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Research Article

Strategic Planning Model for a Construction Company in the Event of an Earthquake

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Abstract

Among all the disasters, earthquakes pose significant danger to the lives of people and buildings that are still under construction. The requirements argue that there is a need for hard-and-core planning to deal with impacts of earthquakes on constructions. This paper also partly focuses on the evolving of the strategies on the construction companies for the regions which are sensitive to earthquakes based on the SWOT, EFE and IFE prospective and analysis of strengths and weaknesses. The model developed in this paper is useful in helping construction companies prepare and respond to-earthquake contingencies in construction projects. This includes market information and competitor data and resources and threats, business targets and any other that relates to business legality, markets and targets. Partitions in this paper are company vision and mission, company SWOT analysis, earth-quake risks, company strategy, and company performance. However, it also discusses how to adapt for and assess SWOT, and the conditions before and after an earthquake occurs. This model will create a strong platform for the construction companies dealing with the earth-quake resistant constructions with a forecast of sustainability and preparedness. The following are the plans that were drawn to create novel strategies towards handling the responses to quakes and to extend the enterprise. Although the model can be developed farther, proper usage of resources, effective and efficient employee involvement and establishment of control over cost will improve the responses to earthquakes. The information helps to make a better protection of earthquakes in construction dealing with urging Companies to take better preparations. The paper persists in calling on the construction firms to carry on innovating their approaches in handling its earthquake.

Keywords

Construction, Earthquakes, Strategic Planning, Seismic Areas, Risk Mitigation

1. Introduction

1.1. Background and Context

Four earthquakes that shook the world and caused a significant impact have been devastating acts that were filled with fear and panic. They have been attempting to comprehend them for centuries, the only tools available being myths and superstitions about why they occurred. Even in countries like Japan where earthquake is expected, it only had been predicted once by astrologers or even fortune teller. However, as science develops, the ability to comprehend earthquakes also improves. In 1978 the Large-Scale Earthquake Countermeasures Act was passed in Japan following which the

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government can make necessary measures to protect people and property with the help of earthquake predictions. It was a great improvement in controlling the dangers of earthquakes [17].

Different countries like Japan, China and Turkey, and so on which have frequently been witnessing earthquakes for many centuries have documented their style and timing. Earthquake occurrences were predicted to be in chronological cycles, at times so quiet, and then a huge earthquake is experienced. They also observed that sometimes earthquakes seem to propagate along specific fault lines although they did not give details why this is the case. In the case of earthquakes, they cannot be predicted with sufficient accuracy; however, learning earthshaking patterns lets the scientists find out regions or areas wherein future earthquakes are likely to occur, hence people can prepare beforehand [17].

It has been found that on average, massive earthquakes can recur, although specialists can only guess when these are going to occur, either tomorrow or decades in the future, in particular areas. This has been very helpful in changing how communities bunker up for an earthquake. For instance, it has given rise to improved standards regarding construction and preparedness in regions that are likely to be affected worse. Despite the fact it may be difficult to prevent an earthquake this knowledge is highly useful to minimize losses and avoid fatalities, which is especially important in countries that have regular earthquakes, such as Japan [17].

1.2. Statement Problem

Natural catastrophes like earthquakes pose a serious threat to people's safety and the stability of buildings in the construction business. Due to their unexpected nature, earthquakes can occur at anytime and anywhere, damaging buildings and other infrastructure. This is a difficulty for construction businesses in terms of finishing jobs and fulfilling customer requests while also assuring the security of their employees and members of the public [16]. Therefore, it is essential to have a strong strategic planning model in place to lessen how earthquakes affect construction projects. Construction businesses can identify their strengths, weaknesses, opportunities, and threats, as well as the internal and external elements that affect their performance, by using several matrices like SWOT analysis, EFE, and IFE.

1.3. Research Question

In the event of an earthquake, the need for strategic planning for construction companies cannot be emphasized enough. This article will go over a few matrices and models that can be used to create plans for dealing with the difficulties that earthquakes provide. Providing construction companies with carefully considered strategies to be ready for seismic events is the aim of this type of strategic planning. In addition to reducing the effects of earthquakes on ongoing and planned projects, these models can assist in building a strong foundation for the business itself in the event of a disaster.

1) How can building firms create plans to reduce the effect of earthquakes on current and upcoming projects?
2) Which exterior and internal elements should construction businesses focus on the most to strengthen their resistance to seismic events?
3) How do strategic models like SWOT, Space Matrix, and Balanced Scorecard contribute to earthquake resilience in construction firms?

These questions serve as a roadmap for creating a strong strategic planning procedure that guarantees operational efficacy and organizational stability during seismic events.

1.4. Objective of the Paper

The business is based on the necessity to offer increased construction solutions that would be capable to safely sustain people and possessions from earthquakes. Another advantage will be an ability to conduct market analysis, comprehend the competition, define required resources, and evaluate threats in seismic zones for the given company.

The model includes all the target markets, projects along with the requisite business resources that are required by the business. It also considers factors such as legal regulations that include the building bye laws. The model provides a framework to prepare for goal accomplishment and guarantees that the firm can address earthquakes appropriately [10].

In alignment with this goal, the following four objectives have been established for the business:

1) Deliver High-Quality Earthquake-Resistant Construction Solutions: This will ensure that all the construction assignments achieve the vision and aspiration of delivering quality structural construction to the resistance of earthquakes.
2) Conduct Comprehensive Market Research: Conduct and schedule periodic market analysis, competitors and customers to guide organizational performance and overall services delivery.
3) Ensure Compliance with Legal and Regulatory Requirements: Ensure strict compliance with all the legal requirements of building construction and penalty for noncompliance for all projects to meet the required legal and safety requirements.
4) Develop a Sustainable Business Model: Development of strategy maps for the organization and determination of WRF, HB, and ROC for construction management that focuses on safety, efficiency, and sustainability and prepare the business to mitigate risks related to earthquakes [10].

The organization needs to provide better construction solutions which would allow to protect the people and property from the risks associated with the frequent earthquakes. Moreover, the business wants to conduct market research, understand competitors, determine essential resources, and

assess risks in seism areas.

Moreover, for the company to do business amidst the menace of earthquake and effectively accomplish its business of offering construction services, then it has to have a Vision & Mission Statement. An important aspect of realization of these objectives is the development of these statements, which inform a strategic management process. The mission statement describes the main objectives and principles of organization while the vision statement draws the picture of the company's long-term prospects [20]. To achieve the best results, a company must have a clear and compelling mission and vision. A company can give its employees a sense of direction and purpose by defining its core values and objectives. This will motivate and inspire them to work together to achieve a common objective [19]. It can be especially crucial for a construction company to have clearly defined mission and vision statements to build buildings that are secure and earthquake resistant. By relying on their creativity and using sustainable building strategies, companies could develop structures that will fulfill clients' requirements as well as benefit the society and the eco-system [13].

1) Mission Statement:
   a. Complete on time and on budget high-quality earthquake-resistant construction projects.
   b. Establish enduring bonds of trust, respect, and openness with customers, staff, and stakeholders.
   c. Promote an environment that values excellence, innovation, and safety in all facets of our work.
   d. Aid in the growth and development of the local economies in the areas we serve.
2) Vision Statement:
   a. Be known as the region's top supplier of earthquake-resistant construction solutions.
   b. Establish a name for excellence and innovation within the sector.
   c. Generate value for customers, shareholders, and staff.
   d. Continually increase our capabilities and services to meet the changing demands of our customers and communities.
   e. Promote sustainable development by including social and environmental factors in our projects [20].
3) Core Principles:
   a. Safety comes first.
   b. Continually offering top-notch construction services
   c. The creativity and innovation that power the company.
   d. Mutually beneficial teamwork and collaboration
   e. Environmental and future generations-friendly sustainability

1.5. Research Map

This paper is organized as follows: In section II, the Vision and Mission of the company is presented with regards to earthquakes and how it links with the objective of the paper. The business analysis conducted in the third section of the strategic plan involves the completion of SWOT analysis. Section 4 is on construction risks and earthquake risk factors. Section 5 discusses the Space Factor and Space Matrix in order to enhance decision making. Section 6 covers the issue of how the model should be brought into practice. Section 7 draws up important measures a construction company must adhere to in the event of an earthquake. Section 8 employs the Competitive Profile Matrix in the analysis of construction firms in the earthquake resisting kind. In section 9 the author reveals the Balanced Scorecard as one of the tools for measuring the performance of the earthquake resilience. Section 10 brings back the SWOT analysis extending it to how weaknesses in relation to earthquake can be managed and how strengths capitalized on. The qualitative and quantitative analysis is done in section 11 whereby the company's readiness to handle an earthquake is evaluated. Section 12 analyses preparedness and response before and after the earthquake. Last, Section 13 offers a review of the major results identified during the models and tests outlined in the paper in addition to managerial conclusions and recommendations.

2. Literature Review

Strategic Planning and Risk Management for Earthquake in Construction Sector and Its Integration

Recent research has shifted to the decision process regarding earthquake hazard and loss mitigation, concern has been on human and financial costs. Fractal model earthquake modelling and assessing the socio-economic effects, emphasizing needs for community response readiness and availability of resources in management and prevention. The proposed earthquake model gives an elaborate picture of the risks, one that aligns with policies and resource allocation to improve decision-making. It also focuses on the need to maintain coordination within the local governments since the measures must devise ways of addressing identified challenges within the regions; this is more so for the developing countries that are most likely to be calamity hit due to lack of funds [15].

Likewise, this study employs an expanded theory of planned behavior to predict household disaster preparedness for an earthquake in Malaysia while including community participation and agency trust. A cross-sectional study of 550 households showed that community factors together with attitude and subjective norms influenced preparedness. The extended TPB model accounted for more variance in preparedness than the basic TPB model; however, perceived behavioral control exerted no influence. The results highlight the importance of incorporating components of an affected community into the disaster preparedness framework [21].

This paper focuses on the assessment of debris removal carried out in Ecuador after the 2016 earthquake. The report discovered that most of the actions planned emphasized simply picking up and disposing of trash rather than reintroducing or repurposing it. While there was clear regulation regarding

waste management, there were no specific rules of earthquake debris. The study also focused on how corporate social responsibility and public policy responsibility can help in managing the crisis. It outlined the fact that there exists a need to improve planning, policies, and ensuring that sustainable practices are enhanced to cater for disaster recovery in future [1].

Hospital construction is crucial during disasters since disasters are inevitable and may happen anytime. Prefab structures such as the Vulcan Mountain Hospital in Wuhan provides not only speed and efficiency. This paper enhances the management, safety and effectiveness utilization through SWOT and STPA methods which become useful for the construction companies' strategic planning during earthquakes [3].

provide construction companies with a suitable strategic framework for evaluating risk areas and vulnerabilities, utilize GIS mapping for detecting risk areas and weaknesses to increase organizational preparedness for both earthquake and post-earthquake fire hazards, the following research recommendations align with the principles of disaster management.

3. Methodology

The use of quality frameworks and data analysis to assess an earthquake readiness measure for a construction company. The strategies are proposed according to the findings in literature regarding earthquake awareness and business continuity management. The numerical data utilized in the present analysis is inferred from a planned case of enhancing the readiness for seismic risk.

3.1. Methodology Explanation

3.1.1. SWOT Analysis

According to the resource map evaluates the strengths, weaknesses, opportunities and threats of the company regarding earthquake readiness. This paper follows prior disaster preparedness studies wherein assets and liabilities have been characterized. Examples are then presented in hypothetical form to demonstrate how SWOT does aid in decision making and formulation of strategies to be taken.

3.1.2. Space Factor Analysis

This analysis is primarily concerned with factors such as Resource Control, Skilled Staff, and Materials that influence response strategies. From a disaster response perspective, it ranks such factors to enhance resource prioritization and decision making during an earthquake [5].

3.1.3. Space Matrix

The SPACE Matrix enables stakeholders to locate the company at a strategic position depending on its strengths and environmental forces. It also maps the organization in relation to external shocks against key business ratios and growth prospects. This tool identifies strategic locations for practices, guaranteeing they follow disaster preparedness without undermining the company's strengths and limitations.

3.1.4. Case Simulation

Appropriate cases include simulations of earthquakes to simulate scenarios that the company will use in formulating its response strategies. These exercises rely on an example data set to establish where issues can be found and confirm that real-life threats are properly considered with regards to the strategic model.

Thus, this methodology connects the study of earthquakes and the provision of hypothetical data to explain how the approaches can improve the company's preparedness and reduce the effects of seismic threats [5].

3.2. Framework Used in the Research on Earthquake Preparedness Strategies

This strategic planning model has been developed from comparative studies of countries' planning for earthquakes; Japan, Turkey, the United States. It is based on structural best practice, and awareness raising, and reaction strategies and thus not dependent on financial documents of organizations.

Key components include:

1) Structural Best Practices: Introducing building designs and construction materials that can help a building be resilient as found in some countries.
2) Public Awareness: Providing education to the construction teams and enlightening those members of the public who might have little clue about construction.
3) Effective Response Practices: Employing known response methods that exist in earthquake-prone countries.

The results revealed that willingness to attend to earthquake preparedness increased with income, owning a home, and time of residence in the community. Risk perception also affects decision making because people who fear an event like an earthquake will do something about it. However, in countries that experience minor earthquakes, such as Korea, people do not recognize the dangers much. However, simply enhancing preparedness is inadequate: the 'normalcy biases have to be specifically targeted. Governments should open the eyes of the people, in terms of real earthquake risks [7].

3.3. Objectives and Purpose of the Strategic Planning Mode

The model is to enhance organizational preparedness and critical dynamics control during a crisis using strategic planning based on more advanced concepts of crisis management. It encompasses anticipation, flexibility and unsustainability to minimize or even eliminate effects of disasters and enhance adequate responses. Key features include:

1) Management of Strategic Crises: Promotes the approach of being prepared to tackle each problem as it arises,

reduce impacts and mitigate disasters properly.

2) Decision-Making Based on Evidence: Leaves no room for guesswork and relies on data and research from all over the world for decisions regarding certain risks.
3) Thorough Risk Assessment: Uses instruments such as SPACE matrix to evaluate threats within and outside the organization.
4) Training and Adaptation for Employees: Educates faculty on how to react and respond to emergencies and convert to the new status quo during, before, and after natural disasters.
5) Constant Improvement: Some of them include aiding the different routine assessment procedures, for instance, bringing out crisis reports to enhance efficiency in the following incidents.

By the adoption of these principles, the model implies proper management of any crisis while enabling organizations to harness opportunity in crisis period [8].

3.4. Analysis Matrix of Earthquake Preparedness

Earthquake preparedness in relation to construction companies involves various assessment methodologies, such as SWOT Analysis, Space Factor Analysis, SPACE Matrix and the Case Simulations. Table 1 below shows SWOT analysis in relation to internal factors of Strengths and Weaknesses. While Figure 1 below depicts these aspects graphically. Figure 2 below is a presentation of the Threats while Figure 3 presents Opportunities recognized with regards to the environmental factors. Opportunities and Threats are then further aggregated in Table 2. SWOT deals with these dimensions, While Space Factor Analysis investigates Resource Space, The SPACE Matrix analyses Strategic Space and Case Simulations looks at Response Space. Together, these methodologies enhance the readiness for seismicity.

3.5. SWOT Analysis

Strengths:

1) Expertise in solutions for earthquake-resistant building
2) A solid reputation for professionalism and quality
3) Created connections with important industry participants.
4) Strong financial standing with enough resources for expansion [9].

Weaknesses:

1) Limited geographic scope because it concentrates on earthquake-prone areas.
2) Reliance on a small number of key customers for a sizeable part of revenue
3) Limited market Depending on the region, there might be a small market for earthquake-resistant structures, which could reduce the potential clientele for the business.
4) Dependence on materials can cause delays and cost overruns if suppliers are scarce or materials are difficult to find [9].

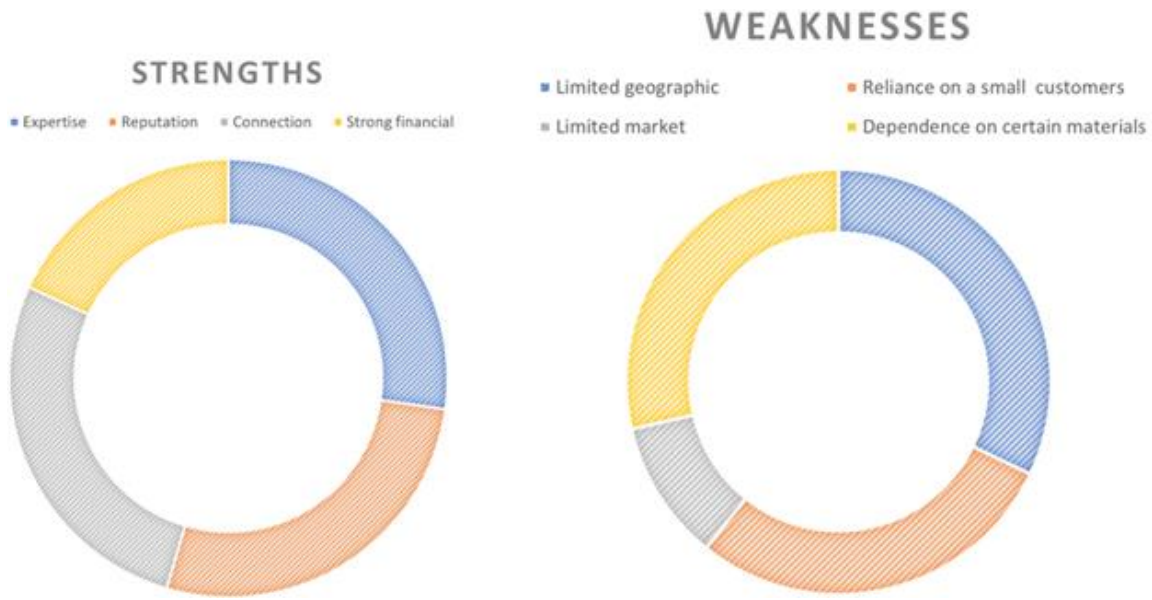

Figure 1. *Shows the key strengths and weaknesses identified in the analysis.*

3.5.1. Internal Factors

Table 1. *Internal Factors - Strengths and Weaknesses.*

Internal Factors	Weight	Rating	Score
Strengths			
Expertise in solutions for earthquake-resistant building	0.15	4	0.60
A solid reputation for professionalism and quality	0.20	3	0.60
Created connections with important industry participants.	0.15	4	0.60
Strong financial standing with enough resources for expansion	0.10	4	0.40
Weaknesses			
Limited geographic scope because it concentrates on earthquake-prone areas.	0.15	3	0.45
Reliance on a small number of key customers for a sizeable part of revenue	0.10	4	0.40
Limited market Depending on the region.	0.05	3	0.15
Dependence on certain materials	0.10	4	0.40
Total	1		3.60

The sustainable architectural firm IFE has a total score of 3.60. The highest score in Strengths is Expertise in solutions for earthquake-resistant building, A solid reputation for professionalism and quality, and Created connections with important industry participants. On the other hand, the highest score in the Weaknesses is Limited geographic scope because it concentrates on earthquake-prone areas. (The numerical data provided for internal factors has been assumed for analysis).

Opportunities:

1) Increasing awareness of earthquake threats has increased demand for earthquake-resistant construction methods.
2) Expansion outside of earthquake-prone zones and into new markets
3) Develop novel materials and technologies that will improve building efficiency and quality, going beyond the use of earthquake-resistant construction methods.
4) Forming strategic partnerships with significant industry players to boost growth and market share [6].

Threats:

1) Heavy competition in the construction business from both established and new companies
2) Economic and political instability in key markets affects demand and sales.
3) Variations in the price and supply of building materials and suppliers
4) Modifications to regulatory rules and policies that affect the norms and practices in the construction industry [6].

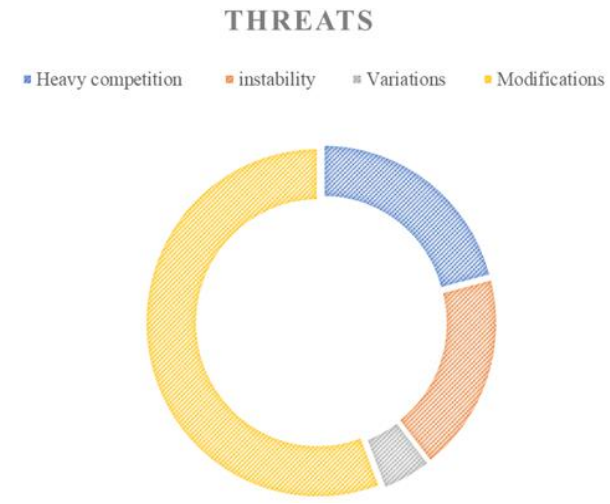

Figure 2. *External factor – threats.*

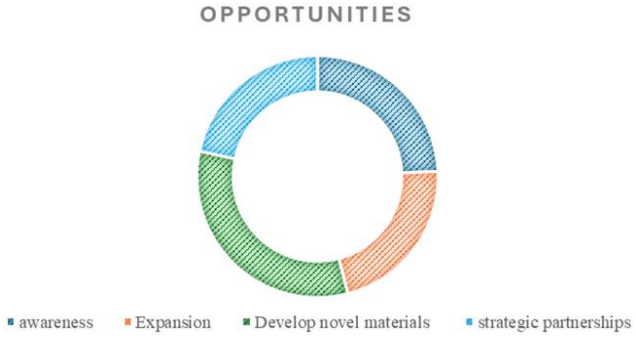

Figure 3. *External factor – opportunities.*

Table 2. External factor – opportunities & threats.

External Factors	Weight	Rating	Score
Opportunities			
Increasing awareness of earthquake threats has increased demand for earthquake-resistant construction methods.	0.15	3	0.45
Expansion outside of earthquake-prone zones and into new markets	0.20	2	0.40
Develop novel materials and technologies that will improve building efficiency and quality, going beyond the use of earthquake-resistant construction methods.	0.15	4	0.60
Strategic alliances with important industry participants to promote growth and market share.	0.10	4	0.40
Threats			
Heavy competition in the construction business from both established and new companies	0.15	3	0.45
Economic and political instability in key markets affects demand and sales.	0.10	4	0.40
Variations in the price and supply of building materials and suppliers	0.05	2	0.10
Modifications to regulatory rules and policies that affect the norms and practices in the construction industry	0.10	4	0.40
Total	1		3.2

3.5.2. External Factors

Using the criteria for evaluating business conditions and challenges, the firm earns 3.2 points out of 4, so direction of opportunities and threats is somewhat favorable. The best emerging market is the production of new materials and technologies to improve the efficiency of structures; the worst risk is high competition in construction services. (The numerical data supplied for external factors has been presumed for analysis).

Table 3. Shows the SPACE Factor for strategic analysis.

Internal Factor	External Factor
CA	IS
Earthquake Resilience Expertise •Sustainable Construction Specialized Design Excellence Established Client Satisfaction	Affordability of resources and competent workforce collaborating with other companies to handle earthquakes Matching What is required for earthquake safety Seeing Promising Opportunities
FS	ES
Responsible Resource Allocation •Investment in Skill Development Planning for an Emergency Fund Strategic Financial Administration	Climate change impacts and hazards •Selection of Long-Lasting Materials Planning for Resilience Observance of Environmental Regulations

3.5.3. Space Factor

The company has laid down a good platform in terms of experience in earthquakes, specialization and clients. It also manages resources, funds and reduces risks within the shortest time possible. In this way, the increase in expectations for environmentally friendly policies as well as the promotion of skills responds to the needs for its continuous performance. Environmental standards and partnership improve the organization's earthquake and climate change risk preparedness.

Table 3 indicates the SPACE Factor Analysis of the following strategic factors.

3.5.4. Space Matrix

Table 4. *Presents the space Matrix.*

	Internal Factor	External Factor
Axis X	CA Earthquake Resilience Expertise -1 Sustainable Construction -1 Specialized Design Excellence -3 Established Client Satisfaction -3 Average =-2	IS Affordability of resources and competent workforce +6 collaborating with other companies to handle earthquakes +4 Matching What is required for earthquake safety +6 Seeing Promising Opportunities +3 Average =4.75
Total axis X score: 2.75		
Axis Y	FS Responsible Resource Allocation +5 Investment in Skill Development +5 Planning for an Emergency Fund +3 Strategic Financial Administration +6 Average = 4.75	ES Climate change impacts and hazards -1 •Selection of Long-Lasting Materials -1 Planning for Resilience -2 Observance of Environmental Regulations -2 Average = -1.5
	Total axis Y score: 3.25	

The SPACE Matrix for assessing strategic positioning is shown in Table 4. According to the data, the business is focused on growth and expansion and appears to be in Quadrant I: Aggressive. (The Space Matrix data provided has been assumed for analytical purposes)

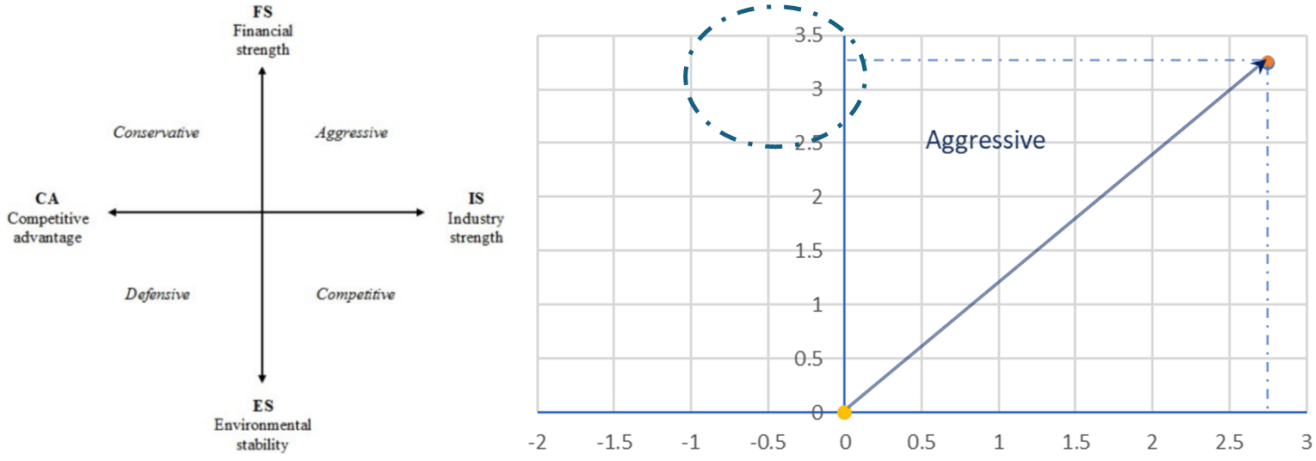

Figure 4. *Indicates that the business is in Quadrant I: Aggressive.*

Decision Stage:

Figure 4 shows the company in Quadrant I: Aggressive. The quantified Space Matrix that refers to the assessment of the company's strategic planning model puts the firm into the I quadrant which means that the planning is aggressive. Such an internal-external network is a strong position, however, the company needs to pay attention on market share and profitability improvement. This way makes sure that the achievement of its goals will not be threatened by future attacks on facilities and people. When a very disastrous quack happens

in an area characterized by frequent earthquakes the company in question has to act efficiently meanwhile planning a way forward.

3.5.5. Case Simulation: Preparing Strategically for an Earthquake with a Construction Company

In the case of an earthquake occurrence, the construction company is required to respond promptly, and appropriately to protect the employees and the infrastructures, then evaluate the situation and act accordingly in the process of recovery [12]. The first process therefore is to evacuate the employees by conducting a sound drill, which entails pointing everyone to safe areas. After some time, structural engineers evaluate other construction areas experiencing things like slips and cracks on structures like foundation. Depending on the extent of the damaged area, funds flow to other important projects like construction of high-rise buildings and bridges that may collapse during construction. Thus, two-way communication is maintained with the company employees, clients, and shareholders through making regular and timely announcements of the situation and the response actions being taken. The following phase then deals with procurement: materials with required seismic resistance are to be available, staff, which will be knowledgeable about post-earthquake reconstruction, is to be provided [18].

Supports are provided on a temporary basis to arrest further failure and make the site suitable for working. When the immediate enemies are at hand and neutralized, the firm goes back to the design and planning and implements the earthquake-resistant material and structures innovations.

In addition, the organization is concerned about the psychological health of its workers and encourages it while also discussing the policy on crisis management. Finally, the company pays attention to the issue of post-earthquake reconstruction and improves the company's designs and materials to address the necessity of resistance to future earthquakes [18].

4. Finding and Discussion

4.1. Construction Company's Risk Assessment

The following risks are present in the construction company's context that requires control for efficient operation. Such cases include natural calamities, for instance, the earthquake for which the structures should have stringent measures relating to safety of the structure and plans for disasters that may be incurred. This is essential in that it prevents legal and financial repercussions otherwise the company must obtain all legal requirements and permits to execute its activities. Some unexpected incidents for businesses include supply chain breakthroughs which include the absence of material or hike in price or might face some among these: Construction projects are very sensitive since time can cost more and bring reputation losses; hence, the reasons must be found and prevented. Safety and health are important on construction sites and the company should have rules and regulations to avoid any incidence. And last but not the least for any business and especially for the business to business marketers financial risks & returns involving cost, credit risks etc. must be adequately dealt to ensure that the business is profitable and remains viable in the long run [14].

4.2. Competitive Profile Matrix for Construction Companies Resistant to Earthquakes

Table 5. *Competitive Profile Matrix.*

Factors	Weight	Construction firm XYZ	Competitor A	Competitor B	Competitor C
knowledge of earthquake-resistant construction techniques	0.15	4	4	2	3
A new approach to using earthquake-resistant materials	0.15	3	3	3	4
adoption of earthquake-resistant building techniques	0.15	4	2	3	3
Adapting to seismic building standards and laws	0.15	3	1	2	4
earthquake-resistant structure design	0.10	3	4	1	4
Preparedness for earthquakes and crisis management	0.15	4	2	1	1
Investing in research and development for seismic resistance	0.15	4	2	1	1
Total	1.00	3.6	2.5	1.9	2.8

With a total score of 3.6, XYZ Construction was found to be the best firm to handle issues caused by earthquakes. This demonstrates its exceptional skill in adoption of earthquake-resistant building techniques, knowledge of earthquake-resistant construction techniques, a new approach to using earthquake-resistant materials, adapting to seismic building standards and laws, earthquake-resistant structure design, Preparedness for earthquakes and crisis management and investing in research and development for seismic resistance. The Competitive Profile Matrix, with data assumed for analysis, is shown in Table 5. (The data presented for the Competitive Profile Matrix has been presumed for analysis).

4.3. Balanced Scorecard [2]

Table 6. Presents the Financial and Customer Perspectives.

	Project Administration	Human Resources	Accounting	Finance	Marketing
Financial Perspective					
Revenue Increase	achieve an average 10% annual revenue growth on earthquake-resilient builds.	Rise average income by 5% annually because of retention of employees and increasing skills.	Increase transparency of finance for an additional 10% annual revenue growth.	Earnings for earthquake projects shall rise yearly at a rate of 15%	Earthquake specific marketing campaigns should be formulated to increase sales of products by at least 20% per annum and target disaster related projects.
Cost Management	Cut annual costs of projects by 5%.	Achieve a 10% annual cost reduction in the direction of a leaner staffing policy on the HR side.	Reduce the annual expenses of accounting cost by 5%, enhance fiscal management, and increase report accuracy.	Eliminate finance costs of earthquake related projects by 10% annually, using efficient cost management techniques.	Reduce by 5% annually, marketing costs while boosting the efforts associated with seismic
Customer Perspective					
Customer Satisfaction	Achieve 95% customer satisfaction through finishing quake-resistant projects punctually and effective communication.	Get 90 % employee satisfaction resulting in better customer services and satisfaction.	Achieve 95% customer satisfaction through accurate and timely financial reporting in earthquake-related projects.	Achieve 95% customer satisfaction by prompt, clear and effective financial transaction in disaster recovery.	Effective communication & completion of earthquake disaster projects for an objective to achieve 90% customer satisfaction.
Client Retention	Ensure that you maintain a 90% client retention rate by providing the highest quality earthquake-resilient services as well as efficient project management.	Maintain an 85% employee turnover rate by providing competitive salaries and career growth prospects in disaster related projects.	Ensure that clients remain at a 90% rate with rapid and precise financial reporting, top-of-the-class customer services when it comes to disaster recovery.	Retain 90 % of customers in the post-disaster period through transparent and open economic management.	Provide personalized customer service in disaster-prone regions to retain 85% of your clients.

Table 7. Shows the Internal Processes and Learning and Growth Perspectives.

Categories	Project Administration	Human Resources	Accounting	Finance	Marketing
Internal Processes Perspective					
Management	Ensure that 90% of earth-	Provide 20 hours of HR	Maximize financial	Optimize earth-	Conduct efficient

Categories	Project Administration	Human Resources	Accounting	Finance	Marketing
of Projects	quake-resilient projects are completed on time.	management and leadership training annually to improve employee satisfaction.	reporting accuracy by 95% through streamlined accounting procedures.	quake-resilient financial planning and budgeting to achieve 95% accuracy.	market research and analysis in disaster-prone regions to achieve a 90% success rate in earthquake-specific marketing campaigns.
Quality Control	Ensure that earthquake disaster preparedness employees are hired, orientated, and evaluated quickly and effectively.	Ensure that disaster-prone projects have transparent and fair employee compensation and benefits.	Ensure precise, timely, and legally correct payroll processing for earthquake-resistant projects.	Encourage sensible financial analysis and decision-making to support business growth during catastrophe recovery.	Ensure effective market research and analysis to guide marketing plans and campaigns tailored specifically for earthquake-prone areas.
Learning and Growth Perspective					
Staff Training	Offer 20 hours of training every year to develop project management, technical, and leadership abilities for earthquake-resistant construction.	Give staff members 20 hours of yearly training to help them become better leaders, communicators, and HR managers for disaster recovery.	Provide staff with 20 hours of yearly training to help them become more knowledgeable about accounting, financial analysis, and compliance with projects involving earthquakes.	Offer 20 hours of yearly training to staff members to improve their financial analysis, planning, and investing skills in disaster-prone areas.	Provide 20 hours of annual training to staff to help them be more effective communicators, marketers, and brand ambassadors in disaster-prone areas.
Employee Contentment	Achieve a 90% employee satisfaction rate by fostering a cooperative work environment, providing opportunities for promotion, and promoting work-life harmony while catastrophe recovery is underway.	Achieve a 90% employee satisfaction rating by offering chances for career advancement, just pay, and acknowledgment for projects that are disaster resistant.	In disaster-prone areas, achieve a 95% staff satisfaction rate for those working in accounting, financial analysis, and compliance.	Through employee-focused disaster recovery measures and budgetary planning, we reach a 95% worker satisfaction rating.	Maintain a 90% staff satisfaction rating for personnel working in disaster-prone areas in marketing, branding, and communication.

Balanced Scorecard

Table 6 of the Balanced Scorecard relates to the Financial and Customer Perspectives which focus on financial and customer view. Determining the efficiency of internal processes and learning and growth perspective are covered in Table 7 as well. (The Balanced Scorecard data presented has been presumed for analytical examination.)

4.4. Integrating SWOT Analysis with Research Objective

4.4.1. Restating the Research Question

Considering the comprehensive findings from the SWOT analysis, Space Factor Analysis, and SPACE Matrix, this section addresses the research question: As a result, the following are the questions that the research seeks to answer:

Each of the above questions poses a different query, but they all relate to the main question:

How can building firms create plans to reduce the effect of earthquakes on current and upcoming projects?

The first major strategic strength revealed by the SWOT analysis is specialization on earthquake services, professional accreditation, good market connections and financial capability for expansion. However, it comes with threats such as limited geographical location most of the raw materials depend on a few customers and some of the material may take time to arrive if they are in scant supply. Other challenges include calamities, restricted buyer opportunity, stiff competition, cost, political, and policy-related risks.

According to the evaluation of the Space Factor Analysis, the internal resources that can act as the core competition for the firm are profound knowledge of earthquake response, specialized design skills, good resource management, and

relatively good risk management. These competencies improve the capacities to tackle the risk factors associated with seismic activity.

The growth vector that is highlighted by the SPACE Matrix positions the firm in a strategic position with a specific objective that is, achieving a higher market share. Therefore, by successfully targeting profitability and managing seismic risks, the efficient measures aimed at the decrease of losses during the earthquake disaster will be provided by the firm.

4.4.2. SWOT Eliminate

Table 8. SWOT Eliminate.

SWOT Eliminate	
Opportunities:	Strengths:
Increasing awareness of earthquake threats has increased demand for earthquake-resistant construction methods.	A solid reputation for professionalism and quality
Threats:	Weaknesses:
Heavy competition in the construction business from both established and new companies	Limited geographic scope because it concentrates on earthquake-prone areas.

The company's good reputation is useful to its activities in earthquake construction, but it lacks capacity in regions where earthquakes are common. Emerging markets due to better demand for seismic-safe technologies and technology competition is a threat. To maintain a strong competitive edge the company should further enhance its existing strengths; it needs to correct its weaknesses, and they need to deliver adequate earthquake resistant solutions. Table 8 SWOT analysis Eliminate is an example of the variables affecting these strategic choices.

4.4.3. Linking SWOT Elements to Recommendation

Table 9. SWOT Eliminate & recommendation.

SWOT elements & Recommendations	
Opportunities:	Recommendations
Increasing awareness of earthquake threats has increased demand for earthquake-resistant construction methods.	Ensure people in the local area are aware of the company's skill in constructing structures that can withstand earthquakes.
Strengths:	Recommendations
A solid reputation for professionalism and quality	Expand the long-term contracts by building upon the company's reputation.
Threats:	Recommendations
Heavy competition in the construction business from both established and new companies	Claim a competitive advantage by designing earthquake-safe homes and then differentiating themselves through affordability or including maintenance for an additional cost.
Weaknesses:	Recommendations
Limited geographic scope because it concentrates on earthquake-prone areas.	Increase across geographically adjacent areas, requiring reliable buildings, by forming affiliations with local firms.

All these recommendations will enhance the growth, competitiveness, and leadership of the company in the construction of earthquake resistant structures. Table 9 SWOT Eliminate & Recommendation lists the tactical steps required to accomplish these objectives.

4.4.4. Explaining the Impact of Recommendation on the Research Question

The conclusions stemming from the SWOT analysis are directly linked to the research questions improving the company's perspective and capability to prevent and counteract earthquakes. Here's how each set of recommendations impacts the research questions:

1) Research Question 1: How can building firms create plans to reduce the effect of earthquakes on current and upcoming projects?

Impact: By establishing industry knowledge in earthquake-resistant construction and collaborating with local community organizations, the company has an improved capacity of communicating on the significance of seismic resistance to stakeholders. This case increases the firm's capacity to make appropriate forecasts and implement protective measures, thus lowering the effects of earthquakes on projects.

2) Research Question 2: Which exterior and internal elements should construction businesses focus on the most to strengthen their resistance to seismic events?

Impact: The suggestions made for maintaining the company's reputation and the special designs achieved stress on concentrating on the internal popularity and skills as the values. Furthermore, the change of area from an earthquake-prone area corresponds with the external factors as it allows the company to extend bigger area of outside influence and stability through diversification of outlets.

3) Research Question 3: How do strategic models like SWOT, Space Matrix, and Balanced Scorecard contribute to earthquake resilience in construction firms?

Impact: The above analysis indicates that earthquake re-

sistant projects could be enhanced by managing resources and increasing worker contentment. The paper also explores the application of this model and its future enhancement as mandated by academic practice. The firm strives to continuously improve the level of seismic protection in its works.

These relate to such areas as resources, workers, and competitiveness or improvement on the existing areas. Strategies such as SWOT analysis technique, Space Matrix technique, and Balanced Scorecard all assist the company in dealing with seismic risks and uphold long-run growth.

4.5. Evaluation

Table 10. Assessment of the Company's Department.

Departments	Target	Performance	Quantitative Reason of Failure	Qualitative Reason of Failure	Corrective Action
Project Management	Sustain an average of 90 percent on-time project deliveries, earthquake resilient projects.	Delivered 88 percent of projects on schedule.	delays resulting from unforeseen weather conditions amounting to approximately 2%. A two percent unplanned contingency for natural disasters.	Inability to modify its behavior in response to weather alterations. Inability of the team to create disaster contingency plans.	Enhancing weather observations and disaster preparedness.
Human Resources	Ensure a satisfaction level among employees of not less than 90%.	Achieved 89% employee satisfaction.	Satisfaction decreased by 1%, which reflects their dissatisfaction with overpay. - Only 2% less customer satisfaction for insufficient opportunity for career development.	Employee feedback on compensation dissatisfaction. - Limited advancement opportunities and employee feedback.	Review pay structures and clearly defined career progression routes.
Accounting	Ensure that there is over 90% accuracy in disaster-related financial statement.	93% accurate rating on a financial statement.	-	-	-
Finance	Cut down 10 percent annual earthquake-related project finance costs via good cost management measures	Reduced finance costs by 9%.	Unexpected one percent inflation in financial markets results in extra costs of 1%. Inefficient resource allocation leading to 2% additional costs.	Unexpected inflation in financial markets. Inefficient resource allocation.	Adjust resource allocation methods and track inflation rates better.
Marketing	Increase in yearly sales by 20 percent by means of earthquake branding specific marketing campaigns.	increased its sales by 30 % per year.	-	-	-

The evaluation of the company's departments, including their performance and contribution to overall operations, is displayed in Table 10. (The evaluation data provided has been assumed for analysis purposes)

5. Evaluation and Assessment

5.1. Pre-Earthquake Evaluation and Assessment

The company was preparing before the earthquake in the following areas; First, the measures of risk analysis were followed, and the areas of Japan exposed to earthquakes were determined with the help of geophysical surveys. construction and design changes of the building structure and materials were considered in structural and non-structural designs by the construction department with engineers. It also examined and reformulated various contingency measures on evacuation, notification, and response to disasters, as well as resources available in case of some mishap. Lastly, all the workforce was provided with measures to protect them in case of an event like an earthquake and they were trained on what to do in case of an event like an earthquake [4].

5.2. Post-Earthquake Evaluation and Assessment

The period after the earthquake, the company made several evaluations to determine the further action plan. First, it assessed the Impact on plant, projects, as well as infrastructures to determine where to start rebuilding. An assessment regarding emergency preparedness and how protective staff and other stakeholders from harm and how they are provided with information to help them deal with emergencies such as evacuation procedures and first aid. It also looked at resource capacity in a bid to confirm the availability and adequacy of resources in reconstructing the company. It offered consideration to the customers and provided them with support and clarification. It also underwent financial scrutiny in a bid to estimate the cost of damage incurred, the insurance costs and other additional financing required. These assessments proved critical in the recovery success of the company. If the company had pre-earthquake planning that was stronger and had a good working post-earthquake plan, then it could have prevented more damage, kept safe, and returned operations to the business more efficiently. The results obtained can be used for changing the company's strategic plan; the main tasks will be effective management of resources and the effective response to emergencies. The company may also penetrate disaster sensitive areas and persist with the construction of earthquake resistance for upcoming hardships [22].

6. Conclusion

To sum up, the model for developing strategy for an earthquake resistant construction company outlines a crucial and impermeable basis. This is an excellent model that commences with a clear vision and a mission for excellence, sustainability, and safety. A SWOT analysis offers an extensive perception of the firm's strengths, weaknesses, opportunities, and threats based on which the firm may utilize its experience in earthquake resistant building as strength, solid image goodwill, and rich industry network as assets.

Pre-and post-earthquake evaluation and assessment ensure that the company is prepared and able to respond well. Some of them include pre-earthquake stage, mitigation phase, readiness preparation, earthquakes, rescue procedures, reconstruction, and recovery. Afterwards, earthquake survey enables quick reaction and effective response of the organization to decrease level of possible collateral damage and increase security measures [22].

It is also strategically placed on a space matrix which favors an aggressive policy geared towards market expansion and profits with strengthening of earthquake resistant building methods [9]. The Competitive Profile Matrix indicates why XYZ Construction has an edge over other companies. It includes their experience and innovative practices as well as their ability to deal with problems like earthquakes. There is always room for improvement at the evaluation stage. Dealing with problems like resource distribution, worker contentment, and cost estimation will help the firm improve its resistance to earthquakes. This model serves as a blueprint for growth in an ever-changing landscape, focusing on green construction and sustainability. Through ensuring its mission and vision focused on safety, quality, and environment, the company can manage earthquake uncertainties at ease. It is a flexible design that keeps pace with the latest earthquake proof building and alerting strategies.

The task management and its resources must be enhanced with the needs of the workers in an attempt of achieving earthquake-resistant projects. The paper also illustrates how the model can be used and enhanced. To improve the firm's earthquake resistance the company has to enhance the quality of resources, care about employees, and increasing competitiveness by using tools such as SWOT, Space Matrix, and Balanced Scorecard.

Abbreviations

EFE	External Factor Evaluation
IFE	Internal Factor Evaluation
SWOT	Strengths, Weaknesses, Opportunities, Threats
STPB	System-Theoretic Process Analysis
TPB	Theory of Planned Behavior
GIS	Geographic Information Systems
CA	Competitive Advantage
IS	Industry Strength
FS	Financial Strength
ES	Environmental Stability

Conflicts of Interest

The authors declare no conflicts of interest.

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