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# Constructing a Risk Assessment Framework for University Social Responsibility Using the SHEL Model

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## 1. Introduction

The concepts of placemaking and sustainable cities are deeply intertwined, working together to create more livable and sustainable urban environments. Placemaking, in particular, is a powerful tool that aims to enhance urban areas, making them more attractive to residents, workers, and community members. By fostering comfortable, healthy, and socially rich spaces, placemaking promotes sustainable urban development while emphasizing community involvement in urban planning. This approach is crucial for creating inclusive and cohesive communities, making it a central focus of our research.

Placemaking enriches physical spaces and nurtures social and cultural dynamics, striving to imbue cities with a strong communal and cultural identity. This ultimately enhances the quality of life for residents. Moreover, the role of universities in society has evolved, particularly in response to pressing challenges such as sustainability and local revitalization. The University Social Responsibility (USR) concept has emerged as a key framework for fostering sustainable urban development. USR advocates for integrating sustainability into university-led urban planning, ensuring that development projects consider social, cultural, and environmental factors.

The Ministry of Education in Taiwan urges universities to actively fulfill their social responsibilities. The National Taiwan Ocean University (NTOU), a renowned institution in marine science, has made significant contributions to marine research and conservation. In 2023, NTOU was recognized for its commitment to social responsibility by securing five University Social Responsibility (USR) projects. These projects aimed to revitalize local communities and integrate sustainable practices, leading to substantial benefits for local tourism and sustainable development. This paper, grounded in NTOU's experiences in implementing USR projects, further explores how the SHEL model can be employed to analyze potential risk types encountered during USR project execution. By examining the implications of different risk types on project outcomes, this study aims to contribute to the understanding of risk management in USR initiatives.

## 2. Risk Identification and Assessment Model

Failure Mode and Effects Analysis (FMEA), also known as Failure Mode and Consequence Analysis, Failure Mode and Effects and Criticality Analysis (FMECA), or Failure Mode, Effects, and Diagnostic Analysis (FMEDA), is a systematic procedure for analyzing potential failure modes within a system. It categorizes these failure modes based on severity and determines their impact on the system (Chiozza et al., 2009). FMEA is widely applied across various phases of the product lifecycle in the manufacturing industry and is increasingly used in the service sector. FMEA is integral to risk assessment processes and involves evaluating three critical criteria for risk factors:

1. Occurrence (O): This criterion assesses the likelihood of potential failure modes by analyzing their root causes and frequency of occurrence.
2. Severity (S): This evaluates the impact of potential failure modes on customers or the system itself, assessing the seriousness and

consequences of these failures.

3. Detection (D): This determines the difficulty of detecting possible failure modes using current design and verification methods, evaluating their detectability.

The Risk Priority Number (RPN) is calculated for each risk factor by multiplying the scores for Occurrence, Severity, and Detection. High RPN values indicate higher risks, which are prioritized for corrective actions and risk mitigation strategies. The RPN is a valuable tool in risk management, helping organizations identify and address potential issues before they escalate into critical problems. It allows for a systematic approach to improving the reliability and safety of products and systems (Lipol et al., 2011).

Sociocultural, Historical, Economic, and Legal/Political (SHEL) are four critical dimensions frequently employed in the analysis of complex systems, projects, or situations (Sun et al., 2011; Choudhry et al., 2019). These dimensions provide a comprehensive framework for understanding a specific context's multifaceted aspects and influential factors. Below is a brief explanation of each dimension:

1. Sociocultural: This dimension focuses on a system or situation's social and cultural aspects. It involves considering factors such as social norms, values, beliefs, traditions, customs, demographics, and how people interact. Socio-cultural factors play a crucial role in shaping behavior, attitudes, and societal dynamics.
2. Historical: The historical dimension involves examining the historical context and events that have influenced the current situation or system. It looks at past decisions, actions, and developments that have contributed to the present circumstances. Understanding the historical dimension helps recognize how past factors continue to impact the present.
3. Economic: The economic dimension deals with economic factors and considerations within a system or context. This includes monetary policies, market forces, resource allocation, financial sustainability, costs, and benefits. Economic factors are critical for assessing projects or systems' financial viability and sustainability.
4. Legal/Political: This dimension examines legal and political factors affecting a situation or system. It includes laws, regulations, government policies, political stability, governance structures, and the influence of political actors and institutions. Legal and political factors can significantly impact decision-making, operations, and outcomes.

The SHEL framework is valuable for comprehensive analysis because it considers these four interconnected dimensions. When applied in various contexts, it helps identify and understand the multifaceted factors and complexities involved, facilitating more informed decision-making and problem-solving. This paper uses SHEL to explore the risks faced when executing the USE plan and uses FMEA to assess risks.

## 3. Data and Model Analysis

This study uses the SHEL model to analyze the risks faced when implementing the USR plan. Table 1 describes the types of dangers that may exist when the USR plan is implemented.

The following passage describes creating an expert questionnaire based on the risk types outlined in Table 1 and obtaining responses from five scholars and experts who have experience executing USR (University Social Responsibility) projects. These five experts include a scholar in urban planning (with 30 years of experience), a scholar in risk management (with 18 years of experience), a scholar in placemaking (with 12 years of experience), and two scholars in tourism (with 19 and 9 years of experience, respectively). The interviewed experts assessed the likelihood and severity of the impact of the risk factors listed in Table 1. They assigned ratings on a scale of 0 to 5 for both "likelihood of occurrence" and "severity of impact" (0 = non-existent, 1 = very low, 2 = low, 3 = moderate, 4 = high, 5 = very high).

Table1 SHEL model and the index

| Risk Type | Index | Connotation |
|---|---|---|
| Sociocultural risk | Community resistance | Place regeneration projects can trigger community divisions because residents have different attitudes and needs for change. |
| | Cultural distortion | Failure to adequately protect and promote local cultural characteristics leads to the loss of cultural diversity. |
| Historical risk | Heritage Protection | Proper consideration should be given to protecting historical heritage and cultural assets, damaging cultural and historical values. |
| | Historical baggage | Old policies and practices may hinder the progress of place creation, and historical baggage needs to be overcome. |
| Economic risk | Financial sustainability | The cost of place generation projects may exceed budget, leading to financial difficulties. |
| | Economic inequality | Place creation can lead to economic disparities in communities, particularly in the housing market. |
| Legal and political risks (Legal/ Political) | Policy uncertainty | Changes or uncertainty in government policies may affect the planning and execution of local regeneration projects. |

The risk map was calculated by multiplying the "severity" and "probability of occurrence" scores. The results were categorized into risk levels based on the following principles: 1-4 points were considered shallow risk, 5-9 points were low risk, 10-14 points were moderate risk, 15-19 points were high risk, and scores greater than 20 were categorized as very high-level risk. Further analysis was conducted using severity as the x-axis and probability of occurrence as the y-axis to create a scatterplot depicting the possible risk types encountered during the execution of USR (University Social Responsibility) projects, as shown in Figure 2.

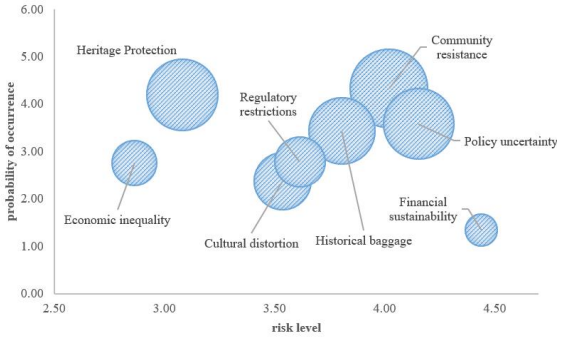


Fig.1 Results of experiments

Based on the RPN (Risk Priority Number) analysis results from Figure 2, it can be observed that there are two risk types with PRN values exceeding 40, namely, “Community resistance (PRN of 56.29)” and “Heritage Protection (PRN of 41.47)”. Additionally, both “Cultural distortion” and “Historical baggage” fall into very high-level risks, similar to the two risks above types. Furthermore, the RPN values for “Economic inequality”, “Policy uncertainty”, and “Regulatory restrictions” range from 15 to 20, classifying them as high-risk factors. As for “Financial sustainability”, its RPN is only 9.93, placing it in the low-risk category.

The RPN analysis reveals that community resistance and policy uncertainty pose the most significant risks to USR projects. To effectively address these challenges, enhanced community engagement and flexible policy response strategies are essential. Risks related to heritage protection, cultural distortion, and historical baggage also warrant careful attention. Integrated cultural and historical protection

measures are crucial for mitigating these risks and preserving valuable heritage assets. While economic inequality and financial sustainability were identified as lower-risk factors, detailed economic and financial planning remains essential to ensure project sustainability.

## 4. Conclusions

University Social Responsibility (USR) encompasses a diverse array of initiatives, ranging from local engagement and talent development to fostering international collaboration. As a pivotal element of social participation, USR programs are designed to enhance professional knowledge and creativity, bridge the gap between theoretical learning and practical application, strengthen local identity and development, and ultimately promote international integration. In the context of placemaking, USR projects seek to create dynamic, inclusive, and culturally enriched urban environments. However, these initiatives are fraught with inherent challenges and risks. This study employs the SHEL Model, which categorizes risk factors into sociocultural, historical, economic, and legal/political dimensions, to systematically analyze the potential risks associated with USR placemaking initiatives.

1. Sociocultural Risks: These include community conflicts, challenges in preserving cultural diversity, and tensions arising from the intersection of traditional values with modern development agendas.
2. Historical Risks: The neglect of historical heritage or the continued impact of past decisions can present significant obstacles to the successful execution of USR projects.
3. Economic Risks: Financial sustainability and the equitable distribution of economic benefits are critical considerations in ensuring the long-term viability of placemaking efforts.
4. Legal/Political Risks: Uncertainties in policy, regulatory barriers, and the influence of political dynamics can impede the effective implementation of USR initiatives.

Understanding these risk factors is essential for urban planners, policymakers, and stakeholders involved in USR-related placemaking. By employing the SHEL Model as an analytical framework, this research offers valuable insights that can help mitigate potential risks and ensure that USR projects contribute positively to the development of vibrant, socially responsible urban spaces.

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