Developing an Indicator Framework for Inclusive Circular Economy Livelihoods among Informal Waste Workers: Evidence from Kathmandu Valley, Nepal

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Abstract: Informal waste workers (IWWs) play an important role in supporting circular economy systems, yet they face continuous political marginalisation, psychological stress, and socio-economic vulnerability. Existing livelihood frameworks fail to capture governance, dignity, and psychological well-being factors specific to waste workers. This study develops and tests an Integrated Livelihood Resilience Framework (ILRF) that includes political capital and psychological capital as separate factors in determining livelihood resilience. The study used a mixed-methods approach. The study surveyed 400 IWWs in the Kathmandu Valley, Nepal, and included in-depth qualitative interviews. The data were analysed using Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modelling (SEM). Preliminary findings show that political exclusion remains common, reliance on informal social networks is significant, and psychological resilience seems important for sustaining livelihoods. The validated framework provides indicators for measuring political and psychological capital, supporting evidence-based policy for inclusive circular-economy transitions. This study contributes to both theoretical and practical understanding of IWW livelihoods and informs just transition policies in Nepal and, similarly, in the Global South.

Keywords: Circular economy; Informal waste workers; Livelihood capital; Livelihood resilience; Political capital; Psychological capital.

Introduction

Informal waste workers (IWWs) is a group that includes itinerant waste buyers, scrap centre workers, rag pickers, and landfill labourers. They form the backbone of circular economy systems across the Global South [1]. These workers help in collecting, sorting, and recycling materials that would help in reducing the amount of waste accumulating in already overburdened landfills, significantly contributing to recycling rates, environmental protection, and urban sustainability [2]. However, even with their essential role, IWWs constantly face political marginalisation, psychological stress, and socio-economic vulnerability [3]. The existing models for livelihood, such as the Sustainable Livelihoods Framework (SLF), have been critiqued for not giving proper attention to political processes, power relations, and psychological factors that eventually shape livelihood outcomes [4]. While the SLF classifies five key forms of capital: human,

social, natural, physical, and financial. It fails to address governance, dignity, voice, empowerment, and resilience dimensions. These aspects are particularly salient towards informal workers who make a living in exclusionary institutional landscapes [5].

The research on IWWs has mostly focused on income security, occupational health and safety, recycling contributions, and poverty. However, several important gaps remain: (1) lack of authorised indicators for measuring livelihood resilience among IWWs, (2) political capital remains poorly operationalised, (3) psychological capital is rarely included in livelihood studies, and (4) a comprehensive framework for inclusive circular economy livelihoods is lacking [6-8].

Although previous studies define the vulnerabilities faced by informal waste workers, an empirically supported indicator framework capable of measuring the political, psychological, and socio-economic dimensions of inclusive circular economy transitions remains lacking. To address this gap, the study was conducted to develop, validate, and operationalise an ILRF for IWWs in Kathmandu Valley, Nepal.

The study is based on the following research questions.

i. What are the core, measurable indicators of Political Capital and Psychological Capital specific to IWWs in Kathmandu Valley?
ii. How do Political Capital and Psychological Capital interrelate to influence Livelihood Resilience?
iii. What are the implications of the validated framework for designing inclusive CE policy tools?

Related work

Early studies documented socio-economic conditions and occupational hazards [9], while later research in the informal sector addressed contributions to recycling and sustainability [10]. More recently, scholars have shifted to governance dimensions, their formalisation, social inclusion, and political marginalisation [5,11-12].

The Sustainable Livelihoods Framework has played a key role in understanding poverty dynamics, particularly in rural communities. However, the researchers have increasingly critiqued its limited attention to political processes and structural factors [4]. In the context of informal waste work, a study has broadened vulnerability assessments to urban informal labour, but it did not fully operationalise political or psychological capital as distinct constructs [6].

Political capital includes the ability to influence decision-making, receive institutional support, and gain recognition, which remains underexplored. A study acknowledged municipal inaction, mistrust, and caste-based discrimination as major barriers to integrating waste pickers into formal waste management in India [7]. Similarly, another study found that formalisation is not a straight path but involves complex dynamics shaped by stigma, recognition, and institutional support [11].

Key Contribution

This study develops the ILRF, which extends traditional livelihood models by openly incorporating political and psychological capital as separate concepts. It provides the first analytically validated indicator framework for measuring political and psychological capital among IWWs. It discusses a robust mixed-methods design with advanced analytical techniques (EFA, CFA, SEM), enabling validation of the measurement model and testing of hypothesised relationships. This study uses a sequential explanatory mixed-methods research design. In phase one, a cross-sectional survey of 400 IWWs is conducted to

establish measurement reliability, validate factor structures, and test hypotheses. In phase two, in-depth qualitative interviews are conducted with a subset of participants to understand context.

The research focuses on Kathmandu Valley, Nepal. Using stratified purposive sampling, the study ensures representation across four worker categories: scrap centre workers (n=100), itinerant waste buyers (n=100), landfill workers (n=100), and rag pickers (n=100). Inclusion criteria: (1) involvement in waste work for at least 6 months, (2) 18 years or older, (3) informed consent.

The structured survey questionnaire includes five different sections: (A) socio-demographic information, (B) political capital, such as voice, participation, legal recognition, access to institutions, etc., (C) psychological capital, including self-efficacy, hope, resilience and optimism, (D) livelihood resilience, including income stability, adaptive capacity, social support, asset ownership and recovery capacity, and (E) perceptions of the CE transition. All the Items are measured using 5-point Likert scales.

Qualitative interviews explore workers' experiences of discrimination, coping mechanisms, perceptions of dignity, and interactions with formal institutions.

The study follows a systematic data analysis process. The process includes data cleaning, reliability testing with Cronbach's Alpha, EFA to identify underlying dimensions, CFA to validate the measurement model, and SEM to test hypotheses.

While data analysis is still ongoing, preliminary observations from pilot testing provide the following suggestions:

i. Different types of IWWs experience different levels of political exclusion, psychological stress and livelihood resilience.
ii. Lack of formal recognition, limited access to social protection and discrimination based on nationality and caste are reported by workers.
iii. Social networks are important for survival, but they provide limited protection against larger systemic shocks.

Discussions

Traditional livelihood frameworks are expanded by showing that political and psychological capital play an important role in IWW resilience. This supports the argument that livelihood studies must also consider power, governance and psychological well-being [4,5].

Income dependence, asset ownership and social participation are expected to be significant determinants of vulnerability. This is consistent with Amin et al. [5]. However, by including political and psychological capital as separate constructs, the ILRF goes beyond their "six-capital lens" and includes governance and psychological dimensions that have not been fully addressed before.

The expected findings complement Juárez Pastor et al. [6]. They provide quantitative evidence on how political factors shape resilience in Nepal. Using SEM allows examination of the importance of political factors relative to other capitals and exploration of how political exclusion affects psychological well-being and adaptive capacity.

The preliminary observation that political exclusion remains widespread is consistent with studies in other contexts as well [7,8]. It highlights the need for inclusive formalisation processes that address power relations, social inclusion and psychological well-being. Without attention to these dimensions, formalisation alone may unintentionally weaken workers' collective power [5].

Conclusions

i. This study develops ILRF and addresses the important gap in the literature on informal waste workers. It incorporates political capital and psychological capital as factors influencing resilience. Existing livelihood models do not fully capture these dimensions, and no validated framework explains their relationships with livelihood resilience during the transition to a circular economy.

ii. A sequential explanatory mixed-methods design was used in the study that comprised a cross-sectional survey of 400 IWWs in Kathmandu Valley using stratified purposive sampling across four categories of workers. Data analysis included reliability testing, EFA, CFA and SEM. The study also conducted in-depth qualitative interviews and performed thematic analysis.

iii. Preliminary observations show that there is variation across categories of workers, widespread political exclusion, dependence on informal social networks and the importance of psychological resilience for livelihood continuity. They also highlight the need for targeted policies that address both material and non-material vulnerabilities. Other findings, including the validated indicator framework and SEM results, will be reported after the analysis is complete.

iv. The use of a cross-sectional design creates limitations in causal conclusions; self-reported data may involve some biases, and the focus on a single city limits its generalizability. Validation analyses are also still ongoing. Therefore, future research should use longitudinal designs, expand to other places, combine quantitative and qualitative findings to develop a policy toolkit, and examine whether the framework applies to other informal worker groups.

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