the application of risk management activities and the challenges affecting implementation.

No hypothesis was tested for the improvement measures. The analysis was descriptive and intended to establish practitioners' perceived priorities rather than

demonstrate the actual effectiveness of the proposed interventions.

IV. RESULTS

- *Building Professionals' Assessment of Risk Management Improvement Measures*

The results show that the twelve improvement measures received mean scores ranging from 4.06 to 4.36, with an overall mean of 4.23. Their RII values ranged from 0.812 to 0.873. The results indicate that respondents generally considered all the measures useful for improving risk management practices in building construction projects.

Table 1 Building Professionals' Assessment of Risk Management Improvement Measures

Improvement Measure	Mean	SD	RII	Rank
Train professionals and site staff in risk management	4.36	0.70	0.873	1
Adopt a formal risk management procedure or plan	4.32	0.73	0.864	2
Improve funding arrangements and ensure prompt payment	4.29	0.74	0.858	3
Carry out regular audits and post-project reviews and share lessons learned	4.28	0.76	0.856	4
Base contingency allowances on assessed risks	4.26	0.73	0.852	5
Build environmental and social requirements into project plans	4.25	0.73	0.851	6
Employ qualified professionals and strengthen site supervision	4.24	0.75	0.847	7
Involve all stakeholders, including the client and host community, early in risk identification	4.22	0.76	0.844	8
Strengthen enforcement of building regulations and speed up approvals	4.20	0.76	0.841	9
Use a risk register on every project	4.19	0.79	0.838	10
Use insurance and performance bonds on building projects	4.12	0.83	0.824	11
Use digital tools for monitoring, records and reporting	4.06	0.83	0.812	12

Source: Field Survey (2026)

Training professionals and site staff ranked first, with a mean score of 4.36 and an RII of 0.873. This indicates that respondents placed the greatest priority on improving the competence of professionals and site personnel involved in managing construction risks. The result highlights the importance of developing the capacity of project participants to identify, assess, communicate and respond to risks throughout the construction process.

The adoption of a formal risk management procedure ranked second, with a mean of 4.32 and an RII of 0.864. This suggests that respondents considered an organised and documented approach to risk management important for improving consistency in project decisions. Such procedures can provide a basis for identifying risks, assigning responsibilities, recording responses and monitoring changes during project implementation.

Improving funding arrangements and ensuring prompt payment ranked third, with a mean of 4.29 and an RII of 0.858. This result reflects the importance of financial capacity in implementing risk management activities. Where clients delay payment or project organisations lack adequate funds, activities such as professional training, site monitoring, risk assessment and contingency planning may be weakened.

Regular audits and post-project reviews ranked fourth, with a mean of 4.28 and an RII of 0.856. The result indicates that respondents considered continuous review and the documentation of lessons learned important for improving future project performance. Audits can help identify deviations from planned procedures, while post-project reviews can provide evidence for improving organisational practice.

Basing contingency allowances on assessed risks ranked fifth, with a mean of 4.26 and an RII of 0.852. This indicates that respondents favoured a risk-informed approach to contingency planning rather than relying exclusively on fixed allowances. Such an approach may help project teams make more realistic financial provisions for uncertainties associated with site conditions, materials, design, construction and other project requirements.

The integration of environmental and social requirements into project plans ranked sixth, with a mean of 4.25 and an RII of 0.851. This measure is particularly relevant to urban and regional planning because building projects interact with surrounding land uses, infrastructure and communities. Environmental and social considerations can include waste management, pollution prevention, site safety, community engagement and the management of construction-related disturbances.

Employing qualified professionals and strengthening site supervision ranked seventh, with a mean of 4.24 and an RII of 0.847. Early involvement of stakeholders, including clients and host communities, ranked eighth, with a mean of 4.22 and an RII of 0.844. These results demonstrate the importance of professional competence, effective supervision and stakeholder coordination in managing risks that may affect project implementation.

Strengthening the enforcement of building regulations and speeding up approval processes ranked ninth, with a mean of 4.20 and an RII of 0.841. Although

this measure did not occupy the highest position, its ranking is significant because the original study also identified approval delays and weak enforcement as major challenges affecting risk management implementation.

The uses of a risk register ranked tenth, with a mean of 4.19 and an RII of 0.838. Insurance and performance bonds ranked eleventh, with a mean of 4.12 and an RII of 0.824, while digital tools for monitoring, records and reporting ranked twelfth, with a mean of 4.06 and an RII of 0.812. Their lower positions should not be interpreted as indicating that these measures are unimportant. Rather, the relatively narrow difference between the highest and lowest mean scores suggests that respondents considered all twelve measures useful, although some were given higher priority.

- *Relationship Between Improvement Priorities and Identified Implementation Challenges*

The improvement measures become more meaningful when considered alongside the challenges identified in the original study. The comparison shows that several highly ranked measures directly address weaknesses observed in the application of risk management practices.

Training ranked first among the improvement measures, while inadequate professional training was identified as a significant implementation challenge. The adoption of formal procedures ranked second, while the absence of a formal risk management policy or procedure was also identified as a challenge. Improved funding and prompt payment ranked third, corresponding with the prominence of financial constraints and delayed payment among the reported challenges.

Regular audits and post-project reviews ranked fourth, while the recording of lessons learned was among the least applied risk management activities. Similarly, risk-based contingency planning ranked fifth, even though contingency allowances based on assessed risks were identified as the least applied activity in the original study.

The planning and regulatory implications are also evident. Strengthening building regulation enforcement and speeding up approvals ranked ninth among the improvement measures, while delays and uncertainty in the approval process and weak enforcement of building regulations were among the major challenges reported by respondents. These findings show that risk management improvement requires action not only within construction firms but also within the institutional environment responsible for regulating physical development.

V. DISCUSSION OF FINDINGS

- *Professional Training as the Highest Improvement Priority*

The ranking of professional and site-staff training as the most important improvement measure demonstrates the value respondents attach to competence in risk management. Construction risks are diverse and may arise at different stages of a project. Professionals therefore require the ability to identify potential problems, evaluate their consequences, determine suitable responses and communicate risk information to relevant project participants.

Training is also relevant to the coordination of building development within urban areas. Professionals who understand the implications of site conditions, environmental requirements, development control and building regulations are better positioned to recognise risks that may affect not only the project but also its surrounding environment. From an urban and regional planning perspective, professional capacity development should therefore include an understanding of the relationship between building projects, land-use requirements, infrastructure, environmental safeguards and community interests.

The result supports the view that risk management should be treated as a continuous professional responsibility rather than an activity undertaken only when problems arise.

- *Formal Risk Management Procedures and Institutional Accountability*

The second-place ranking of formal risk management procedures indicates the importance of institutionalising risk management within project organisations. A formal procedure can establish a consistent process for identifying risks, documenting decisions, assigning responsibilities and monitoring responses. It can also improve accountability by making it easier to determine who is responsible for addressing particular risks.

This priority has implications for the management of urban development. Building projects are implemented by different professionals and organisations whose responsibilities must be coordinated. A documented risk management procedure can improve the exchange of information between clients, consultants, contractors and other relevant stakeholders. It may also support better coordination between project organisations and institutions responsible for planning approvals and development control.

The result is consistent with the principles of ISO 31000:2018, which emphasise the integration of risk management into organisational governance, decision-making and operational processes (ISO, 2018).

- *Funding, Prompt Payment and the Financial Sustainability of Projects*

The third-place ranking of improved funding and prompt payment highlights the financial conditions required for effective risk management. Construction projects depend on the availability of funds to undertake planned activities, engage competent professionals, procure materials, maintain site operations and respond to unforeseen events. Delayed payment may disrupt these activities and reduce the capacity of project participants to manage identified risks.

The finding is particularly important because financial constraints and delayed payment were among the major challenges reported in the original study. The result suggests that improving risk management cannot be achieved solely through technical procedures or professional training. Clients and developers must also provide reliable financial arrangements that enable project teams to implement the measures required for effective project delivery.

In urban development, financially unstable projects may contribute to prolonged construction activities, incomplete developments and inefficient use of land and infrastructure. Prompt payment and realistic project funding can therefore support more predictable implementation of building projects.

- *Audits, Post-Project Reviews and Organisational Learning*

Regular audits and post-project reviews ranked fourth. The result indicates that respondents recognise the importance of reviewing project activities and retaining lessons from completed projects. Audits can help identify whether risk management procedures are being followed, whether assigned responsibilities are being discharged and whether planned responses remain appropriate as project conditions change.

Post-project reviews are equally important because they provide opportunities to document the causes of delays, cost variations, disputes, environmental problems and other implementation difficulties. This information can be used to improve future project planning and management.

From a planning perspective, institutional learning can also support better development management. Lessons relating to site conditions, drainage, environmental effects, approval processes and community concerns can inform subsequent projects and improve coordination between project participants and relevant public institutions.

- *Environmental and Social Requirements in Building Project Planning*

The integration of environmental and social requirements ranked sixth. Although it was not among the first five measures, its high mean score and RII indicate that respondents considered it an important component of risk management improvement.

Building projects can generate environmental and social effects that extend beyond the boundaries of individual sites. These may include waste generation, dust, noise, pollution, traffic disruption, safety concerns and complaints from neighbouring communities. Integrating environmental and social requirements into project plans can help identify such effects early and provide opportunities for appropriate mitigation.

This finding establishes a direct relationship between building project management and urban and regional planning. Planning seeks to coordinate physical development with environmental protection, infrastructure provision and community interests. The management of construction-related environmental and social risks therefore contributes to the wider objective of ensuring that building development is compatible with the surrounding urban environment.

The result is consistent with the wider urban resilience literature, which identifies the integration of environmental, infrastructure and governance considerations as important for resilient urban development (Sáenz de Tejada et al., 2024).

- *Development Control, Building Regulations and Approval Processes*

Strengthening the enforcement of building regulations and speeding up approvals ranked ninth among the twelve measures. This result is important because the original study also identified approval delays and weak enforcement as significant challenges affecting risk management implementation.

Building approval and development control are important components of urban planning administration. They provide institutional mechanisms through which proposed development can be examined in relation to applicable planning and building requirements. Where approval processes are uncertain or enforcement is inconsistent, project participants may face additional financial, administrative and scheduling risks.

The findings suggest that improving construction risk management requires effective coordination between building professionals and the public institutions responsible for physical planning and development control. Regulatory agencies can contribute by improving the clarity of approval requirements, strengthening inspection and monitoring arrangements, promoting consistent enforcement and reducing avoidable administrative delays.

This interpretation is consistent with Wyndham et al. (2021), who demonstrate that land-use regulatory frameworks and planning practices can influence the creation or reduction of disaster risk. It also reflects the integrated approach to urban and territorial planning advocated by UN-Habitat (2015).

However, the present study assessed professionals' perceptions of the usefulness of strengthening enforcement and speeding up approvals. It did not independently measure the performance of any planning authority or establish the actual causes of approval delays. Such institutional performance questions require separate investigation using administrative records, agency-level data and other relevant evidence.

- *Stakeholder Participation and Urban Development Coordination*

Early stakeholder involvement ranked eighth. This result highlights the importance of involving clients, host communities and other relevant participants in identifying

risks before project implementation advances. Different stakeholders may possess information about site conditions, local activities, access requirements, infrastructure constraints and potential environmental or social effects.

In urban and regional planning, public participation and institutional coordination are important for ensuring that development decisions take account of different interests and local conditions. The involvement of stakeholders in construction risk identification can therefore improve communication between project organisations and the communities within which projects are implemented.

This is particularly relevant where building activities may affect neighbouring properties, roads, drainage systems, public spaces and community facilities. Early engagement may help identify potential conflicts and provide opportunities for appropriate responses before they become more difficult and expensive to resolve.

- *Lower-Ranked Measures and Their Continuing Importance*

The use of a risk register, insurance and performance bonds, and digital monitoring tools occupied the tenth, eleventh and twelfth positions respectively. These rankings should not be interpreted as evidence that the measures are unnecessary. The mean scores and RII values remained relatively high, and the difference between the highest and lowest mean scores was only 0.30.

The comparatively lower ranking of digital tools may reflect the fact that respondents placed greater immediate priority on professional competence, formal procedures and financial arrangements. Nevertheless, digital systems can support the documentation, monitoring and communication of project risks. Their usefulness is likely to depend on the availability of appropriate infrastructure, trained personnel and organisational capacity.

Similarly, risk registers and insurance arrangements can support risk documentation and financial protection. Their effectiveness depends on whether they are integrated into project procedures and used consistently rather than treated as isolated administrative requirements.

The findings therefore suggest that the improvement measures should be considered as an integrated package. Higher-ranked measures may require immediate attention, but lower-ranked measures remain relevant to a comprehensive risk management system.

VI. IMPLICATIONS FOR URBAN AND REGIONAL PLANNING

The findings have several implications for urban and regional planning practice.

First, planning and development control institutions should strengthen coordination with building professionals and project organisations. Building approval procedures, inspection arrangements and development control requirements should be sufficiently clear and predictable to reduce avoidable uncertainty in project implementation. This does not mean relaxing regulatory standards; rather, it requires improving administrative efficiency while maintaining compliance with applicable planning and building requirements.

Second, environmental and social risk considerations should be incorporated into the planning and implementation of building projects. Project-level risk management should pay attention to waste management, drainage, pollution prevention, site safety and the effects of construction activities on neighbouring land uses and communities. These considerations are important for reducing negative externalities associated with physical development.

Third, professional development programmes should incorporate the planning and environmental dimensions of construction risk management. Building professionals need technical competence, but they also need to understand how building projects interact with land-use arrangements, infrastructure networks, development control and urban resilience.

Fourth, clients and developers should establish reliable funding and payment arrangements. Financial uncertainty can weaken the implementation of risk management measures and contribute to delays and incomplete development. Improved financial planning can therefore support more predictable project implementation.

Fifth, stakeholder participation should be encouraged at the early stages of building project planning. The involvement of clients, host communities, professionals and relevant public institutions can improve risk identification and reduce avoidable conflicts during implementation.

Finally, professional organisations and public institutions should encourage the adoption of formal risk management procedures, risk registers, periodic audits and post-project reviews. Such arrangements can improve organisational learning and support more consistent project delivery across the urban environment.

These implications should be understood as planning and management recommendations derived from the survey findings. The study did not directly test the performance of planning institutions or measure the effects of these interventions on urban development outcomes.

VII. CONCLUSION AND RECOMMENDATIONS

This study assessed building professionals' priorities for improving risk management practices in building construction projects in Port Harcourt metropolis, with particular attention to their implications for urban and regional planning. The findings showed that all twelve

improvement measures were considered useful by respondents. Training professionals and site staff ranked first, followed by the adoption of formal risk management procedures, improved funding and prompt payment, regular audits and post-project reviews, and risk-based contingency allowances.

The results also demonstrate that the improvement of construction risk management is connected to wider urban development concerns. The integration of environmental and social requirements, early stakeholder participation, stronger enforcement of building regulations and more efficient approval processes are relevant to the coordination and management of physical development. These measures can support improved project implementation and contribute to the broader objectives of sustainable urban development.

The study recommends that construction organisations provide regular risk management training for professionals and site personnel and adopt formal procedures for identifying, assessing, recording and monitoring project risks. Clients and developers should establish realistic funding arrangements and ensure prompt payment to support the implementation of planned risk management activities. Project organisations should also undertake regular audits, conduct post-project reviews and document lessons learned.

In addition, contingency allowances should be based on assessed project risks, while environmental and social requirements should be incorporated into project planning. Building professionals should involve relevant stakeholders early in the risk identification process. Public institutions responsible for physical planning and development control should improve the clarity and efficiency of approval procedures and strengthen the consistent enforcement of applicable building regulations.

The study contributes practitioner-based evidence on the relative priority of measures for improving risk management in building construction projects. Its contribution to urban and regional planning lies in demonstrating how project-level risk management priorities intersect with development control, environmental management, stakeholder coordination and sustainable management of the built environment. However, the results represent professionals' perceptions of usefulness and do not establish the actual effectiveness of the measures. The use of a preliminary state-wide sampling frame, rather than a fully verified local register of eligible professionals, also limits the extent to which the findings can be generalised beyond the study population.

Future research should examine how the implementation of these improvement measures affects actual project outcomes and should independently assess the relationship between construction risk management, development control performance and the sustainability of urban development.

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