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Public Manager Job Satisfaction Study

Leadership Profile in Project Structure Design

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Discovering Thoughts, Inventing Future

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Preface

The Global Journal of Management and Business Research (GJMBR) is pleased to present this issue, bringing together a curated collection of high-quality research papers that explore diverse facets of management science, business strategy, and economic theory.

This issue features research spanning topics including administration & management, economics & commerce, finance, accounting & auditing, marketing, real estate, tourism management, and interdisciplinary business studies. Each paper has undergone a rigorous double-blind peer-review process to ensure analytical rigor and originality.

We would like to express our sincere gratitude to the authors for entrusting their research with us, to the reviewers for their thorough and constructive evaluations, and to our readers for their continued engagement with the scholarly discourse.

We hope that the research presented herein inspires further inquiry and contributes meaningfully to the advancement of knowledge in management and business.

The Chief Editor
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Abstract

Reusable packaging assets such as pallets, boxes, cartons, and bags are widely used in industrial warehouse operations to support material handling and distribution. Although many of these assets are suitable for repeated use, they are frequently retained, damaged, or discarded after material delivery due to the absence of a structured return process. This results in unnecessary replacement costs, increased waste, and limited visibility of reusable assets.

This paper proposes a practical framework for managing reusable packaging assets in industrial warehouses based on circular economy principles. The framework combines asset identification, controlled issuance, return management, governance, and performance monitoring to improve asset recovery and encourage reuse without significantly changing existing warehouse operations.

The framework was developed through operational observations, frequent customer engagement, stakeholder alignment sessions, and process reviews conducted to understand the operational challenges associated with reusable packaging management. Unlike existing studies that mainly address reusable packaging from a supply chain perspective, this paper focuses on warehouse operations and department-level accountability.

The proposed framework provides organizations with a practical approach for improving asset visibility, reducing unnecessary replacement purchases, strengthening governance, and supporting more sustainable warehouse operations.

Circular economy | Reusable packaging | Warehouse operations | Asset management | Sustainability | Performance measurement

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A Circular Economy Framework for Reusable Packaging Assets in Industrial Warehouse Operations

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Abstract

Reusable packaging assets such as pallets, boxes, cartons, and bags are widely used in industrial warehouse operations to support material handling and distribution. Although many of these assets are suitable for repeated use, they are frequently retained, damaged, or discarded after material delivery due to the absence of a structured return process. This results in unnecessary replacement costs, increased waste, and limited visibility of reusable assets.

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Keywords: *asset management, Circular Economy, performance measurement, Reusable packaging, Sustainability, Warehouse operations*

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1. Introduction

Industrial warehouses support daily operations by supplying materials to various departments using reusable packaging assets such as pallets, boxes, cartons, and bags. While these assets are essential for safe material handling and transportation, they often receive little attention once the requested materials have been delivered.

In many organizations, the warehouse process effectively ends at the point of material delivery. Consequently, reusable packaging assets may remain at receiving locations, be used for unintended purposes, become damaged, or be discarded without a structured return process. Over time, this reduces asset visibility, increases replacement purchases, and limits opportunities to support sustainability initiatives.

Applying circular economy principles to warehouse operations offers an opportunity to extend the service life of reusable packaging assets through systematic recovery and reuse. However, achieving this objective requires more than encouraging departments to return packaging materials. It requires a practical management framework that clearly defines ownership, establishes return responsibilities, monitors performance, and supports continuous improvement.

This study proposes a practical framework for managing reusable packaging assets in industrial warehouses. The framework focuses on improving return compliance, strengthening governance, increasing asset utilization, and supporting circular economy objectives through practical operational controls.

2. Literature review

Circular economy promotes the efficient use of resources by extending the useful life of products and materials through reuse, repair, recovery, and recycling. These principles have become increasingly important within logistics and supply chain management as organizations seek to reduce waste while improving operational efficiency.

Previous studies have demonstrated that effective management of reusable packaging assets can reduce replacement costs, improve resource utilization, and support sustainable operations. Research related to circular economy and reverse logistics also highlights the importance of recovering and reusing transport packaging to reduce waste and improve overall supply chain performance.

Publications from the Ellen MacArthur Foundation, the United Nations Environment Programme (UNEP), and ISO 14001 further

emphasize the value of practical resource management practices that encourage reuse and continuous improvement.

Despite these contributions, most published studies focus on transportation systems, reverse logistics, or overall supply chain performance. Comparatively little attention has been given to the day-to-day management of reusable packaging assets within industrial warehouses after materials have been issued to internal operating departments.

This paper addresses that gap by proposing a practical warehouse-based framework that integrates asset identification, return management, governance, and performance monitoring into a single operational approach suitable for industrial warehouse environments.

3. Methodology

The proposed framework was developed using a practice-based approach informed by frequent engagement with warehouse customers, stakeholder alignment sessions, operational observations, process discussions, and reviews of existing warehouse practices related to reusable packaging assets.

These activities were conducted to understand the operational challenges associated with issuing, recovering, and reusing packaging assets across different warehouse activities. The information collected was used to identify recurring operational issues, evaluate existing practices, and develop a framework that can be implemented without significant changes to current warehouse operations.

The framework was developed through five stages. The first stage focused on identifying operational challenges associated with reusable packaging assets. The second stage classified packaging assets according to their reuse potential. The third stage developed the proposed operational framework.

The fourth stage established governance responsibilities together with practical performance measures. Finally, the framework was reviewed to ensure its applicability within industrial warehouse environments and its alignment with continuous improvement practices.

The proposed framework is intended to provide organizations with a practical starting point that can be further evaluated and refined using operational data collected during future implementation.

4. Framework implementation

The proposed framework applies circular economy principles through a practical management process that improves the visibility and utilization of reusable packaging assets throughout their operational lifecycle. Rather than treating pallets, boxes, cartons, and reusable bags as temporary packaging materials, the framework considers them reusable operational assets that should remain under warehouse control until they complete their service life.

The proposed framework covers the most common reusable packing assets found in industrial warehouse operations, as summarized in Table 1.

The framework begins when reusable packaging assets are issued together with operational materials. Each asset is assigned a unique identification number using an appropriate identification method to maintain traceability and establish clear accountability throughout its operational lifecycle. This approach enables warehouses to maintain visibility of reusable assets after material delivery and strengthens responsibility at the receiving department.

Table 1. Typical Reusable Packing Assets Covered by the Proposed Framework

Packing Assets	Typical End-of-Life Action
Wooden pallets	Reuse, Repair, Recycle
Plastic pallets	Reuse, Recycle
Reusable boxes	Reuse, Repair
Cartons	Reuse (when suitable), Recycle
Bags	Reuse (where applicable), Recycle or Disposal

After materials have been delivered, reusable packaging assets are returned through an agreed operational process. Upon return, each asset is inspected to determine whether it is suitable for immediate reuse, requires minor repair, should be recycled, or has reached the end of its useful life. This process supports continuous circulation of reusable assets while maintaining operational reliability and safety.

Successful implementation depends primarily on governance rather than technology. Clear ownership, defined responsibilities, and regular management follow-up are essential for maintaining a sustainable return process and improving long-term asset utilization.

To evaluate performance, organizations should establish a limited number of practical performance indicators that measure the effectiveness of the framework. These indicators may include return compliance, asset recovery, damage rate, asset utilization, average return time, and estimated cost avoidance. Monitoring these measures provides management with meaningful operational information while supporting continuous improvement and informed decision-making.

The framework has been intentionally designed to remain flexible and scalable. Organizations may begin by applying the framework to one category of reusable packaging assets before expanding it to additional asset types as operational maturity and organizational readiness increase.

The framework consists of six integrated operational components, summarized in Table 2.

Table 2. Key Components of the Proposed Framework

Framework Component	Purpose
Asset Identification	Improve asset traceability and accountability
Controlled Issuance	Record reusable assets during material issue
Return Management	Ensure recovery of reusable packing assets
Asset Inspection	Verify asset condition before reuse
Governance	Define ownership and operational responsibilities
Performance Measurement	Measure performance and support continuous improvement

5. Discussion

Implementing practical controls for reusable packaging assets allows industrial warehouses to apply circular economy principles without significantly changing existing operational practices. The proposed framework strengthens existing warehouse processes by improving asset visibility, defining responsibilities, and encouraging consistent return practices throughout the asset lifecycle.

The framework integrates asset identification, return management, governance, and performance monitoring into a single operational process that can be adapted to different warehouse

environments. Its flexibility allows organizations to implement the framework progressively according to their operational requirements and available resources while maintaining the same management principles.

By improving the control of reusable packaging assets, organizations can reduce unnecessary replacement purchases, improve resource utilization, strengthen accountability, and support long-term sustainability objectives without significantly changing existing warehouse operations.

The proposed framework also supports broader sustainability initiatives by encouraging the efficient use of reusable packaging assets and reducing unnecessary waste generated through repeated replacement.

These practices are aligned with the sustainability objectives of Saudi Vision 2030, which emphasize resource efficiency, environmental responsibility, and sustainable industrial development. By extending the service life of reusable packaging assets through practical warehouse controls, the framework supports more sustainable warehouse operations while contributing to the long-term goals of responsible resource management.

6. Conclusion

Reusable packaging assets represent an important opportunity for improving warehouse performance while supporting circular economy objectives. However, many organizations continue to experience unnecessary replacement purchases and avoidable waste because these assets are not systematically managed after material delivery.

This paper presents a practical framework for improving the management of reusable packaging assets in industrial warehouses through asset identification, return management, governance, and performance monitoring. The proposed framework strengthens accountability, improves asset utilization, and supports sustainable warehouse operations without requiring significant changes to existing operational practices.

By focusing on practical implementation rather than theoretical concepts, the framework provides organizations with a realistic approach for improving resource utilization while supporting long-term sustainability objectives.

7. Limitations and Future Work

The proposed framework was developed using operational observations, stakeholder engagement, and existing warehouse practices. Although it provides a practical approach for managing reusable packaging assets, its effectiveness should be further evaluated through implementation using actual operational data collected from industrial warehouse environments.

Future research may validate the framework across different industries, evaluate different asset identification methods, and examine how digital tracking technologies can further improve the management of reusable packaging assets while supporting circular economy practices.

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Job Satisfaction and Dissatisfaction for Public Managers: Assessing Traditional Assumptions

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Abstract

A traditional approach to job satisfaction and dissatisfaction assumes that they are located on the continuum of the same dimension. According to this approach, both job satisfaction and dissatisfaction are affected by the same aspects of a job, and job dissatisfaction is expected to decline if job satisfaction increases. With surveyed answers of public managers in the U.S., this study assessed whether or not the traditional assumption holds true. Findings indicate that job satisfaction and job dissatisfaction for public managers were affected by different aspects of a job. While intrinsic aspects (or rewards) such as pride and recognition had a significant influence on public managers job satisfaction, extrinsic aspects (or rewards) such as pension/retirement plan and desire for low conflicts determined their job dissatisfaction level. Managerial implications are discussed.

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Abstract

A traditional approach to job satisfaction and dissatisfaction assumes that they are located on the continuum of the same dimension. According to this approach, both job satisfaction and dissatisfaction are affected by the same aspects of a job, and job dissatisfaction is expected to decline if job satisfaction increases. With surveyed answers of public managers in the U.S., this study assessed whether or not the traditional assumption holds true. Findings indicate that job satisfaction and job dissatisfaction for public managers were affected by different aspects of a job. While intrinsic aspects (or rewards) such as pride and recognition had a significant influence on public managers job satisfaction, extrinsic aspects (or rewards) such as pension/retirement plan and desire for low conflicts determined their job dissatisfaction level. Managerial implications are discussed.

Keywords: *absenteeism, extrinsic rewards, Herzberg two-factor theory, intrinsic rewards, Job dissatisfaction, Job Satisfaction, public managers*

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1. Introduction

Organizations make an effort to improve productivity among their employees by increasing their motivational level and decreasing employee turnover intention (Shepperd, 1993, Huselid, 1995, Grant, 2008, Tnay et al., 2013). Public organizations are not an exception. If public employees are not well motivated at work, public goods and services may not be properly delivered to citizens (Naff and Crum, 1999, Alonso and Lewis, 2001). If public organizations experience a high level of employee turnover, they are forced to repeat the long process of recruiting, hiring, and training new employees, which will result in a huge cost to organizations (Waldman et al., 2004, Meier and Hicklin, 2008). Furthermore, there is no guarantee that similar quality of public goods and services would be provided by newcomers, should good performers leave. Therefore, one of the big challenges for public management is: how we can keep employees motivated (or satisfied) at work, and how we can encourage quality employees to stay at their current organizations.

Traditionally, turnover studies assumed that job satisfaction and job dissatisfaction belong to the same dimension and are placed on the opposite ends of the same continuum (Dunnette et al., 1967, Oshagbemi, 1997, McNeese-Smith, 1999, Klassen and Anderson, 2009). According to this assumption, if the level of job satisfaction decreases among employees, employee turnover—a major indicator of job dissatisfaction—would increase as a result of the low job satisfaction. If this assumption is true, both job satisfaction and turnover issues can be addressed by focusing on only the ways to improve job satisfaction among employees. In other words, we can deal with two challenges such as job satisfaction and turnover with one solution.

However, some scholars proposed an alternative argument that job satisfaction and job dissatisfaction may not belong to the same dimension (Herzberg et al., 1959, Herzberg and Hamlin, 1961). According to this argument, job dissatisfaction issues cannot be properly remedied with the same approach that is used for addressing job satisfaction issues because the opposite of job satisfaction may not be job dissatisfaction. Therefore, they suggested that two different approaches should be adopted to deal with two different organizational issues such as job satisfaction and job dissatisfaction.

This study examines whether or not the traditional assumptions for job satisfaction and dissatisfaction can be applicable to public sector settings. The findings in this study would help develop proper human resource management policies that can motivate and retain quality public employees.

1.1. Job satisfaction and motivation

Job satisfaction can be understood as an overall affective orientation that individuals would have toward their current work (Kalleberg, 1977) or whether or not employees like their jobs (Spector, 1997). As a more comprehensive definition, job satisfaction is a pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values (Locke, 1969).

Since the first published investigation of job satisfaction (Hoppock, 1935), researchers have explored diverse determinants of job satisfaction and reached a conclusion that characteristics of individuals and work environments (job itself included) are two major sources of job satisfaction (Connolly and Viswesvaran, 2000, Judge and Larsen, 2001, Ilies and Judge, 2003). Major individual characteristics, as job satisfaction determinants, include

race (Bartel, 1981, Tuch and Martin, 1991), gender (Clark, 1997, Sousa-Poza and Sousa-Poza, 2000), and educational backgrounds (Glenn and Weaver, 1982, Lee and Wilbur, 1985). With regards to work environments, major determinants of job satisfaction are job characteristics (Lee et al., 1983, Loher et al., 1985), rewards (Janssen, 2001, Danish and Usman, 2010), organizational size (Regoli et al., 1989, Artz, 2008), organizational structure (Idson, 1990, Willem et al., 2007), and organizational climate (Downey et al., 1975, Fu and Deshpande, 2014).

Job satisfaction is one of the major factors that can increase work motivation (Wright, 2001). If employees are more satisfied at work, they would be better motivated and ultimately could show higher work performance (e.g., Brown and Peterson, 1994, Ololube, 2006). Wright (2001) explained that employees' satisfaction with types of rewards or working conditions they receive identifies "necessary conditions for their optimal employee motivation". Since motivation plays an important role in producing better performance at work, organizations in which more employees are satisfied at work are more likely to show a better work performance.

Employees would be more likely to be satisfied at work if their work orientations accommodate what they prefer (Rose, 2003, Hakim, 2000, Clark, 1997). Work orientations refers to what rewards employees prefer to receive and what feelings employees would like to experience at work (Rose, 2003). While extrinsic rewards and working conditions such as pay, benefits, and job security have been highlighted to increase a job satisfaction level among employees (Amabile, 1993, Vallerand, 1997, Benabou and Tirole, 2003, Kuvaas et al., 2017), substantial attention has been given to the role of employees' feelings at work such as achievement, recognition, and responsibility (Charbonneau et al., 2001, Grant, 2008, Chen and Law, 2016, Wulf and Lewthwaite, 2016, Mekler et al., 2017). Researchers found that, compared to private managers, job satisfaction among public manager tend to be more positively affected by intrinsic rewards such as recognition and self-development opportunity than by extrinsic rewards such as pay and benefits (Khojasteh, 1993, Rainey and Bozeman, 2000, Bright, 2005, Buelens and Van den Broeck, 2007).

1.2. Job dissatisfaction, absenteeism, and turnover

Job dissatisfaction is defined as an unpleasant emotional state, based on appraising one's job as frustrating and blocking the attainment of one's job values (Lock, 1969). Unlike the assumption of the traditional approach regarding job satisfaction, job dissatisfaction may have a different dimension, compared to job satisfaction, and thus it would be affected by a different set of factors. Herzberg and his colleagues first proposed the Two-Factor Theory of Motivation, and argued that both satisfaction and dissatisfaction were not placed on the same dimension (Herzberg et al., 1959, Herzberg, 1968). According to this theory, the opposite of satisfaction is not dissatisfaction, but no satisfaction. In other words, satisfaction and no satisfaction are placed at the opposite ends of the same continuum. Likewise, the opposite of dissatisfaction is not satisfaction, but no dissatisfaction. Therefore, it is argued that dissatisfaction and no dissatisfaction are located at the opposite ends of the same continuum. Herzberg and his colleagues called the factors "motivators" if they were related to the feeling of job satisfaction, and argued that they were connected to work itself such as recognition, responsibility, achievement, and self-development opportunity. They also argued that a set of factors, called "hygiene factors", were related to the feeling of dissatisfaction, and were related to working conditions and environments such as salary, benefits, interpersonal relationships, and company policies. Overall, Herzberg's motivators are associated with higher-order needs, while hygiene factors are more like lower-order needs in Maslow's need hierarchy (1954). For example, when employees are provided with a secure job status, employees would be less dissatisfied, instead of being more satisfied because job security is one of hygiene factors that are related to job dissatisfaction.

According to the turnover studies, employees tend to resign from their current organizations when they experience a low level of job involvement, autonomy, or pay (e.g., Price, 1977, Marsh and Mannari, 1977, Michaels and Spector, 1982, Harris and Adams, 2007, Grotto et al., 2017, Hom et al., 2019). Therefore, from the traditional perspective, resignation (i.e., voluntary turnover) can be a consequence of a low level of job satisfaction, or it can be a consequence of a high level of job dissatisfaction from the alternative perspective. However, because the alternative approach to job satisfaction and dissatisfaction was proposed later and has not been shared by as many researchers as for the traditional approach. In fact, most turnover studies took the traditional assumption that job satisfaction and dissatisfaction is on the same continuum, and concluded that there was a negative correlation between job satisfaction and resignation (e.g., Mobley, 1977, Carsten and Spector, 1987, Tett and Meyer, 1993, Irvine and Evans, 1995, Lambert, 2010, Azeez et al., 2016). Researchers also confirmed that organizational performance would decrease when employee turnover increase (e.g., Jackofsky, 1984, Dess and Shaw, 2001, Shaw et al., 2005, Hur, 2013, Li et al., 2019). In sum, organizations are more likely to experience decreased performance when more employees resign, regardless of whether researchers took the traditional or the alternative assumption about job satisfaction and dissatisfaction.

Absenteeism is one of the major behavioral variables that turnover researchers have paid attention to (Parasuraman, 1982). A large body of literature supported the argument that absenteeism is an earlier behavioral correlate and potential precursor to eventual turnover (e.g., Lyons, 1972, Muchinsky, 1977, Mitra et al., 1992, Dalton and Todor, 1993, Harrison and Martocchio, 1998, Harrison et al., 2006, Cohen and Golan, 2007, Harrison and Newman, 2012, Carpenter and Berry, 2017). Researchers confirmed a significant and positive correlation between absenteeism and voluntary turnover (e.g., Patchen, 1960, Block et al., 1964, Lyons, 1972, Porter and Steers, 1973, Steers and Rhodes, 1978, Somers, 1995, Cohen and Golan, 2007). Therefore, while absenteeism and turnover are distinct behavioral constructs, employee turnover may be more likely to occur when absenteeism is left unaddressed.

Based on the traditional assumption about job satisfaction and dissatisfaction, two tentative hypotheses are proposed as follows.

Hypothesis 1: Both job satisfaction and job dissatisfaction would be affected by the same aspects of a job.

Hypothesis 2: If job satisfaction increases, job dissatisfaction would decrease as a result.

2. Methods

2.1. Data

Given that managers play a central role in achieving goals and objectives of public organizations (Lynn et al., 2000, Meier and O'Toole Jr, 2002, Moynihan and Pandey, 2005), it is important to make them satisfied at work. To understand how public managers can be better satisfied and how they can be encouraged to stay at their current organizations, this study used National Administrative Studies Project (NASP III) data that surveyed public managers in Georgia (GA) and Illinois (IL) in the U.S., conducted by Bozeman and colleagues in 2005. National Administrative Studies Projects (NASP) data was first collected in 1992 and NASP III is a final attempt at a NASP database. Surveys were sent to public managers in GA and IL, and 790 public managers responded, which led to overall response rate 43 %. Among survey participants, 56 % were male and 44 % were female. This survey was asking public managers to evaluate how important each aspect of a job was for them. If an aspect of a job is evaluated as important or very important by a public manager and his/her expectation for this aspect of a job is met, we can imagine that their job satisfaction level would increase as a result.

2.2. Measures for intrinsic aspects of a job

Opportunity for advancement (IA 1): Survey participants were asked how important it was to have an opportunity for advancement within the organization's hierarchy (4 being very important and 1 being not important).

Opportunity for training and career development (IA 2): Survey participants were asked how important it was to have an opportunity for training and career development at work (4 being very important and 1 being not important).

Pride (IA 3): Survey participants were asked how much they agreed to the statement, "I feel a sense of pride working for this organization" (4 being strongly agree and 1 being strongly disagree).

Recognition (IA 4):[1] Survey participants were asked how much they agreed to the statement, "There are recognition for me to work hard in my job" (4 being strongly agree and 1 being strongly disagree).

2.3. Measures for extrinsic aspects of a job

Job security (EA 1): Survey participants were asked how important it was to be offered job security at work (4 being very important and 1 being not important).

Pension and retirement plan (EA 2): Survey participants were asked how important it was to get good pension or retirement plan from the work (4 being very important and 1 being not important).

Less conflict (EA 3): Survey participants were asked how important it was to meet the desire for low conflict work environments (4 being very important and 1 being not important).

Salary (EA 4): Survey participants were asked how important it was to get a good salary from the work (4 being very important and 1 being not important).

2.4. Measures for dependent variables

Two dependent variables were used in the regression analyses (see Tables 2 and 3). For the first dependent variable, overall job satisfaction was used to measure job satisfaction. More specifically, public managers were asked how much they agreed to the statement, "Overall, I am satisfied with my job" (4 being strongly agree and 1 being strongly disagree). For the second dependent variable, absenteeism was adopted as an operational proxy indicator for turnover that reflects work withdrawal and aspects of job dissatisfaction. More specifically, the number of absent days due to personal leave was used to measure absenteeism. While voluntary turnover is a direct behavioral measure for job dissatisfaction, absenteeism was used as a proxy measure due to unavailable information about turnover in the dataset. As previously mentioned, researchers confirmed a positive correlation between absenteeism and voluntary turnover, and absenteeism is regarded as an earlier behavioral correlate of eventual turnover, though they remain distinct behavioral phenomena.

3. Findings

Before running regression analyses, Pearson correlation analysis was conducted. The correlation analysis showed that public managers' job satisfaction was significantly correlated with most intrinsic aspects/rewards of a job such as IA 2 (.09, $p<.05$), IA3 (.58, $p<.01$), and IA4 (.43, $p<.01$), but neither of extrinsic aspects/rewards had significant correlation with job satisfaction (see Table 1). With regards to public managers' absenteeism, no factors were significantly related to it except one extrinsic aspects/rewards of a job (EA 2, -.14, $p<.001$). Overall, these results are not inconsistent with what Herzberg et al (1959) predicted in their study. According to these results, it seems that public managers tend to be more job satisfied when they put more importance on training and development (IA 2), pride (IA 3), and recognition (IA 4). It also seems that public managers would be less frequently absent when they put more importance on pension and retirement plan (EA 2).

Multicollinearity might be an issue in regression analyses when there exist high correlations among independent variables and control variables in a regression model (Schroeder et al., 1990, Grewal et al., 2004). Multicollinearity will undermine the statistical significance of independent variables in regression analysis and the results of regression analysis may not be reliable (Blalock Jr, 1963, Smith and Sasaki, 1979). In this study, high correlations existed between motivators, between hygiene factors, and between motivators and hygiene factors (see Table 1), which indicate a possible existence of milticollinearity in regression analysis. However, when Variance Inflation Factors (VIFs) were examined, no evidence of multicollinearity was found. According to the general rule of interpreting VIF (O'brien, 2007, Robinson and Schumacker, 2009), multicollinearity exists if the largest individual VIF is greater than 10 and if the mean of all VIFs is considerably larger than one such as 10 or 30. For all regression analyses in this study, individual and mean VIFs were between 1 and 2.

3.1. Regression analysis

Regression analyses were conducted in two steps for both job satisfaction and dissatisfaction. For pubic managers' job satisfaction (see Table 2), the first regression analysis was conducted with only extrinsic aspects/rewards of a job in Model 1, and none showed a significant effect on job satisfaction. However, when intrinsic aspects/rewards of a job were added in Model 2, significant and positive effects were found in two variables such as pride (IA3) and recognition (IA4). As indicated in the correlation analysis, this result confirmed what Herzberg et al. (1959) predicted in

[1]The original survey used incentive, instead of recognition. In this study, incentive is interpreted as a result of recognition. The NASP III data did not provide a clear idea as to what kinds of incentives were offered to public mangers.

Table 1. Correlation matrix

IA: Internal aspects/rewards EA: External aspects/rewards	JS	Absence	IA 1	IA 2	IA 3	IA 4	EA 1	EA 2	EA 3	EA 4
JS (Job Satisfaction)	1									
Absence (# of days missed due to Personal Leave)	.05	1								
IA 1 (Advancement)	.06	.01	1							
IA 2 (Training & development)	.093*	-.02	.556**	1						
IA 3 (Pride)	.58**	.01	.136**	.211**	1					
IA 4 (Recognition)	.43**	.01	.077*	.114**	.455**	1				
EA 1 (Job Security)	-0.01	-.06	.270**	.294**	0.01	-0.05	1			
EA 2 (Pension & retirement plan)	-0.01	-.14***	.270**	.280**	0.04	-0.04	.477**	1		
EA 3 (Low conflict)	0.05	.06	.171**	.191**	.077*	0.02	.277**	.268**	1	
EA 4 (Salary)	0.00	.01	.217**	.202**	0.03	0.05	.166**	.267**	.201**	1

*$p < .05$, **$p < .01$, ***$p < .001$

their study. That is, only some intrinsic aspects/rewards of a job showed a significant and positive influence on public managers' job satisfaction.

Public managers' absenteeism (i.e., dissatisfaction) and its related factors were explored in Models 3 and 4 (see Table 3). When regression analysis was conducted with only intrinsic aspects/rewards of a job in Model 3, absenteeism was not significantly associated with any of these intrinsic aspects/rewards. In Model 4, however, when extrinsic aspects/rewards of a job were added, organizational pension and retirement plan (EA2) showed a significant and negative coefficient, and desire for low conflict (EA3) showed a significant and positive coefficient. According to this finding, public managers' expectation for EA3 did not seem to be met whereas public managers' expectation for EA2 seemed to be met. That is, public managers' absenteeism tended to be higher when their expectation for EA3 that was rated important/very important was not met. Notably, although Model 4 is statistically significant overall ($F = 2.92, p < .01$), the variance explained by the model remains low ($R^2 = 0.03$), indicating that extrinsic hygiene factors account for only 3% of the variance in absenteeism and that practical predictive power is limited.

In Model 4, the job satisfaction level was also added to Model 3 to verify whether or not absenteeism is associated with job satisfaction. If job dissatisfaction is opposite to job satisfaction on the same continuum as seen in the traditional assumption, absenteeism should decrease when job satisfaction increases. That is, a negative correlation is supposed to exist between absenteeism and job satisfaction if the traditional assumption holds true. However, Model 4 showed that job satisfaction had a positive and non-significant coefficient with absenteeism.

In sum, job satisfaction was significantly predicted by only intrinsic aspects/rewards of a job as seen in Models 1 and 2, whereas absenteeism was significantly associated with only extrinsic aspects/rewards of a job as seen in Models 3 and 4. Therefore, Hypothesis 1 was not supported. Furthermore, it turned out that absenteeism was not located at the opposite end of the same continuum with job satisfaction. As seen in Model 4, absenteeism was not significantly related to the level of job satisfaction. Therefore Hypothesis 2 was not supported, either.

Table 2. Regression analysis for job satisfaction

Job aspects	Variables	Job satisfaction (Dependent variable)	
		Model 1	Model 2
Extrinsic aspects/rewards	Job security (EA 1)	-.019	.010
	Org pension & retirement plan (EA 2)	-.012	-.013
	Desire for low conflict (EA 3)	.049	.022
	Salary (EA 4)	-.010	-.035
Intrinsic aspects/rewards	Advancement (IA 1)		-.003
	Training & career development (IA 2)		-.029
	Pride (IA 3)		.496***
	Recognition (IA 4)		.160***
	Number of observations	743	740
	R-squared	.01	.37
	F-value	.70	55.13***

*Notes: Unstandardized coefficients are displayed * p < .05 ** p < .01 *** p < .001*

Table 3. Regression analysis for job dissatisfaction

Job aspects	Variables	Absenteeism (Dependent variable)	
		Model 3	Model 4
Intrinsic aspects/rewards	Advancement (IA 1)	-.391	.266
	Training & career development (IA 2)	-.105	-.118
	Pride (IA 3)	-.279	-.070
	Recognition (IA 4)	-.491	-.079
Extrinsic aspects/rewards	Job security (EA 1)		-.098
	Org pension & retirement plan (EA 2)		-.870***
	Desire for low conflict (EA 3)		.416**
	Salary (EA 4)		.225
Other	Job satisfaction		.289
	Number of observations	752	741
	R-squared	.01	.03
	F-value	1.40	2.92**

*Notes: Unstandardized coefficients are displayed * p < .05 ** p < .01 *** p < .001*

4. Discussion

This study assessed traditional assumptions about employees' job satisfaction and examined whether or not same aspects/rewards of a job are associated with both job satisfaction and job dissatisfaction among public managers. According to the findings in this study, job satisfaction and job dissatisfaction need to be addressed by taking different approaches, respectively. More specifically, intrinsic aspects/rewards of a job such as pride (IA3) and recognition (IA4) showed a significant and positive association with public managers' job satisfaction. The findings in this study also indicate that job dissatisfaction needs to be taken care of by focusing on extrinsic aspects/rewards of a job such as pension & retirement plan (EA2) and desire for low conflicts (EA3). Again, the traditional assumption about job satisfaction and dissatisfaction was not supported with public managers' sample. The finding of this study support other studies with employees of for-profit organizations (Koelbel et al., 1991, Lundberg et al., 2009, Sanjeev and Surya, 2016), and with public employees (Park et al., 1988, Chu and Kuo, 2015).

Generally speaking, management is more constrained in public organizations than in for-profit organizations, and this constraint is one of the major causes for a low level of motivation/job satisfaction among public managers (Rosenbloom, 1998, Pollitt and Bouckaert, 2004). Furthermore, given a tight budget for improving working conditions and a limitation to provide monetary rewards to good performers in public organizations, it becomes a big challenge to increase public managers' motivation level. Traditionally public organizations have focused on improving extrinsic aspects/rewards of a job such as pay raise or better retirement plan, and they have failed to meet public managers' expectations for those. Findings in this study would help increase the level of motivation among public managers because it would cost little to improve intrinsic aspects of a job or to give intrinsic rewards to public managers such as recognition and pride.

While increasing job satisfaction is important, we also know that employee turnover is costly to an organization. In particular, public managers' resignation can be a huge loss to their organizations and citizens because public managers play a key role in running public organizations and in providing quality public services to citizens (Lynn et al., 2000, Meier and O'Toole Jr, 2002, Moynihan and Pandey, 2005). Therefore, possible causes for their resignation should be better taken care of in advance. As mentioned previously, job dissatisfaction is known as a precursor to resignation (e.g., Egan et al., 2004, Coomber and Barriball, 2007) and absenteeism is a major indicator for employee turnover (e.g., Somers, 1995, Cohen and Golan, 2007). Therefore, if public managers are dissatisfied at work, they would be frequently absent, then they may end up quitting their jobs. According to the findings in this study, public managers would be less frequently absent when their organizations meet public managers' expectation for extrinsic aspects/rewards of a job such as pension and retirement plan (EA 2) and desire for low conflict (EA 3). Overall, it is recommended to take care of both job satisfaction and dissatisfaction among public managers by focusing on different aspects/rewards of a job, respectively, unlike traditional assumptions suggest.

This study provides practical and effective insights to motivate and retain quality public managers by focusing on intrinsic and extrinsic aspects/rewards of a job. However, several important limitations of this study should be noted.

First, the empirical analysis relies on cross-sectional data from the 2005 National Administrative Studies Project (NASP III). Because cross-sectional survey data cannot establish causal pathways, the observed relationships between job aspects, job satisfaction, and absenteeism should be interpreted as statistical associations rather than direct causal effects. Furthermore, while NASP III provides a robust historical benchmark for testing motivation theories, public sector work environments, technologies, and remote/hybrid work policies have evolved since 2005, which may limit generalizability to modern public organizations.

Second, job satisfaction was assessed using a single-item global measure. Although single-item questions are frequently utilized in large-scale public administration surveys, multi-item scales typically offer higher reliability and capture multidimensional facets of job satisfaction, which may influence the precision of regression coefficients in Model 2.

Third, absenteeism (measured by personal leave days) was used as an operational proxy for job dissatisfaction and turnover due to data constraints. Although absenteeism is an established behavioral correlate of turnover, absenteeism and voluntary turnover remain distinct behaviors driven by different personal, familial, or market factors.

Finally, while the regression model for absenteeism (Model 4) was statistically significant overall, it explained only 3% of the variance ($R^2 = 0.03$). This low explanatory power indicates that extrinsic hygiene factors account for only a small portion of absenteeism, leaving the vast majority of variance driven by unmeasured personal or organizational variables.

Future research utilizing longitudinal data, multi-item measurement scales, and direct turnover measures in contemporary public sector settings will be valuable to validate and extend these findings.

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El perfil del líder como factor contingente en la adaptación de la estructura organizacional de los Proyectos: Un Análisis Cualitativo en América Latina

The Leader's Profile as a Contingency Factor in the Adaptation of Organizational Structure in Projects: A Qualitative Analysis in Latin America

Article Record

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Abstract

Contemporary project management requires flexible organizational structures capable of responding to the complexity, uncertainty, and dynamism of current business environments. Although the literature has traditionally classified project structures as functional, matrix, and projectized, a gap remains in understanding the role played by the leader's profile in the practical adaptation of such structures. This study aims to analyze how the project leader's profile acts as a contingent factor in the configuration, adjustment, and operationalization of project organizational structures in Latin America. An exploratory qualitative approach was adopted, based on semi-structured interviews with 20 project leaders from different sectors and countries in the region. Data analysis was conducted through thematic coding assisted by MAXQDA 24 and exploratory semantic co-occurrence analysis, following Lincoln and Guba's (1985) qualitative rigor criteria of credibility, transferability, dependability, and confirmability. The findings show that leadership does not replace organizational governance, the PMO, or the corporate parent structure; rather, it operates as a situated agency capacity that enables the adaptation of roles, decision flows, coordination mechanisms, and integration practices within existing institutional boundaries. The findings contribute to contingency theory and project organizational design by conceptualizing leadership as a structural moderator in Latin American contexts. Given the exploratory nature of the study and the sample size, the results do not seek statistical generalization but analytical transferability for future empirical research.

Latin America | leadership | Organizational structure | project management | structural design

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El perfil del líder como factor contingente en la adaptación de la estructura organizacional de los Proyectos: Un Análisis Cualitativo en América Latina

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Abstract

La gestión de proyectos contemporánea requiere estructuras organizacionales flexibles, capaces de responder a la complejidad, la incertidumbre y el dinamismo de los entornos empresariales actuales. Aunque la literatura ha clasificado tradicionalmente las estructuras de proyectos en funcionales, matriciales y proyectizadas, aún persiste una brecha en la comprensión del papel que desempeña el perfil del líder en la adaptación práctica de dichas estructuras. Este estudio tiene como propósito analizar cómo el perfil del líder de proyecto actúa como factor contingente en la configuración, ajuste y operacionalización de la estructura organizacional de proyectos en América Latina. Se adoptó un enfoque cualitativo de carácter exploratorio, basado en entrevistas semiestructuradas realizadas a 20 líderes de proyectos de diversos sectores y países de la región. El análisis de los datos se efectuó mediante codificación temática asistida por MAXQDA 24 y análisis exploratorio de coocurrencias semánticas, siguiendo los criterios de rigor cualitativo de credibilidad, transferibilidad, dependencia y confirmabilidad propuestos por Lincoln y Guba (1985). Los resultados muestran que el liderazgo no sustituye la gobernanza organizacional, la PMO ni la estructura corporativa matriz; más bien, opera como una capacidad de agencia situada que permite adaptar roles, flujos de decisión, mecanismos de coordinación y formas de integración dentro de límites institucionales existentes. Los hallazgos contribuyen a la teoría de la contingencia y al diseño organizacional de proyectos al proponer una lectura del liderazgo como modulador estructural en contextos latinoamericanos. Dado el carácter exploratorio del estudio y el tamaño de la muestra, los resultados no buscan generalización estadística, sino transferibilidad analítica para futuras investigaciones empíricas.

Keywords: *América Latina, diseño estructural, Estructura organizacional, gestión de proyectos, liderazgo*

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1. Introducción

La gestión de proyectos constituye un elemento clave para el éxito de las organizaciones, y la definición de una estructura organizacional de proyecto adecuada representa una decisión estratégica que afecta directamente la asignación de recursos, los procesos de toma de decisiones, la comunicación interna y el logro de los objetivos establecidos (Joslin & Müller, 2015; Project Management Institute [PMI], 2017). La literatura ha distinguido tradicionalmente entre estructuras funcionales, matriciales, proyectizadas, híbridas, virtuales y en red, cada una con beneficios, limitaciones y condiciones específicas de aplicación (Ahmady et al., 2016; Gonzalez & Fierro, 2025). No obstante, la evolución reciente de los entornos organizacionales ha evidenciado una transición desde modelos jerárquicos rígidos hacia configuraciones más flexibles, colaborativas y centradas en equipos, especialmente en contextos caracterizados por incertidumbre, transformación digital y presión por resultados adaptativos (Lundin & Söderholm, 1995; Turner & Müller, 2005).

Desde la teoría de la contingencia, no existe una estructura organizacional universalmente óptima; la efectividad estructural depende del ajuste entre el entorno, la estrategia, la tecnología, la complejidad del proyecto, la disponibilidad de recursos y las capacidades organizacionales (Donaldson, 2006; Drazin & Van de Ven, 1985). En este marco, el liderazgo no debe ser entendido como un determinante absoluto que diseña la estructura desde cero, sino como un factor contingente que interpreta las condiciones del proyecto y contribuye a adaptar la estructura existente. Esta precisión resulta central, ya que en la práctica corporativa las estructuras funcionales, matriciales, proyectizadas o híbridas suelen estar condicionadas previamente por la gobernanza organizacional, la PMO, la cultura institucional y la estructura matriz de la organización.

En consecuencia, este estudio propone analizar el perfil del líder como un modulador estructural situado. El líder de proyecto influye en la forma en que la estructura se operacionaliza mediante la asignación de roles, la coordinación interfuncional, la negociación de autoridad, la gestión de recursos, la integración de equipos y la adaptación de los mecanismos de comunicación y decisión. Esta perspectiva permite evitar una interpretación causal rígida y reconoce que el diseño estructural de los proyectos emerge de la interacción entre factores organizacionales, técnicos,

institucionales y humanos (Anantatmula, 2010; Müller & Turner, 2007).

Los objetivos revisados de esta investigación son: (i) caracterizar los perfiles de liderazgo percibidos por profesionales de proyectos en contextos latinoamericanos; (ii) identificar los mecanismos mediante los cuales dichos perfiles influyen en la adaptación operativa de las estructuras organizacionales de proyectos; y (iii) proponer implicaciones prácticas para líderes, PMO y tomadores de decisiones interesados en fortalecer estructuras de proyecto más adaptativas.

2. Revisión de la literatura

2.1. Antecedentes

La evolución de las estructuras organizacionales de proyectos (EOP) ha sido un tema pivotal en la gestión de proyectos desde mediados del siglo XX. Estudios pioneros como los de Shenhar y Dvir (1996) y Stuckenbruck y Zomorrodian (1987) analizaron las ventajas y limitaciones de estas estructuras, enfocándose en la interacción entre la autoridad del equipo funcional y el equipo del proyecto. Estas investigaciones iniciales establecieron una terminología común y sirvieron como base para desarrollos posteriores en el campo.

La teoría de la contingencia, que sostiene que no existe un modelo organizacional universalmente óptimo, ha sido un pilar teórico fundamental, indicando que el diseño estructural debe adaptarse a las condiciones contextuales y la información disponible (Carroll & Burton, 2012; Donaldson, 2006; Drazin & Van de Ven, 1985; Luthans & Stewart, 1977; Otley, 2016). Desde 1987, diversos estudios han confirmado que las estructuras matriciales robustas y las proyectizadas tienden a ser más efectivas para el éxito de los proyectos en comparación con las estructuras funcionales (Chuah et al., 1995; Gray et al., 1990). Sin embargo, el hecho de que el 28% de las organizaciones aún emplee estructuras funcionales sugiere la influencia de factores adicionales no completamente explorados (Patanakul et al., 2012).

El concepto de organización temporal, introducido por Lundin & Söderholm (1995), marcó un nuevo enfoque al concebir los proyectos como entidades transitorias diseñadas para resolver problemas específicos en un tiempo limitado. Además, el surgimiento del enfoque ágil en 2001, combinado con avances en tecnologías de la información, comunicaciones y la globalización, fomentó la adopción de estructuras más flexibles, como las virtuales y en red (Adams & Adams, 1997; Clegg & Kornberger, 2003; Shenhar, 2001; Swart et al., 2022; Turner & Miterev, 2019).

La literatura ha identificado múltiples factores que moldean el diseño de las EOP. Inicialmente, Larson y Gobeli (1989) destacaron la autoridad del director de proyecto y de la entidad funcional como elementos clave. Posteriormente, Ford y Randolph (1992) propusieron un modelo más amplio que incluye cinco dimensiones: entorno, características organizacionales, características del proyecto, del equipo y del líder, identificando trece factores de diseño, como la complejidad, la diversidad, la cultura organizacional y las características de las tareas. Otros autores, como Blaskovics (2018), Fiala (2004), Kerzner (2009) y Lechler y Dvir (2010), han señalado entre tres y siete factores, incluyendo la estrategia organizacional, la tecnología, el territorio, el tamaño y duración del proyecto, la capacidad de cooperación del equipo y la experiencia previa con estructuras organizativas.

En tiempos recientes, se han incorporado factores más dinámicos, como la incertidumbre del mercado y las innovaciones en tecnología financiera (Zani et al., 2024). A pesar de esta diversidad, los estudios actuales tienden a centrarse en no más de cinco factores de diseño (PMI, 2017), omitiendo frecuentemente el perfil del liderazgo como variable clave en la selección de la estructura organizacional de los proyectos.

2.2. Liderazgo y estructura organizacional

En los entornos organizacionales contemporáneos, el liderazgo de proyectos ha dejado de ser una función meramente operativa para convertirse en un componente estratégico en la configuración estructural de los proyectos. Las investigaciones recientes como las de Jitpaiboon et al. (2019) y Joslin y Müller (2015) destacan que el liderazgo efectivo en proyectos incide directamente en la forma como se diseñan y adaptan las estructuras organizacionales, particularmente en contextos de alta complejidad e incertidumbre.

La estructura organizativa no solo proporciona un marco de distribución de funciones, sino que también actúa como reflejo de las decisiones políticas, culturales y estratégicas que asume el liderazgo del proyecto (Modig, 2007; Nguyen & Watanabe, 2017). Así, la relación entre liderazgo y los factores de diseño delimita los márgenes de acción del líder, este último redefine constantemente la estructura para ajustarla a los requerimientos dinámicos del proyecto y su entorno (Müller et al., 2019).

En esta línea, diversos estudios como Aubry & Lavoie-Tremblay (2018); Belout & Gauvreau (2004) y Jitpaiboon et al. (2019) coinciden en que el factor de diseño debe traducirse en una capacidad organizacional para integrar equipos multidisciplinarios, gestionar recursos escasos y articular visiones diversas. Esta capacidad depende, en gran medida de que las organizaciones puedan adaptarse a las estructuras del proyecto, superando los modelos burocráticos tradicionales (Hällgren, 2010; San Cristóbal et al., 2018).

Para Patanakul et al. (2012) los líderes de proyecto aumentan las posibilidades de éxito del proyecto, especialmente en entornos complejos donde la flexibilidad y la toma de decisiones descentralizada son claves. La evidencia empírica muestra que aquellas organizaciones que habilitan a sus líderes de proyecto para redefinir los procesos y estructuras presentan mayores niveles de desempeño y resiliencia organizativa (Fernando et al., 2018).

Además, se ha identificado que las prácticas de liderazgo aplicadas por los líderes de proyectos deben estar alineadas con una visión sistémica del proyecto y con el contexto institucional donde este se implementa. En entornos latinoamericanos, donde los proyectos operan en escenarios marcados por tensiones políticas, institucionales y culturales, el liderazgo estructuralmente habilitado cobra especial relevancia (Jun Park & Jeong Park, 2009; Might & Fischer, 1985). Desde un enfoque contemporáneo, el uso del Organizational Network Analysis (ONA) representa una revolución en la forma en que se concibe el liderazgo dentro de las estructuras organizacionales de los proyectos. Para Krpan et al. (2025), esta metodología permite identificar actores clave dentro de las redes internas de comunicación, revelando patrones relacionales que tradicionalmente pasaban desapercibidos.

El tipo de liderazgo adoptado influye directamente en cómo se conciben las estructuras: si se promueve un liderazgo transformacional y adaptativo, la estructura tiende a ser más orgánica, abierta a la retroalimentación y sensible a los cambios contextuales. En este sentido, el estudio de Doan et al. (2020) subraya que los líderes transformacionales caracterizados por su empatía, gestión emocional y capacidad de inspirar generan un entorno psicosocial que facilita la cohesión estructural del equipo de proyecto. Por tanto, los factores de diseño moldean las arquitecturas organizacionales que sustentan su ejecución (Müller & Jugdev, 2012; Pilkienė et al., 2018).

2.3. De los estilos de liderazgo a los perfiles de rol en proyectos

La literatura sobre liderazgo en proyectos ha abordado con frecuencia estilos como el liderazgo transformacional, adaptativo, distribuido y orientado a resultados. Estos enfoques permiten comprender las conductas, competencias y capacidades relacionales mediante las cuales los líderes influyen en los equipos, gestionan la incertidumbre, facilitan la coordinación y contribuyen al desempeño del proyecto (Aga et al., 2016; Anantatmula, 2010; Turner & Müller, 2005). Sin embargo, en la práctica organizacional dichas conductas no se expresan de manera abstracta, sino a través de posiciones institucionales concretas, tales como líderes técnico-funcionales, responsables de PMO, directores de programa o ejecutivos de alta dirección.

Por ello, este estudio distingue entre estilos de liderazgo y perfiles de rol. Los estilos de liderazgo representan patrones conductuales, mientras que los perfiles de rol representan posiciones organizacionales desde las cuales se ejerce influencia estructural. Así, un liderazgo transformacional puede manifestarse en un perfil ejecutivo cuando impulsa estructuras híbridas, descentralizadas y orientadas a resultados; un liderazgo adaptativo puede observarse en una PMO cuando ajusta metodologías, prácticas de gobernanza y mecanismos de coordinación; y un liderazgo técnico-funcional puede traducirse en estructuras más jerárquicas cuando la prioridad es el control operativo, la especialización técnica o el cumplimiento regulatorio.

Esta distinción permite conectar la literatura previa con los resultados empíricos del estudio. Los perfiles identificados en los hallazgos no sustituyen los estilos de liderazgo discutidos en la teoría; más bien, muestran cómo dichos estilos se materializan en roles organizacionales específicos que influyen en la adaptación de la estructura del proyecto. En este sentido, el aporte conceptual del estudio consiste en vincular la dimensión conductual del liderazgo con la institucional del diseño organizacional de proyectos.

3. Metodología

3.1. Enfoque y tipo de investigación

La presente investigación adopta un enfoque cualitativo con diseño exploratorio y descriptivo, orientado a comprender en profundidad el vínculo entre los factores de diseño de proyectos y la configuración de estructuras organizacionales en el contexto latinoamericano. La elección de este enfoque responde a la necesidad de abordar fenómenos complejos desde la perspectiva de los actores involucrados, permitiendo la emergencia de significados y categorías desde el propio discurso de los participantes (Creswell, 2014).

3.2. Población y muestra

La población objetivo estuvo conformada por profesionales especializados en gestión de proyectos en América Latina, particularmente en países del Pacto Andino (Ecuador, Colombia, Perú, Bolivia), además de Chile y Argentina. La muestra fue seleccionada mediante un muestreo intencional y por conveniencia, considerando criterios de inclusión como: a) experiencia mínima de cinco años en gestión de proyectos, b) participación en estructuras organizativas de proyectos complejos o multiproyectos, y c) vinculación con organismos profesionales como el Project Management Institute (PMI).

La muestra quedó conformada por 20 participantes, alcanzando saturación teórica (Glaser & Strauss, 1967). El perfil de los entrevistados evidenció una alta especialización, con un promedio de 13,9 años de experiencia en gestión de proyectos, representación diversa en roles (directores de programa, PMO, gerentes generales), sectores (información, industria, finanzas), y niveles organizativos (funcional y de proyectos), con predominancia del sector privado (85%).

3.3. Instrumento

Para la recolección de datos se empleó una guía de entrevista semiestructurada, diseñada en función de los objetivos de investigación. Este instrumento permitió explorar tanto categorías predefinidas como emergentes, conservando flexibilidad metodológica (Rubin & Rubin, 2012). Se realizaron 20 entrevistas en profundidad con especialistas en dirección de proyectos. Todos los participantes firmaron el consentimiento informado y cumplieron con el perfil requerido, el cual fue validado durante la entrevista. Además, se recopiló información demográfica y descriptiva como parte del proceso.

Las entrevistas fueron grabadas mediante la plataforma Zoom y posteriormente transcritas utilizando la herramienta de inteligencia artificial READ, complementándose con una validación manual y confirmación escrita por parte de los entrevistados. Las transcripciones, junto con las respuestas descriptivas, fueron organizadas en una matriz analítica e importadas a MAXQDA 24 para su codificación temática y posterior análisis de coocurrencias.

3.4. Análisis de datos

El análisis se desarrolló mediante un enfoque temático, utilizando el software MAXQDA 24 (Braun & Clarke, 2006). Para garantizar el rigor metodológico, el estudio adoptó los criterios de rigor científico propuestos por Lincoln y Guba (1985), asegurando credibilidad, transferibilidad, dependencia y confirmabilidad.

La credibilidad se aseguró mediante la triangulación de fuentes (20 entrevistas a participantes de distintos sectores), la validación cruzada con transcripciones originales y el uso de memos analíticos por caso. La transferibilidad se abordó a través de descripciones densas del contexto organizacional, considerando el tipo de empresa, país y nivel de madurez en gestión de proyectos, así como comparaciones entre América Latina y otras regiones como Europa y EE. UU. En cuanto a la dependencia, se mantuvo una estructura coherente y trazable del proceso analítico, respaldada por una arquitectura clara de códigos y subcódigos generados en MAXQDA, lo cual permite la reproducibilidad del análisis. Finalmente, la confirmabilidad se garantizó mediante el uso de evidencias directas y trazables (citas textuales), la diversidad de los participantes y una reflexividad estructurada que minimizó posibles sesgos del investigador.

El proceso incluyó: (1) lectura sistemática de las transcripciones para familiarización con los datos; (2) codificación inicial deductiva e inductiva, generando 189 subcódigos organizados en seis códigos principales; (3) identificación de temas emergentes a través de herramientas visuales como Code Maps y Code Relations Browser; (4) revisión de coherencia interna y diferenciación temática; (5) definición y nombramiento de temas y subtemas con respaldo en citas textuales; y (6) elaboración de un informe analítico con análisis por segmentos, contrastes descriptivos no generalizables por características de los participantes, y uso de matrices para el análisis mixto (Gizzi & Rädiker, 2021).

El análisis permitió identificar hallazgos fundamentales sobre la configuración de las estructuras organizacionales de proyectos, los factores de diseño considerados en la práctica, las escalas asociadas y otros elementos clave. Estos hallazgos trascienden las clasificaciones teóricas existentes, aportando una comprensión

más dinámica de la práctica organizacional. A pesar de que la teoría enuncia una amplia variedad de factores, el estudio permitió reducirlos a aquellos efectivamente utilizados por expertos.

Para el análisis de coocurrencias se utilizó la herramienta Code Relations Browser de MAXQDA 24. La unidad básica de análisis fue el segmento codificado de entrevista. Se consideró coocurrencia la presencia de dos códigos dentro del mismo segmento o en segmentos contiguos asociados a una misma respuesta temática. Como criterio mínimo de inclusión se consideraron relaciones con al menos dos apariciones en el corpus. La visualización de clústeres tuvo un propósito exploratorio e interpretativo, no confirmatorio, y fue contrastada con memos analíticos y citas textuales de los participantes.

4. Resultados

A continuación, se presentan los resultados correspondientes a la fase cualitativa del estudio, organizados en torno a los objetivos de investigación previamente formulados. Esta fase tuvo como objetivo identificar los factores de diseño efectivamente considerados por las organizaciones en la práctica y comprender su relación con los perfiles de liderazgo y la adaptación de las estructuras organizacionales de proyectos. El análisis temático, realizado con apoyo del software MAXQDA, permitió clasificar y sintetizar los hallazgos a partir de una codificación abductiva, revelando patrones consistentes en las decisiones estructurales adoptadas por las organizaciones.

4.1. Factores de diseño considerados por las organizaciones

La figura 1 corresponde a una nube de palabras generada a partir del análisis temático de las entrevistas, en la que el tamaño de cada término representa su frecuencia de aparición en los segmentos codificados. Este recurso visual permitió identificar los factores de diseño que más se repiten en el discurso de los entrevistados, lo que refleja su relevancia práctica en la configuración de estructuras organizacionales de proyectos.

Estos elementos no solo reflejan preocupaciones operativas y estratégicas de los líderes de proyecto, sino que también evidencian una convergencia entre la experiencia profesional y ciertos lineamientos teóricos. Estos factores constituyen insumos relevantes para futuras investigaciones cuantitativas orientadas a estimar su peso relativo y su grado de influencia en distintos contextos organizacionales.



Figure 1. Nube de palabras factores de diseño

La presencia de variables como el control por resultados, el enfoque metodológico, el liderazgo y las restricciones externas sugiere que las decisiones estructurales responden tanto a condiciones internas de gestión como a presiones del entorno. Es decir, el liderazgo del proyecto no solo actúa sobre una estructura predefinida, sino que opera como modulador activo de la misma, en función de los recursos, riesgos y oportunidades del entorno organizacional.

La Figura 2 representa un análisis de clústeres construido a partir de la coocurrencia de códigos en los segmentos analizados, el cual permitió identificar dos agrupaciones temáticas de factores de diseño estructural en proyectos. Cada color simboliza una familia

conceptual distinta que refleja patrones latentes en la toma de decisiones organizacionales:

El análisis de clústeres reveló:

- Color Rojo: Agrupa códigos asociados con la complejidad de los proyectos
- Color Verde: Agrupa códigos asociados con la especialización de los recursos
- Color Turquesa: Agrupa códigos asociados con los recursos para la conformación de las estructuras organizacionales
- Color Azul: Agrupa códigos asociados con liderazgo y restricciones para la estructura
- Color Morado: Agrupa códigos asociados con habilidades y entorno

Este agrupamiento refleja cómo las dinámicas internas, las capacidades del equipo y el contexto institucional influyen en la forma en que se concibe y se adapta la estructura organizacional. En conjunto, estos clústeres no solo organizan la variedad de factores identificados, sino que revelan dimensiones integradas que articulan lo técnico, lo estratégico, lo político y lo contextual en el diseño de estructuras proyectuales en América Latina.

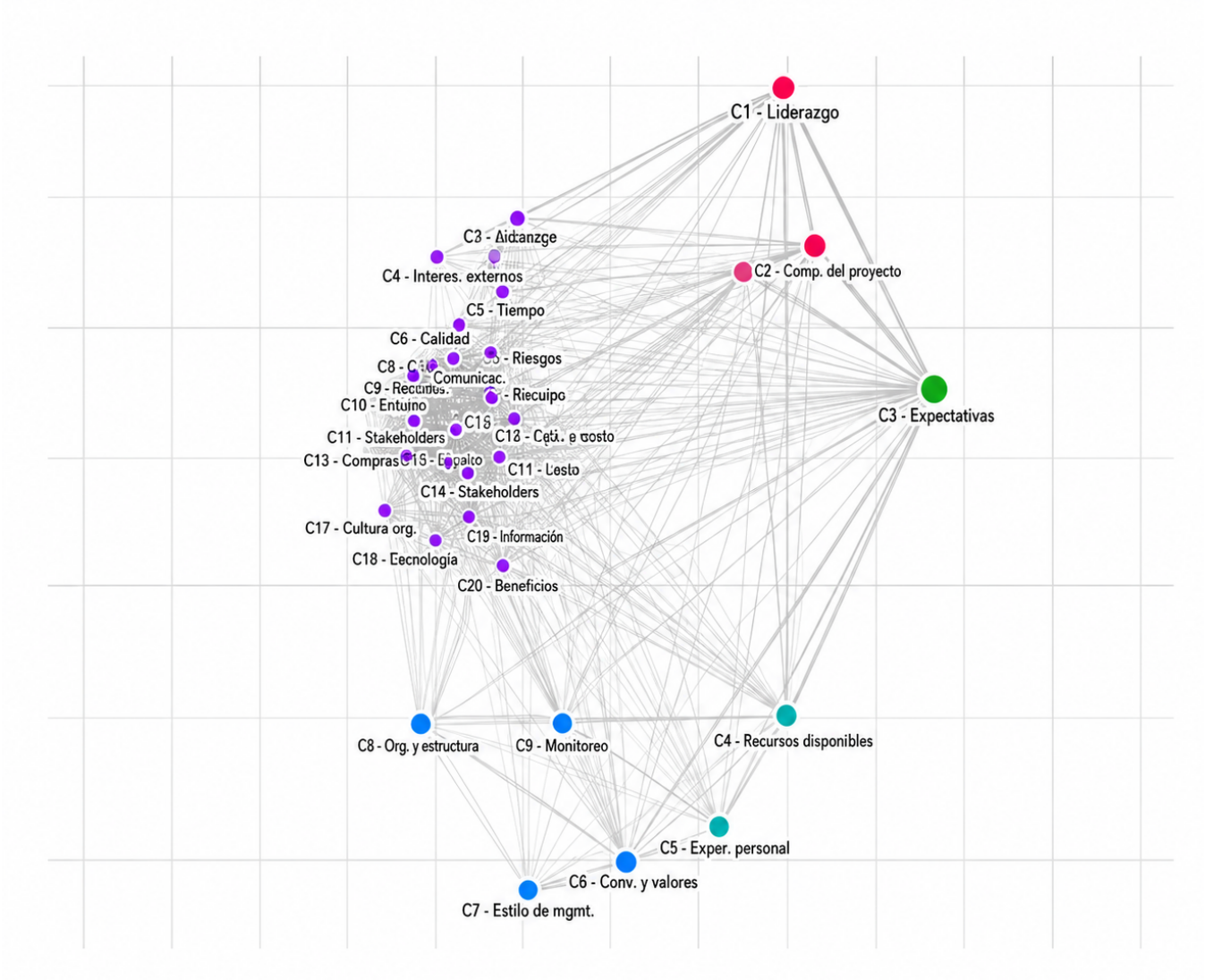


Figure 2. Análisis de clústeres sobre los factores de diseño de proyectos

4.2. El liderazgo como factor contingente en la adaptación estructural del proyecto

Un hallazgo central de esta investigación es que el perfil del líder de proyecto actúa como factor contingente en la adaptación de la estructura organizacional del proyecto. Este resultado no implica que el líder sustituya la estructura formal definida por la organización matriz, la PMO o los órganos de gobernanza. Más bien, evidencia su capacidad para modular la forma en que dicha estructura se operacionaliza en la práctica, especialmente mediante decisiones sobre autoridad, comunicación, coordinación, integración de equipos y uso de recursos.

Los resultados especifican cómo diferentes perfiles de liderazgo se vinculan interpretativamente con distintas configuraciones estructurales y dinámicas operativas:

- **Liderazgo Técnico/Funcional:** Conduce a estructuras más jerárquicas y orientadas al control, priorizando la claridad

de roles y la estabilidad operativa. Este enfoque se alinea con organizaciones que priorizan la eficiencia operativa y la estandarización en contextos de baja complejidad o alta regulación (Mintzberg, 1979). La toma de decisiones centralizada y la claridad en los roles son características de estructuras que buscan minimizar la ambigüedad y maximizar la predictibilidad.

- **Liderazgo de PMO/Unidad Especializada:** Fomenta estructuras balanceadas o proyectizadas, con énfasis en la integración metodológica, la gobernanza y el alineamiento estratégico. Esto valida el rol de las PMO como catalizadores que no solo introducen metodologías formales, sino que activamente modelan la estructura para facilitar la coordinación transversal y la gobernanza, mitigando silos y promoviendo una visión unificada del proyecto (PMI, 2017). La institucionalización de la autoridad y responsabilidad de la PMO permite una gestión transversal y coordinación interáreas más efectiva.
- **Liderazgo de Alta Dirección/Ejecutivo:** Promueve estructuras flexibles, híbridas y adaptativas, con una fuerte orientación a resultados, liderazgo distribuido y una visión transformacional. Esto concuerda con las tendencias actuales que abogan por la agilidad y la capacidad de respuesta en entornos VUCA (Volatile, Uncertain, Complex, Ambiguous) (Ries, 2011). En estos escenarios, la estructura se adapta para empoderar a los equipos, fomentar la innovación y facilitar una rápida toma de decisiones, trascendiendo las limitaciones de las estructuras rígidas y promoviendo una cultura de adaptabilidad organizacional.

Los resultados permiten identificar tres perfiles de rol mediante los cuales se expresa la influencia estructural del liderazgo. El liderazgo técnico-funcional se asocia con estructuras más jerárquicas, orientadas al control, la claridad de roles, la especialización técnica y la estabilidad operativa. El liderazgo de PMO o unidad especializada se vincula con estructuras balanceadas, matriciales o proyectizadas, donde la gobernanza, la integración metodológica, la coordinación transversal y el alineamiento estratégico son elementos centrales. Finalmente, el liderazgo de alta dirección o ejecutivo se relaciona con estructuras híbridas, flexibles y adaptativas, especialmente en entornos de alta incertidumbre, transformación organizacional o presión estratégica por resultados.

Estos perfiles no deben interpretarse como categorías excluyentes ni como estilos psicológicos de liderazgo. Representan configuraciones institucionales de influencia estructural, desde las cuales los líderes traducen estilos, competencias y decisiones en prácticas concretas de coordinación, formalización, flexibilidad, delegación y asignación de recursos.

5. Discusión

Los factores más destacados, como la especialización, la complejidad del proyecto, la cultura organizacional y la disponibilidad de recursos, muestran que las decisiones estructurales están influenciadas por aspectos técnicos, culturales e institucionales. Esta visión se alinea con la teoría de la contingencia de Donaldson (2006) y Otley (2016), que subraya la interacción entre el entorno, las capacidades internas y el perfil de liderazgo para configurar estructuras organizativas adaptativas.

Un hallazgo clave es la relevancia que las organizaciones latinoamericanas asignan a la estructura organizacional como factor crítico asociado al éxito de los proyectos. El 38% de los participantes señaló que una estructura adecuada es esencial para alcanzar los objetivos, mientras que el 20% la vinculó con una gestión más eficiente y el 16% con un mejor rendimiento del equipo. Esta percepción destaca la estructura organizacional de proyectos (EOP) no solo como un soporte operativo, sino como un marco estratégico que influye en la legitimidad, la coordinación interfuncional y la toma de decisiones. Esto refuerza el argumento de Shenhar y Dvir (1996) de que una estructura alineada con los objetivos estratégicos mejora las tasas de éxito, y concuerda con estudios recientes que resaltan su papel en la gobernanza, la gestión de riesgos y la sostenibilidad de los resultados (Locatelli et al., 2023).

El análisis por clústeres temáticos identificó cinco categorías principales que agrupan los factores de diseño: complejidad del proyecto, especialización de recursos, disponibilidad de medios, restricciones organizacionales y competencias del equipo. Esta clasificación proporciona un marco teórico-empírico más sólido para investigaciones futuras, sugiriendo que las decisiones estructurales deben abordarse desde un enfoque sistémico que integre múltiples niveles de análisis (Dumitrascu-Bălduău et al., 2021; Lee-Kelley & Sankey, 2008).

Un hallazgo particularmente relevante es la relación entre el liderazgo de alta dirección o equipos ejecutivos y la adopción de estructuras flexibles o híbridas. Esto se alinea con las tendencias actuales que promueven la agilidad en entornos VUCA (volátiles, inciertos, complejos y ambiguos) (Ries, 2011). La preferencia por un enfoque centrado en resultados, liderazgo distribuido y una visión transformacional indica que, cuando la alta dirección participa activamente, las estructuras se adaptan para empoderar a los equipos, promover la innovación y agilizar la toma de decisiones, superando las limitaciones de modelos rígidos y fomentando una cultura de adaptabilidad. Este liderazgo responde a factores como la "tasa de cambio" y la "incertidumbre del mercado" (Ford & Randolph, 1992; Gonzalez & Fierro, 2025), donde las estructuras ágiles resultan esenciales para el éxito del proyecto. La "disposición y capacidad de cooperación de los miembros del proyecto" (Fiala, 2004) se optimiza bajo este modelo, al promover un entorno de liderazgo distribuido y autonomía.

Los resultados confirman que el liderazgo influye en la adaptación de la estructura organizacional de los proyectos, pero esta influencia se encuentra condicionada por factores superiores de gobernanza, cultura organizacional, disponibilidad de recursos, grado de formalización, madurez en dirección de proyectos y estructura corporativa matriz. Esta precisión responde a la necesidad de evitar una visión excesivamente voluntarista del liderazgo, según la cual el líder tendría control absoluto sobre el diseño estructural.

Desde la teoría de la contingencia, los hallazgos sugieren que el liderazgo constituye una variable mediadora entre las condiciones contextuales y la estructura operativa del proyecto. En otras palabras, el líder interpreta las contingencias del entorno y ajusta mecanismos de coordinación, comunicación, autoridad y control dentro de los límites establecidos por la organización. Esta lectura permite integrar la perspectiva clásica del diseño organizacional con enfoques contemporáneos sobre liderazgo, gobernanza de proyectos, PMO y organizaciones temporales (Donaldson, 2006; Drazin & Van de Ven, 1985; Joslin & Müller, 2015; Lundin & Söderholm, 1995).

Asimismo, el estudio aporta al debate latinoamericano al mostrar que, en contextos caracterizados por restricciones institucionales, diversidad cultural, informalidad organizacional y distintos niveles de madurez en gestión de proyectos, la capacidad del

líder para adaptar la estructura puede adquirir especial relevancia. No obstante, debido al tamaño de la muestra, estos hallazgos deben interpretarse como patrones exploratorios y no como diferencias concluyentes entre países, sectores o tamaños empresariales.

6. Conclusiones

Este estudio cualitativo proporciona una comprensión contextualizada de cómo el perfil del líder de proyecto influye en la adaptación de las estructuras organizacionales de proyectos en América Latina. La principal conclusión es que el liderazgo no determina de manera absoluta la estructura, sino que actúa como un factor contingente que modula su funcionamiento práctico dentro de límites institucionales, estratégicos y organizacionales.

Las conclusiones específicas por perfil de liderazgo son:

- **Liderazgo Técnico/Funcional:** Conduce a estructuras más jerárquicas y orientadas al control, priorizando la claridad de roles y la estabilidad operativa, en línea con la necesidad de eficiencia y estandarización.
- **Liderazgo de PMO/Unidad Especializada:** Fomenta estructuras balanceadas o proyectizadas, con énfasis en la integración metodológica, la gobernanza y el alineamiento estratégico, promoviendo la madurez en la gestión de proyectos.
- **Liderazgo de Alta Dirección/Ejecutivo:** Promueve estructuras flexibles, híbridas y adaptativas, con una fuerte orientación a resultados, liderazgo distribuido y una visión transformacional, ideales para entornos dinámicos y de alta incertidumbre.

Desde el punto de vista teórico, el estudio contribuye a la teoría de la contingencia al proponer que el liderazgo puede entenderse como un mecanismo de interpretación y adaptación estructural. Desde el punto de vista práctico, los resultados sugieren que las organizaciones deben considerar el perfil de liderazgo al asignar proyectos complejos, fortalecer las capacidades de la PMO y diseñar mecanismos de gobernanza que permitan equilibrar control, flexibilidad y autonomía.

El estudio reafirma el carácter estratégico del diseño estructural en los proyectos, no como una decisión técnica aislada, sino como un proceso condicionado por variables institucionales, organizacionales, tecnológicas, culturales y humanas. La estructura del proyecto no es un producto estático ni estandarizado, sino una construcción adaptativa que responde a la dinámica del entorno, a los recursos disponibles, a la madurez de la organización y a la interacción entre los actores clave.

7. Limitaciones

Aunque este estudio ofrece una comprensión profunda sobre la relación entre el perfil de liderazgo y la estructura organizacional de proyectos, presenta limitaciones que deben reconocerse explícitamente.

En primer lugar, el tamaño muestral de 20 participantes permite alcanzar la saturación teórica en un estudio cualitativo exploratorio, pero no permite establecer comparaciones estadísticamente generalizables entre países, sectores económicos o tamaños empresariales.

En segundo lugar, los resultados se basan en percepciones de líderes de proyectos, por lo que futuras investigaciones podrían incorporar datos provenientes de PMO, patrocinadores, equipos de proyecto y documentos organizacionales.

En tercer lugar, el análisis de clústeres tuvo un propósito exploratorio e interpretativo, por lo que no debe entenderse como una prueba cuantitativa confirmatoria.

Futuras investigaciones podrían ampliar la muestra, incorporar diseños mixtos, aplicar análisis factorial exploratorio o confirmatorio sobre los factores de diseño identificados y contrastar los perfiles de liderazgo con indicadores objetivos de desempeño, madurez organizacional y efectividad estructural.

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Disaster Resilience in Mountainous Regions of India

Article Record

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Disaster Management, a part of the Next Generation Administrative Reforms, focuses on mainstreaming disaster management in development plans and ensuring effective governance. This includes improving government structures and processes, promoting citizen-centric governance, and innovations in e-governance. We present in our paper the research on catastrophe resilience in India's mountainous regions. We start by presenting the overall picture of India, displaying its multi-hazard map, and reviewing the categorization of disasters. Next, we address the susceptibility and vulnerability of mountainous regions to calamities. We then describe India's disaster management policies, framework, and institutional mechanism. Two case studies of catastrophes in mountainous regions are then presented, based on two questionnaire-based surveys. By doing this, we provide light on the chosen process. The outcomes, their implications, and the overall resilience capability follow suit. Finally, we offer suggestions for the handling of disasters in the mountainous areas.

case studies | catastrophe resilience | Disaster Management | mountainous regions | policies and framework

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Disaster Resilience in Mountainous Regions of India

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Abstract

Disaster Management, a part of the Next Generation Administrative Reforms, focuses on mainstreaming disaster management in development plans and ensuring effective governance. This includes improving government structures and processes, promoting citizen-centric governance, and innovations in e-governance. We present in our paper the research on catastrophe resilience in India's mountainous regions. We start by presenting the overall picture of India, displaying its multi-hazard map, and reviewing the categorization of disasters. Next, we address the susceptibility and vulnerability of mountainous regions to calamities. We then describe India's disaster management policies, framework, and institutional mechanism. Two case studies of catastrophes in mountainous regions are then presented, based on two questionnaire-based surveys. By doing this, we provide light on the chosen process. The outcomes, their implications, and the overall resilience capability follow suit. Finally, we offer suggestions for the handling of disasters in the mountainous areas.

Keywords: *case studies, catastrophe resilience, Disaster Management, mountainous regions, policies and framework*

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1. Introduction

The research on catastrophe resilience in India's mountainous regions is presented in this paper. We start by presenting the overall picture of India, displaying its multi-hazard map, and reviewing the categorization of disasters. Next, we address the susceptibility and vulnerability of mountainous regions to calamities. We then describe India's disaster management policies, framework, and institutional mechanism. Two case studies of catastrophes in mountainous regions are then presented, based on two questionnaire-based surveys. By doing this, we provide light on the chosen process. The outcomes, their implications, and the overall resilience capability follow suit. Lastly, we provide recommendations for disaster management in the mountainous regions.

We show below the general profile of India covering dimensions such as area, location, borders, major rivers, forest, coastline, desert, population, states, union territories, sex ratio, population density, annual exponential population growth rate, population share, and climate (see Table 1).

1.1. Multi-Hazard Map

Multi-hazard map of India includes key hazards such as earthquakes, landslides, floods, cyclones, droughts, and avalanches. Based on these variables, we show below the multi-hazard map of India (see Figure 1). The map shows the various zones impacted by hazards and their severity as given below:

- Wind and cyclone very high damage risk zone-A
- Wind and cyclone very high damage risk zone-B
- Wind and cyclone high damage risk zone
- Wind and cyclone moderate damage risk zone-A
- Wind and cyclone moderate damage risk zone-B
- Wind and cyclone low damage risk zone
- Earthquake very high damage risk zone
- Earthquake high damage risk zone
- Earthquake medium damage risk zone
- Earthquake low damage risk zone
- Flood zone
- No flood zone

1.2. Disaster Categorization in India

We show below the broad types of disasters that occur in India and also disasters specific to the mountainous region (see Table 2).

Disaster resilience in the mountainous regions of India is a critical issue due to the unique challenges posed by the geography and climate of these areas. Key points and strategies relevant to enhancing disaster resilience in these regions include:

1.2.1. Earthquakes:

- The Himalayan region is highly seismic due to the collision of the Indian and Eurasian tectonic plates.
- Frequent earthquakes cause significant damage to infrastructure and pose risks to human lives.

Table 1. India: General Profile

No.	Feature	Description
1	Area	3.3 million sq. km
2	Location	Situated in southern Asia, the Indian peninsula is separated from mainland Asia by the Himalayas; lying entirely in the northern hemisphere, India lies between latitudes 8° 4' North and 37° 6' North; longitudes 68° 7' East and 97° 25' East
3	Borders / Neighboring Countries	North: China, Bhutan, and Nepal; Himalayan Mountain ranges. Northwest: Afghanistan and Pakistan. South: Sri Lanka and Maldives; Indian Ocean, Palk Strait and the Gulf of Mannar. East: Myanmar and Bangladesh; Bay of Bengal. West: Arabian Sea
4	Major Rivers	Twelve with a total catchment area of 252.8 million hectares
5	Forest	692,027 sq. km (21.5 percent of the total geographical area)
6	Coastline	7,517 km encompassing the mainland, Lakshadweep Islands, and the Andaman and Nicobar Islands
7	Desert	442,289 sq. km
8	Population	1.2 billion (Census 2011)
9	States	29
10	Union Territories	7
11	Sex Ratio	940 females per 1,000 males (Census 2011)
12	Population Density	382 persons per sq. km (Census 2011)
13	Annual Exponential Population Growth Rate	1.64 percent in 2001–2011 (Census 2011)
14	Population Share	Rural: 69%; Urban: 31% (Census 2011)
15	Climate	Tropical monsoon; tropical climate marked by relatively high summer temperatures and dry winters. Main seasons: a) Winter (December–February), b) Summer (March–June), c) South-West monsoon (June–September), and d) Post monsoon (October–November)

Source: https://nidm.gov.in/easindia2014/err/pdf/country_profile/India.pdf

Table 2. Disaster Categorization in India

Broad Type of Disaster	Disasters Specific to Mountainous Region
Water and Climate related Disasters	Floods and Drainage Management
	Cyclones
	Hailstorm
	Cloud burst
Geological related Disasters	Landslides and mudflows
	Earthquakes
	Dam failures / dam bursts
Chemical, Industrial and Nuclear related Disasters	Chemical and Industrial Disasters
Accident related Disasters	Forest Fires
	Urban Fires
	Mine Flooding
	Major Building Collapse
	Boat Capsizing
Biological related Disasters	Biological Disasters and Epidemics
	Pest Attacks

Source: Ministry of Home Affairs, Government of India and UNDP, Disaster Management in India—A Status Report*, 2017.*

1.2.2. Landslides:

- Steep slopes and heavy monsoon rains contribute to frequent landslides.
- Deforestation and unplanned construction exacerbate the risk.

1.2.3. Floods:

- Glacial melting and heavy rainfall can lead to flash floods and river floods.
- The rapid flow of water from the mountains can cause downstream flooding, affecting both mountainous and plain areas.

1.2.4. Climate Change:

- Increasing temperatures are causing glacial retreat and altering precipitation patterns.
- This impacts water resources, and agriculture, and increases the frequency of extreme weather events.

1.3. Vulnerability

India has been vulnerable, in varying degrees, to a large number of natural, as well as, human-made disasters on account of its unique geo-climatic and socioeconomic conditions. It is highly vulnerable to floods, droughts, cyclones, earthquakes, landslides, avalanches, and forest fires. Out of 36 states and union territories in the country, 27 of them are disaster-prone. Almost 58.6 percent

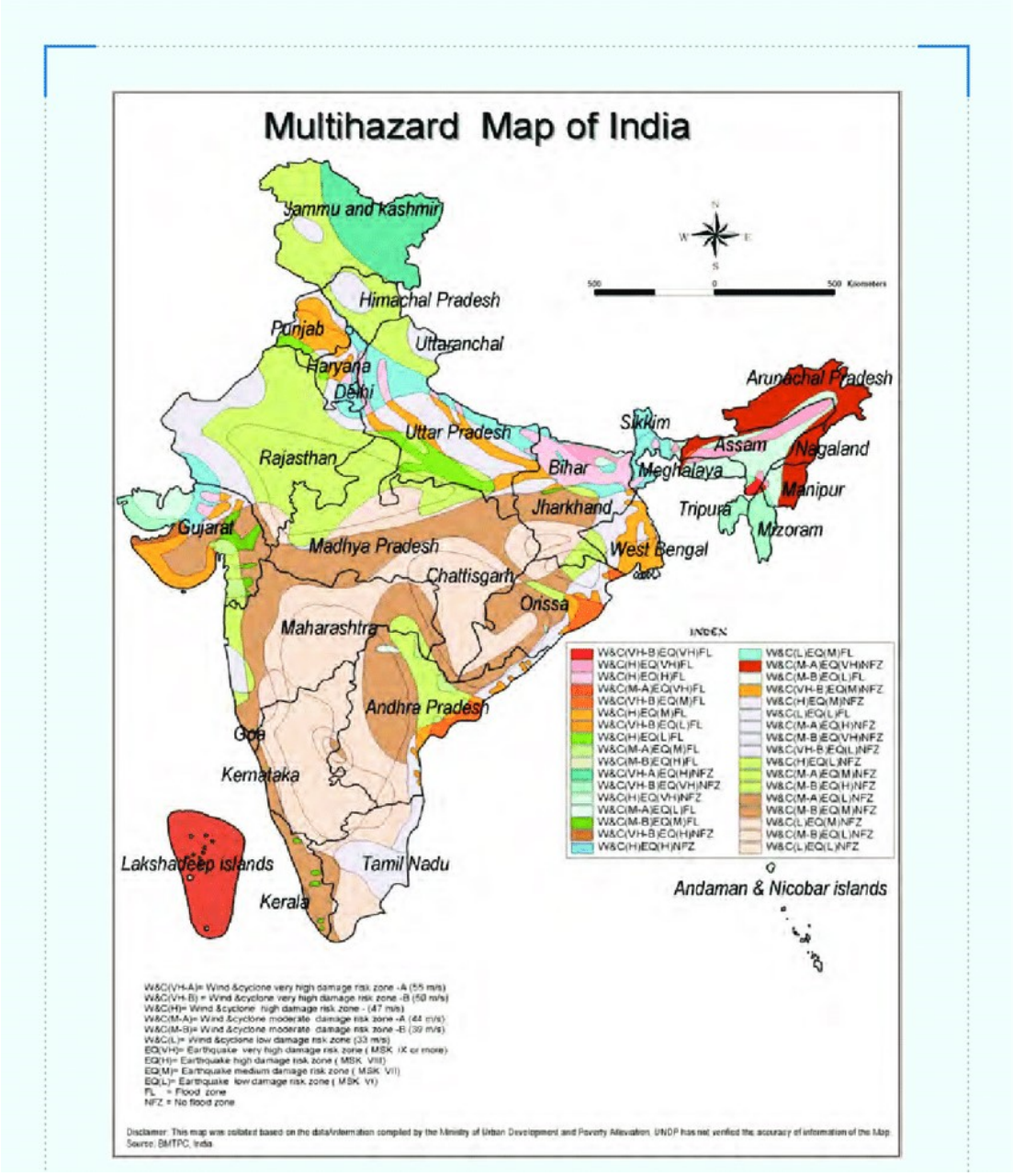


Figure 1. Multihazard Map of India

Source: National Institute of Disaster Management (NIDM), https://nidm.gov.in/easindia2014/err/pdf/country_profile/India.pdf

of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 percent of land) are prone to floods and river erosion; of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis; 68 percent of the cultivable area is vulnerable to drought and hilly areas are at risk from landslides and avalanches. Each time a disaster hits the country, it results in huge losses both in terms of human losses and economic impact. According to a World Bank study on National Disasters conducted in 2010, India faces losses of up to 2 percent of its GDP due to natural disasters. These disasters immensely impact the poor and vulnerable sections of society. India lost approximately $79.5 billion USD to natural disasters in 20 years (United Nations, Economic Losses, Poverty and Disasters 1998–2017, United Nations Office for Disaster Risk Reduction, Geneva, 2018).

The vulnerability of disaster resilience in the mountainous regions of India can be attributed to several interrelated factors. These vulnerabilities impact the capacity of these regions to withstand and recover from disasters effectively. Here is an in-depth analysis of the key vulnerabilities:

India has been hit hard by several disasters. We show in Table 3 the occurrence of India's deadliest disasters from 1993 to 2023.

1.3.1. Geographical and Environmental Vulnerabilities

- **Terrain and Topography:**
  - *Steep Slopes:* Increase the risk of landslides and make construction of resilient infrastructure challenging.

Table 3. India's Deadliest Disasters (1993–2023)

Sl. No.	Name of Event	Year	State and Area
1	Latur Earthquake	1993	Latur, Marathwada region of Maharashtra
2	Odisha Super Cyclone	1999	Odisha
3	Gujarat Earthquake	2001	Bhuj, Bhachau, Anjar, Ahmedabad, and Surat in Gujarat
4	Tsunami	2004	Coastline of Tamil Nadu, Kerala, Andhra Pradesh, Puducherry, Andaman and Nicobar Islands
5	Maharashtra Floods	2005	Maharashtra
6	Kashmir Earthquake	2005	Kashmir
7	Kosi Floods	2008	North Bihar
8	Cyclone Nisha	2008	Tamil Nadu
9	Cyclone	2012	Tamil Nadu
10	Uttarakhand Flash Floods	2013	Uttarakhand
11	Kashmir Floods Disaster	2014	Kashmir
12	COVID-19	2020	All over India
13	COVID-19	2021	All over India
14	COVID-19 / Chardham Area Breaches	2022	Delhi, Tamil Nadu, Maharashtra, Telangana, and West Bengal
15	Landslides, Cloudbursts, Floods, Earthquakes, High Temperatures	2023	Himachal Pradesh, Punjab, Delhi, Uttarakhand, Telangana, Uttar Pradesh, Maharashtra, Gujarat

Source: India Ministry of Home Affairs, Annual Reports, 1993–2023 and World Bank, Annual Report 2012–2022.

  - *Remote and Inaccessible Areas:* Hinder timely disaster response and relief efforts.

- **Climatic Conditions:**
  - *Extreme Weather:* Harsh winters, heavy monsoon rains, and increasing climate variability contribute to disasters like avalanches, landslides, and floods.
  - *Glacial Dynamics:* Glacial melting and the formation of glacial lakes increase the risk of glacial lake outburst floods (GLOFs).

1.3.2. Socio-Economic Vulnerabilities

- **Poverty and Livelihood Dependence:**
  - *Economic Dependency:* Communities rely heavily on agriculture, tourism, and natural resources, which are highly susceptible to disaster impacts.
  - *Low-Income Levels:* Limited financial resources reduce the ability to invest in disaster-resilient infrastructure and preparedness measures.
- **Education and Awareness:**
  - *Limited Awareness:* Insufficient knowledge about disaster risks and preparedness measures among local populations.
  - *Educational Barriers:* Lower levels of education hinder the dissemination and understanding of disaster-related information.

1.3.3. Infrastructure Vulnerabilities

- **Inadequate Infrastructure:**
  - *Non-resilient buildings:* Many structures are not built to withstand earthquakes, landslides, or heavy snowfall.
  - *Poorly Maintained Roads:* Essential roads and bridges are often in poor condition, exacerbating isolation during disasters.
- **Critical Infrastructure:**
  - *Healthcare Facilities:* Limited and inadequately equipped healthcare facilities hamper effective medical response during disasters.
  - *Communication Networks:* Inconsistent or weak communication infrastructure can delay emergency response and coordination.

1.3.4. Institutional and Governance Vulnerabilities

- **Policy and Implementation Gaps:**
  - *Inadequate Policies:* Disaster management policies may not fully address the unique challenges of mountainous regions.
  - *Implementation Challenges:* Even where policies exist, enforcement and implementation at the local level can be inconsistent.
- **Coordination and Planning:**
  - *Fragmented Coordination:* Poor coordination among various government agencies, NGOs, and community organizations.
  - *Planning Deficiencies:* Lack of integrated and long-term planning for disaster risk reduction.

1.3.5. Environmental and Ecological Vulnerabilities

- **Deforestation and Land Degradation:**
  - *Soil Erosion:* Deforestation and unsustainable land use practices lead to soil erosion, increasing landslide risks.
  - *Habitat Loss:* Disrupts local ecosystems and reduces natural buffers against disasters.
- **Water Management Issues:**
  - *Water Scarcity:* Erratic water supply due to climatic changes affects agriculture and drinking water availability.
  - *Glacial Melt and River Management:* Poor management of glacial resources and rivers increases the risk of floods.

1.4. Disaster Management Policies and Framework in India

Disaster management systems, processes, and policies in India can be traced back to 1871–74, during British rule, when the Indian administrative system was undergoing a change and it was the Collector at the District level who was made responsible for carrying out relief work during emergencies and disasters.

In the post-independence period, at the federal level, the Revenue Department was established as a specialized department and made responsible for relief and rehabilitation activities, including disaster management. A system was established that when a disaster occurs, a senior Indian Administrative Service Officer is designated as a Relief Commissioner and coordinates work with the Central Relief Commissioner at the federal level. Over the past sixty years, the approach to disaster management in India has undergone substantive changes. India witnessed major disasters such as the Latur Earthquake (1993), the Malpa Landslide (1994), the Odisha Super Cyclone (1999), and the Bhuj Earthquake (2001), which led to drawing up a systematic, comprehensive, and holistic approach towards disasters (India National Institute of Disaster Management, 2013).

Various strategies for managing natural disasters and facilitating effective planning for safe national development have been brought up for consideration by the Tenth Plan document (2002–2007) by the Planning Commission. The policies have further evolved over the years, and the National Disaster Management Plan released by the Government indicates the vision to make India on the path of becoming disaster-resilient, achieve substantial disaster risk reduction, and significantly decrease the losses of life, livelihoods, and assets—economic, physical, social, cultural, and environmental—by maximizing the ability to cope with disasters at all levels of administration as well as among communities.

In the year 2005, the Government of India established a legal framework and passed the Disaster Management (DM) Act to promote a culture of prevention and preparedness in the context of disaster management in India. The nature of disasters was spelled out in the Act to include Floods, Cyclones, Earthquakes, Epidemics, Chemical Disasters, Industrial Disasters, Rail Accidents, Air Accidents, Fire, Nuclear Incidents, and Mine Disasters. The Act encourages the mitigation of disasters with the help of the latest technology. Key highlights of the DM Act are to:

- Mainstream disaster management concerns into the development planning process and strengthen regulatory structures through a robust techno-legal framework,
- Involve the people of this country in the planning and implementation of disaster management systems,
- Provide an institutional mechanism for drawing up and monitoring the implementation of plans for responding to disasters, and
- Involve various wings of the Government in the prevention and mitigation of disasters.

India through its continuous efforts has significantly improved its preparedness to deal with natural calamities. The Disaster Management Act 2005 articulates the need for mainstreaming Disaster Risk Reduction (DRR) into development planning. The National Policy and National Plan on Disaster Management seeks to build a safe and disaster-resilient India. The measures taken by the central and state governments have significantly improved disaster management practices, preparedness, prevention, and response mechanisms resulting in a significant reduction in casualties during natural calamities, including cyclones, in the country.

1.5. Institutional Mechanisms for Managing Disasters in India

Institutional mechanisms have been created under the Disaster Management Act for strategizing, coordinating, implementing, and monitoring disaster management activities (see Table 4).

The State Disaster Management Authorities (SDMAs) under the Chairmanship of the state Chief Ministers, as well as the District Disaster Management Authorities (DDMAs) under the Chairmanship of Collectors/District Magistrates/Deputy Commissioners have also been put in place to manage situations at the state and local levels.

1.5.1. National Disaster Management Authority (NDMA)

The NDMA was created under an administrative order notified in 2005 under the Disaster Management Act. The main responsibilities of the NDMA are to:

- Lay down policies on disaster management,
- Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan,
- Lay down guidelines to be followed by the State Authorities in drawing up State Plans,
- Lay down guidelines to be followed by the different Ministries or Departments of the Government of India to integrate measures for the prevention of disasters or mitigation of their effects in their development plans and projects,
- Coordinate the enforcement and implementation of policies and plans for disaster management,
- Recommend the provision of funds for mitigation,
- Provide such support to other countries affected by major disasters as may be determined by the Central Government,
- Take such other measures for the prevention of disasters, or the mitigation, or preparedness and capacity building for dealing with threatening disaster situations or disasters as it may consider necessary, and
- Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

The National Executive Committee (NEC) assists the NDMA in the performance of its functions.

1.5.2. State Disaster Management Authorities (SDMAs)

State Disaster Management Authorities have been set up to lay down policies and plans for disaster management in their respective states. The Act envisages the establishment of a State Executive Committee, to be headed by the Chief Secretary of the State Government, with four other Secretaries of such departments as the State Government may think fit. It has the responsibility for coordinating and monitoring the implementation of the National Policy, the National Plan, and the State Plan.

Table 4. Institutional Mechanisms for Dealing with Disasters

No.	Name	Composition
1	Cabinet Committee on Security (CCS)	Prime Minister, Minister of Defence, Minister of Finance, Minister of Home Affairs, and Minister of External Affairs
2	National Crisis Management Committee (NCMC)	Cabinet Secretary (Chairperson), Secretaries of Ministries/Departments and agencies with specific DM responsibilities
3	National Disaster Management Authority (NDMA)	Prime Minister (Chairperson), Members (not exceeding nine, nominated by the Chairperson)
4	National Executive Committee (NEC)	Union Home Secretary (Chairperson), Secretaries to the GOI in the Ministries/Departments of Agriculture, Atomic Energy, Defence, Drinking Water and Sanitation, Environment, Forests and Climate Change, Finance (Expenditure), Health and Family Welfare, Power, Rural Development, Science and Technology, Space, Telecommunications, Urban Development, Water Resources, River Development, and Ganga Rejuvenation, The Chief of the Integrated Defence Staff of the Chiefs of Staff Committee, ex officio as members. Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, Mines, Shipping, Road Transport and Highways and Secretary, NDMA are special invitees to the meetings of the NEC.
5	National Disaster Response Force (NDRF)	The specially trained force is headed by a Director General. Structured like paramilitary forces for rapid deployment
6	National Institute of Disaster Management (NIDM)	Union Home Minister; Vice Chairman, NDMA; Members including Secretaries of various nodal Ministries and Departments of Government of India and State Governments and heads of national-level scientific, research, and technical organizations, besides eminent scholars, scientists, and practitioners.

Source: National Disaster Management Plan, 2016.

1.5.3. District Disaster Management Authorities (DDMAs)

District Disaster Management Authorities have been set up in each district of a state as planning, coordinating and implementing bodies for disaster management and to take all measures in the district in accordance with the guidelines laid down by the National and State Authorities. The District Magistrate / District Collector / Deputy Commissioner heads the Authority as Chairperson, with an elected representative of the local authority as Co-Chairperson, except in the tribal areas where the Chief Executive Member of the District Council of Autonomous Districts is the Local Authority.

1.5.4. National Institute of Disaster Management (NIDM)

The National Centre for Disaster Management, established in 1995, was upgraded to the National Institute of Disaster Management (NIDM) after the transfer of responsibility for disaster management to the Ministry of Home Affairs. The main responsibility of the institute is human resource development through the development and implementation of human resource plans, capacity building and training, research, documentation, and policy advocacy in the field of disaster management. NIDM works in tandem with the NDMA and Central, State, and local governments as well as various other stakeholders to build their capacities toward promoting a culture of prevention and preparedness at all levels.

1.5.5. Other Training Institutions

In addition to the above, the following institutions have been established by the Government to train and equip personnel on aspects of disaster management:

- **National Fire Service College (NFSC):** The NFSC at Nagpur is a national-level institution mandated to train the personnel of state fire services/brigades in all spheres of fire engineering.
- **National Civil Defence College (NCDC):** The NCDC at Nagpur is one of the main centers for disaster relief and management training and a nodal center for radiological, nuclear, biological, and chemical emergency response.

1.5.6. National Disaster Response Force (NDRF)

The National Disaster Response Force is a disaster response agency under the National Disaster Management Authority (NDMA) created by the Ministry of Home Affairs, Government of India. It was established in 2009 in Delhi for disaster management and specialized response to natural and man-made disasters. Functioning at the state and central levels under the NDMA based in Delhi, it consists of ten battalions of the Central Armed Police Forces, including two that have been set up in each of the Border Security Force (BSF), Central Reserve Police Force (CRPF), Central Industrial Security Force (CISF), and Indo-Tibetan Border Police (ITBP) trained in various types of natural, man-made and non-natural disasters. All the battalions are being trained to respond to natural disasters while four of them are being specially trained for handling radiological, nuclear, biological, and chemical disasters.

2. Case Studies

The research methodology for conducting the case studies is illustrated in Figure 2.

Two field case studies have been conducted, relating to Uttarakhand and Telangana. For Uttarakhand, representing a high-altitude Himalayan mountainous region, the study was carried out in Garhwal, Rudraprayag, and Chamoli. For Telangana, the study was carried out in Madhurapur; the rationale for including Telangana is to compare a high-relief mountainous region with a non-mountainous region characterized by Deccan Plateau topography.

As an exploratory pilot field survey, the questionnaire was administered to 7 households in Uttarakhand and 13 households in Telangana (total 20 households). While this pilot sample provides valuable qualitative ground-level insights into community vulnerabilities and resilience practices, we acknowledge the sampling limitations for broad statistical generalizations, and a larger sample is planned for subsequent investigations. These study locations were decided based on disaster exposure criteria such as landslides, cloudbursts, floods, and seismic activity. The location

Table 5. Responses to Questionnaire by Households

S. No.	Age of Head	Family Members	Cooking Fuel	Fuel Collection Source	Water Source
1	70	5	Biogas	Village outskirts including forests	Piped water (piped into dwelling)
2	76	2	Biogas	Village outskirts	Piped water (piped into dwelling)
3	66	5	Biogas	Village outskirts	Piped water (piped into dwelling)
4	55	2	Biogas	Village outskirts	Piped water (piped into dwelling)
5	67	5	Biogas and Wood	Forest / Purchase	Piped water (piped into dwelling)
6	76	6	Biogas	Village outskirts	Piped water (piped into dwelling)
7	67	5	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into dwelling)
8	69	6	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into dwelling)
9	60	10	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into dwelling)
10	55	8	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into dwelling)
11	43	5	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
12	48	4	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
13	57	6	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
14	70	10	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
15	55	6	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
16	60	10	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
17	48	6	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
18	68	8	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
19	51	4	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)
20	60	4	LPG	Retail outlets of Petroleum and Gas Companies	Piped water (piped into compound, yard/plot)

Note: S.No. 1–7 represent Uttarakhand households; S.No. 8–20 represent Telangana households.

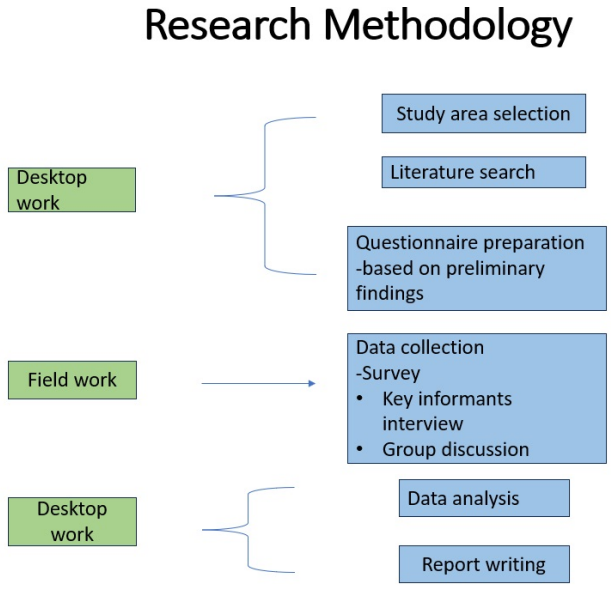


Figure 2. Research Methodology

of the places visited can be seen on the maps given in Figure 3 and Figure 4.

We now present the data collected from Uttarakhand and Telangana. We consider dimensions such as demographics including age, size of family, fuel for cooking, fuel collection source, and water provision. The information provided by 7 households in Uttarakhand and 13 households in the Telangana region is given in Table 5.



Figure 3. Location of Households in Uttarakhand (Map I)

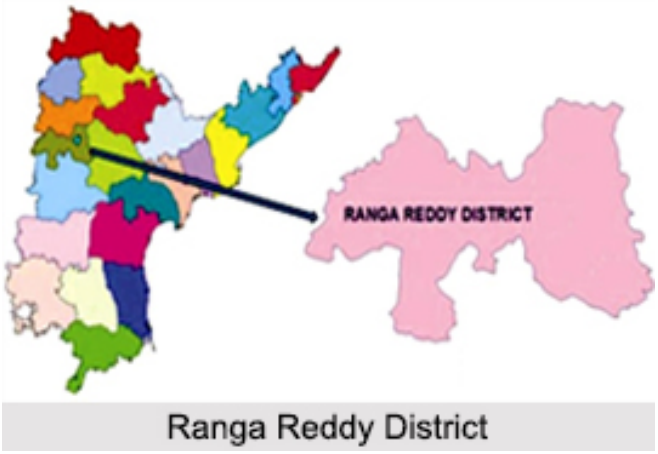


Figure 4. Location of Households in Telangana (Map II)

3. Discussion

It is now proposed to analyze the data collected from 20 families comprising 7 from Garhwal and 13 from Madhurapur as under.

The age of the head of the household varied between 41 and 80 years (see Figure 5). The age group having the highest number of the head of the household was between 66 and 70 years with 7 heads of the household falling in this bracket. The lowest age group between 41 and 45 years had only 1 household; in the highest age group of 76 and 80 years, there were 2 households.

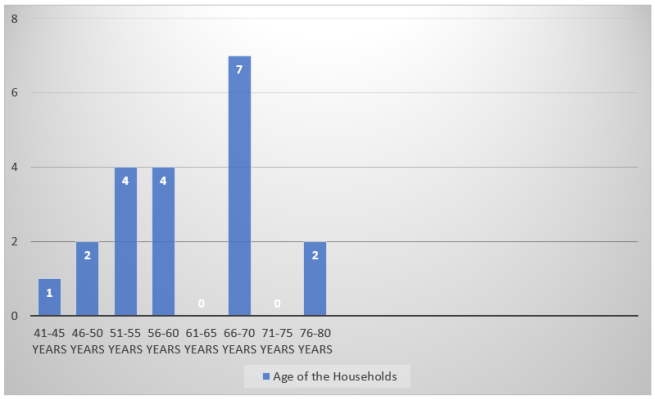


Figure 5. Age Distribution of Head of Household

3.1. Number of Family Members

The number of family members differed in the various distribution cycles from a minimum of 1–2 in the first group to 9–10 members in the last group (see Figure 6).

3.2. Impact of Hazards

- **Impact on Daily Lives:** The hazards faced by the locals have significantly impacted their daily lives.
- **Landslides:** Frequent landslides make it difficult for locals to travel and access healthcare and education outside the village.
- **Lack of Opportunities:** Younger generations lose opportunities to grow, develop, and get engaged in various trades and jobs in the village.
- **Floods:** Monsoon season floods damage homes and infrastructure, leaving families without shelter and basic amenities.

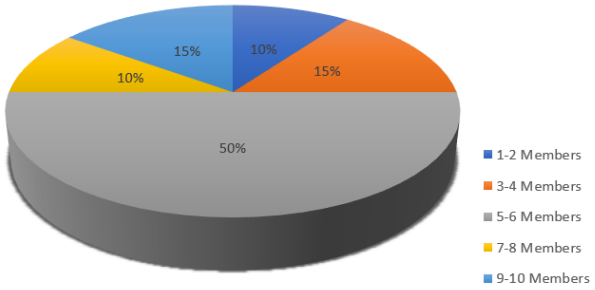


Figure 6. Distribution of Number of Family Members

- **Economic and Social Impact:** The hazards have negatively affected the local economy. The hazards obstruct participation in socio-economic activities and events such as Gauchar Mela, Auli Festival, Nanda Raj-Jat, Binsar Mela, Chandrabadni Fair, Kunjapuri Fair, Mahashivratri, Dussehra, and Diwali.
- **Decline in Productivity:** Destruction of crops and farmland has resulted in a decline in productivity and income for families.
- **Challenges for Sustainability:** The hazards pose challenges for families to sustain themselves and meet their basic needs.

3.3. Health Services

All the respondents indicated the availability of health services as under:

ASHA and Anganwadi Workers deliver elementary health services at the doorstep, especially childcare and women-related healthcare.

Primary Health Centers attend to the basic health needs referred by the village-level health workers.

- The main source of fuel varied from biogas to LPG. The biogas was procured from the nearby forest and areas where cattle were housed. The survey disclosed that the inhabitants had access to drinking water supplied through pipelines with connections extended to inside compounds or dwellings.
- Due to high temperatures and the occurrence of frequent floods in Madhurapur, Telangana, the crops suffered severely causing unprecedented loss year after year.
- Many districts in the two states received rainfall much higher than the average levels breaching the reservoirs and dams. The situation was accentuated further by cloudbursts resulting in the loss of human lives, cattle, and property.
- The government agencies swung into action but the relief followed the lead-lag pattern. The remedial action was awaiting permanent relief.

3.4. Agriculture, Farming, and Animal Rearing

Major agricultural productions include:

- Paddy
- Corn
- Various Vegetables

The major agricultural production includes paddy, corn, and various vegetables (see Figure 7). Paddy tops with 43 percent, followed by corn at 36 percent, vegetables at 11 percent, and fruits at 1 percent of respondents.

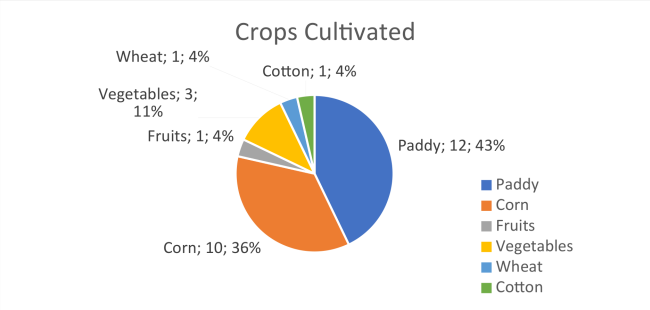


Figure 7. Crops Cultivated by Respondents

Animal rearing is a common practice in the area, but limited only to rearing to hybrid cows. The respondents do not rear buffaloes and chicken.

3.5. Field Visits and Floods Data

Pictures captured during the field visits and floods are displayed in Figure 8 and Figure 9.



Figure 8. Pictures Captured During Field Visit

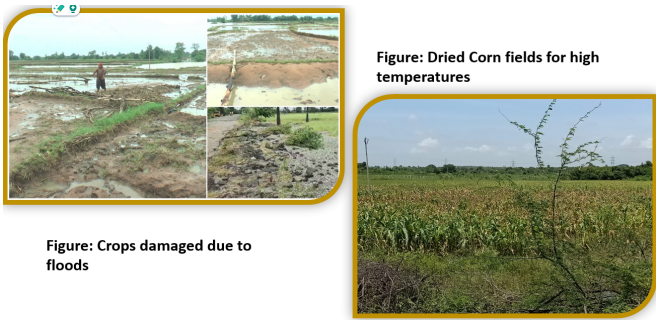


Figure 9. Pictures Captured During Floods

3.6. Educational Background

The educational background of respondents is presented in Figure 10:

- Most of the respondents have been to school. Only 13 percent of respondents were illiterate.
- 46 percent of respondents have attended school up to Class 1–10.
- 22 percent of respondents were graduates.
- 11 percent of respondents were postgraduates.

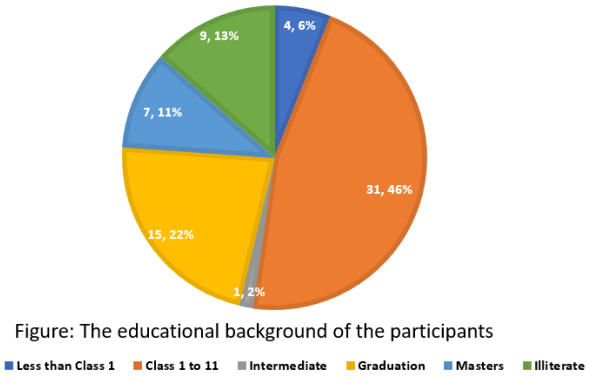


Figure 10. Educational Background of Respondents

3.7. Occupational Background

The occupational distribution of respondents is shown in Figure 11:

- The respondents are engaged in various types of occupations including self-employment, formal employment, and farming.
- Farming engaged 28 percent of respondents.
- Students accounted for 29 percent of the respondents.
- The data showcases a mix of occupations such as traditional agriculture, employment, and homemaking. Such diversity can enhance community resilience by drawing upon different skill sets during disasters.
- 15 percent of respondents were housewives engaged as homemakers.
- Only 2 percent of the respondents were unemployed.
- Reliance on agriculture suggests a strong connection to local resources.

3.8. Quality of Constructed Houses

The quality of constructed houses depicts the quality of roof construction and exterior wall construction (see Figure 12 and Figure 13):

- Most of the respondents (88 percent) used cement and concrete for casting roofs.
- Very few (12 percent) chose asbestos sheets for constructing roofs.
- 79 percent of respondents used cemented plastered bricks or stones for exterior walls to ensure longer durability against disasters.
- Raw and scratchy plastered bricks, broken stones, and cement blocks were used by 5 percent and 16 percent respectively.

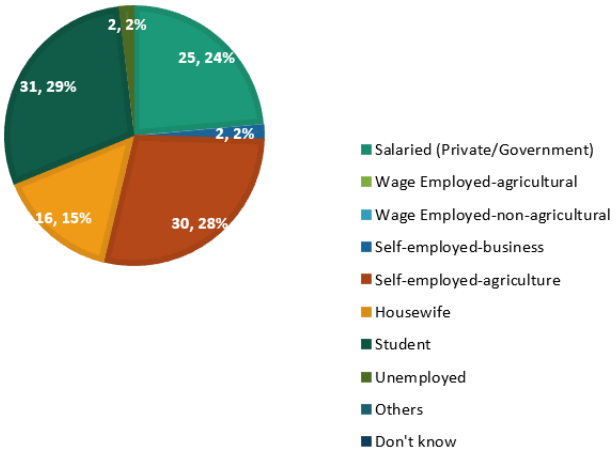


Figure 11. Occupational Background of Respondents

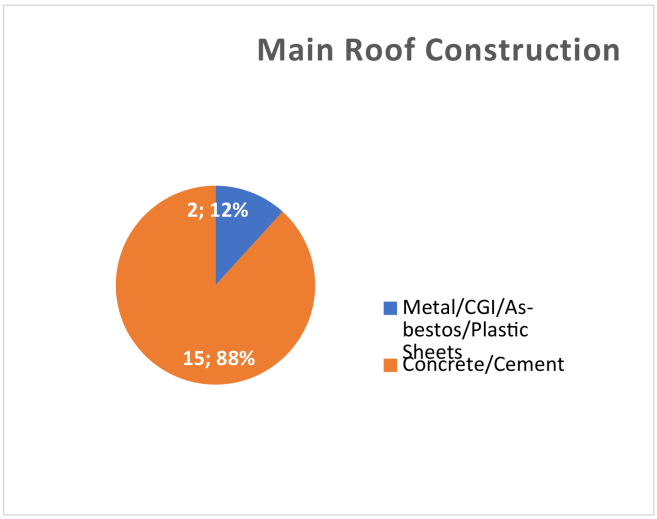


Figure 12. Main Roof Construction of Surveyed Houses

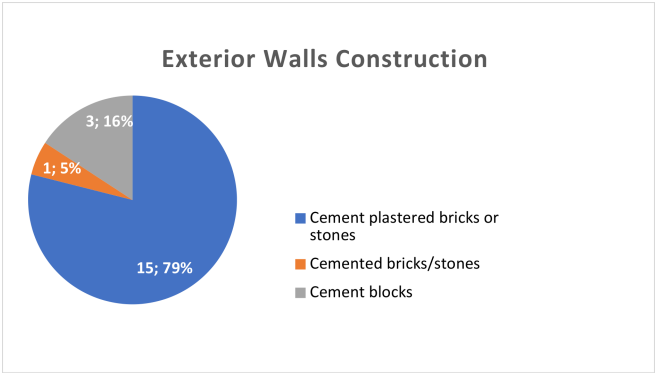


Figure 13. Exterior Walls Construction of Surveyed Houses

3.9. Water Safety Practices

- Incidence of Ensuring safe drinking water is crucial for disaster resilience.
- The variety of water treatment practices suggests a range of awareness levels about water safety. Boiling, filtering, straining through a cloth, and using electronic purifiers appear to be more robust methods for enhancing water resilience, crucial during disasters when clean water sources may be compromised (see Figure 14).

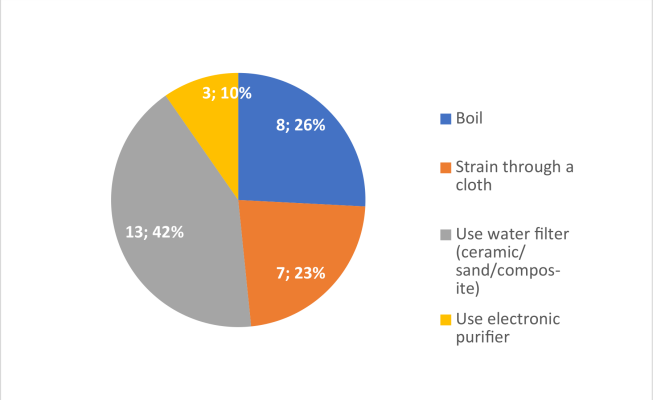


Figure 14. Water Safety Practices of Respondents

3.10. Toilet Facilities

The distribution of toilet types among respondents is presented in Figure 15:

- 5 percent of respondents have pit latrines with slabs.
- 35 percent have flush-to-pit latrines.
- 60 percent have flush to septic tanks.
- Toilets have been constructed by the Government for all households lacking facilities.

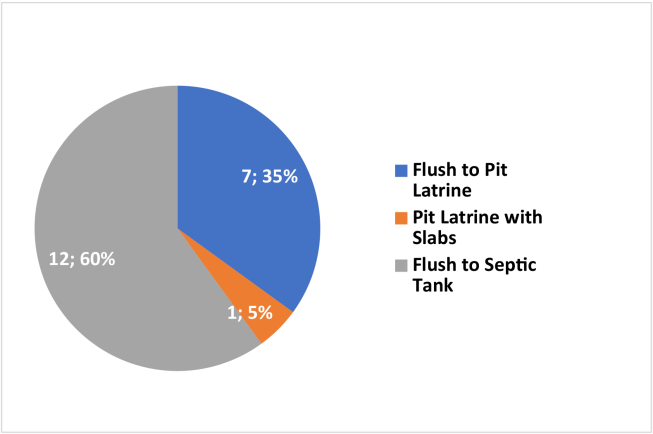


Figure 15. Toilet Types of the Respondents

3.11. Irrigation Practices

The irrigation practices of respondents are illustrated in Figure 16:

- 50 percent of respondents depend on flood irrigation.

- 25 percent of respondents depend on drip irrigation.
- The remaining 25 percent use wells, ponds, and rain channels for irrigating fields.

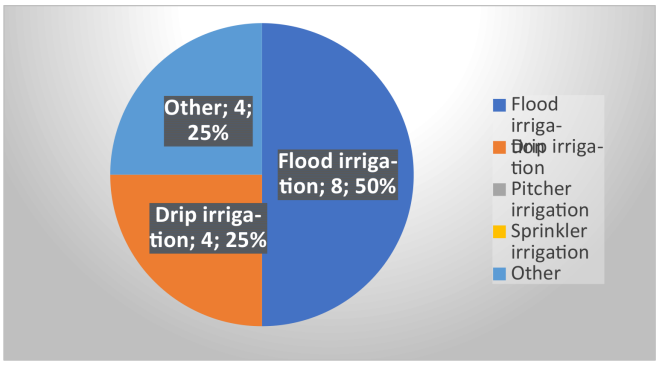


Figure 16. Irrigation Practices of Respondents

3.12. Weather and Climate Variability (2013–2023)

The survey displays the following trends relating to weather and climate variability (see Figure 17):

- Average temperatures in summer and winter remained unchanged according to 5 respondents, whereas 15 respondents revealed high variability.
- Average rainfall variability was noted by 5 respondents, while 14 respondents reported no change.
- Erratic events, snowfall, and hailstorms affected the inhabitants.
- Water availability decreased according to 50 percent of respondents for drinking, irrigation, and tourist needs.
- Crop productivity decreased as per 25 percent of respondents.
- Climate change affected livestock productivity severely as disclosed by 18 respondents.
- Rangelands decreased according to 19 respondents.
- Pesticide usage increased in 7 cases, decreased in 2 cases, and remained unchanged in 11 cases.
- Tourist activities were mostly related to Uttarakhand and remained static.

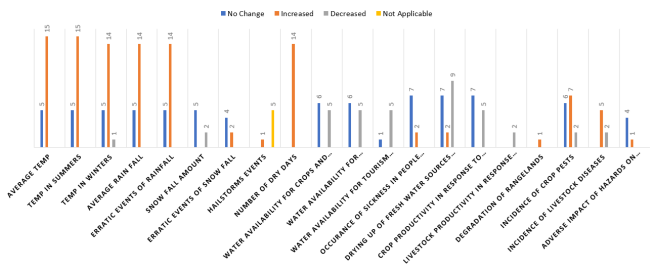


Figure 17. Trends Relating to Weather and Climate Variability

4. Findings

The broad findings from Garhwal, Chamoli, Rudraprayag (Uttarakhand) and Madhurapur (Telangana) are presented below:

Uttarakhand

- Respondents were engaged in small-scale cultivation.
- Employed in government jobs, private sector jobs, and small-scale businesses.
- Children were studying in Dehradun, Rishikesh, Roorkee, and Delhi.
- Did not maintain large cattle herds at houses; they hardly had one cow for milk.
- Gas cylinders are widely used for cooking.
- Inhabitants do not go to the forest for wood/grass for cooking purposes.
- Lifestyles have been undergoing a significant modernization.
- Warning systems are in place to caution about impending disasters.
- Rehabilitation facilities are extended as first-aid relief.

Telangana

- All respondents are engaged in cultivation. Crops are frequently damaged by floods. Many respondents deploy tractors and harvesting cutter machines on a rental basis.
- Children study in Shadnagar, a nearby town.
- Maintain buffaloes and cows at houses for dairy purposes.
- Gas cylinders provided under government schemes are used for cooking.
- Lifestyles have been gradually changing. Face limited connectivity to the mainland, depending largely on personal transport.
- Warning systems regarding disasters are limited to newspapers, radio, TV news, and social media.
- Lack of adequate local health facilities; rehabilitation facilities are primarily extended as first-aid.
- Drinking water is adequately available, but water for irrigation is in short supply.

4.1. Some More Case Studies

We present below additional case studies from northeastern hill and flood-prone regions (Assam, Arunachal Pradesh, and Nagaland) that broadly corroborate the results obtained from Uttarakhand and Telangana. These supplementary studies strengthen the case by demonstrating how infrastructure vulnerability, ecological degradation, and shifting hydrological patterns compound disaster risk across varied vulnerable terrains.

Dhemaji District, Assam

Observations from the 2020 floods in Mas Dihiri village, Dhemaji district:

- The village has shifted by 3 kilometers along with the Kumutiya River since 1960.
- 28 houses in Kekuri village were washed away by the Jiadhal River floods in 2020.
- Large swathes of rice fields were covered with sand, rendering them uncultivable for a prolonged period (see Figure 18).



Figure 18. Floods in Mas Dihiri Village, Dhemaji District

West Kameng, Arunachal Pradesh

Key impacts in West Kameng district (see Figure 19):

- Construction of a highway in the district has affected the health of natural springs.
- Human interventions exacerbate the impacts of climate change.
- At least ten springs from Bhalukpong at the Assam–Arunachal Pradesh border to Morgung village in West Kameng have dried up.
- Singchung village is witnessing major changes in its biodiversity and climate indicators due to climate change.



Figure 19. Impact on Springs in West Kameng, Arunachal Pradesh

Wokha, Nagaland

Disaster and ecological observations in Wokha district (see Figure 20):

- In 2018, many villages in the district witnessed floods for the first time in a generation; flood waters could still be seen in December 2020.
- New pests and insects are attacking vegetables and other crops.
- Butterflies and various small and large animal species have decreased in numbers over the years.
- Fish populations and aquatic diversity have notably declined.

We now conclude the main findings of the study and suggest the way forward.



Figure 20. Floods and Ecosystem Changes in Wokha, Nagaland

Source: National Institute of Disaster Management, Ministry of Home Affairs, Govt. of India.

5. Conclusions

Based on the empirical investigations and analysis, the study draws the following conclusions:

- Disaster Risk Reduction (DRR) needs to move up to scientific and sophisticated levels by putting in place robust early warning systems.
- Disaster Risk Reduction machinery must be proactive to thwart the adverse impact of impending disasters.
- More trained human resources and dedicated teams are required to combat disasters effectively.
- Capacity building has to travel down to grass-roots communities and local governance tiers.
- Post-disaster rehabilitation and compensation must be comprehensive and timely.
- Deforestation and unsustainable slope destabilization need to be arrested forthwith.
- Disaster Risk Reduction should be integrated with formal and informal education at all levels.
- The recurring hazards faced by locals significantly impair daily life, livelihoods, and youth employment prospects.
- Frequent landslides restrict mobility, healthcare access, and schooling outside rural clusters.
- Primary health services and rural connectivity require substantial strengthening.
- Disaster management must be interwoven with local democratic leadership and community participation.

5.1. Way Forward: Strategies for Disaster Resilience

The strategic recommendations for enhancing disaster resilience based on the field case studies are outlined below:

5.1.1. Early Warning Systems:

- Implementing advanced seismic monitoring and early warning systems across vulnerable Himalayan zones.
- Installing automated rain gauges, river level sensors, and landslide detection systems in critical catchments.

5.1.2. Infrastructure Development:

- Constructing earthquake-resistant buildings and systematically retrofitting existing public and private structures.
- Developing robust road networks equipped with proper cross-drainage and slope stabilization systems to mitigate landslide disruptions.

5.1.3. Community Awareness and Training:

- Educating local communities on disaster preparedness, evacuation routes, and rapid response protocols.
- Conducting regular mock drills and structured training programs for community-first responders.

5.1.4. Sustainable Land Use Planning:

- Enforcing strict techno-legal regulations on construction and hillside zoning in high-risk zones.
- Promoting large-scale afforestation and bio-engineering soil conservation practices to stabilize steep slopes.

5.1.5. Water Resource Management:

- Implementing continuous glacial lake monitoring and sustainable catchment management practices.
- Constructing check dams, retaining structures, and decentralized reservoirs to regulate torrential runoff and attenuate flash flood impacts.

5.1.6. Collaboration and Policy Implementation:

- Strengthening institutional coordination among central and state agencies, district administrations, NGOs, and community organizations.
- Ensuring stringent, accountable implementation of disaster management policies, environmental protection guidelines, and building codes.

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Intellectual Capital Formation Through Academic Professional and Organizational Knowledge Dynamics

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Intellectual Capital Formation Through Academic Professional and Organizational Knowledge Dynamics

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Abstract

The objective of this paper was to specify a model for the study of intellectual capital formation. A documentary, retrospective and exploratory study was carried out with a selection of sources indexed to international repositories, considering the period from 2019 to 2022, as well as the search by keywords. The axes, themes, dimensions and categories of discussion were established in the research agenda, suggesting the extension of work towards other scenarios such as training and training.

Keywords: *agenda, Entrepreneurship, formation, Institutionalism, talents*

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1. Introduction

Until March 2022, the pandemic has claimed the existence of seven million directly through the spread and disease of COVID-19 (WHO, 2022). In an indirect way, affecting comorbidities such as diabetes or hypertension, it would be related to 20 million deaths (PAHO, 2022). Anti-COVID-19 policies in education are distinguished by replacing the traditional classroom with a virtual one (OCDE, 2022). The epidemiological traffic light determines the transition: in red, the educational systems withdraw, the confinement intensifies and the interaction is reduced to virtual platforms; in green, universities and institutes design hybrid teaching and learning systems (SSA, 2022). Underlying this phase of lack of confidence is the formation of intellectual capital as a liaison policy between universities and knowledge-creating organizations.

Intellectual capital refers to a series of academic and professional training requirements that allow a more direct transition from the university to the labor market, mainly employment opportunities in the locality (Acosta, 2012). In this sense, the intellectual capital review works have focused their interest in the formation of habitus understood as the transfer of knowledge, skills and wisdom of the professional to the student.

In this way, the works related to the formation of the intellectual habitus have demonstrated a virtuous circle of trust, commitment, entrepreneurship, innovation and satisfaction (Ardevol, 2015). It is an academic and professional training focused on the climate of relationships, tasks and conflicts.

However, systematic reviews and metanalysis related to intellectual capital have focused on performance, productivity and competitiveness without considering this training process (Carreón et al., 2015). In this sense, a review of the training process of intellectual capital will establish the axes, themes, dimensions and categories.

The formation of intellectual capital involves phases of management, production and transfer of knowledge (Carreon, 2019). This is the case of professional training in companies located in the Silicon Valley, Palo Alto, California, United States. It is a process in which the creation of an innovation is driven by risk capitals that increase as the original idea is consolidated and adjusts to the current and future requirements of a real or potential market.

In the process of intellectual capital formation, it involves consolidating intangible assets of organizations financed with venture capital (Adams, 2020). Management is simple when compared to the consolidation of the entrepreneurial project or the production of new knowledge, as well as the transfer of this knowledge to other areas of the subsidiary or subsidiary organizations or companies of the main parent company.

The theory of intellectual capital formation warns that such complexity would not be possible without inherited or acquired knowledge teaching (Garcia, 2020). It is a training habit in which expressions, knowledge, values and appreciations are transferred in academic, professional and labor training.

These four dimensions related to *ethos*, *aesthesis*, *hexis* and *eidos* form a formative habitus that is gestated in the interrelation of provisions against or in favor of a project; opportunity generation, resource optimization or process innovation (Korstanje, 2020).

Research related to training habitus highlights the convergence of the four aesthetic, expressive, cognitive and ethical dimensions in the production of knowledge (Clark, 2020). If the management of each of them involves the translation of these four dimensions into objectives, tasks and goals, then the production of knowledge will start from personal dispositions and will culminate with the consolidation of distinctive features of the innovative product or process. That is, technology is a reflection of the academic, professional and labor relations involved in the management, production and transfer of knowledge.

Consequently, the measurement of this formative process of intellectual capital has been very complex (Villegas, 2018). Some instruments focus their interest in entrepreneurship; considering the creation of opportunities, the optimization of resources or the innovation of processes as central axes. Other works refer more to the particular analysis of academic, professional or occupational training, focusing their analysis on the translation of knowledge, experiences and emotions.

However, the formation of human capital is focused on the transfer of knowledge that allows the consolidation of projects and the conversion of talents into intangible assets. That is, emotions, values, expressions and knowledge transferred towards the convergence of objectives, tasks and goals as entrepreneurship or innovation devices.

From the formative theory of the intellectual capita and the studies on the relations between its dimensions and components in the academic, professional and labor field, it is possible to delineate trajectories of relations between the categories and variables.

The first trajectory of the academic, professional and labor habitus explains the transfer of knowledge prior to management and production oriented to the consolidation of projects outlined in this path. This is the case of innovations that originated among students and consolidated among competitors, as is the case of information and communication technologies.

The second route refers to the process of management, production and transfer of knowledge complementary to the first route since it involves the insertion of risk capital. The same innovative project of information or communication technology is potentialized with venture capital to intensify the consolidation of the project.

A third peripheral route to the previous two refers to the process of knowledge transfer and its culmination in a production of knowledge. This is the case of strategic alliances between universities and organizations that, through professional practices to social services, will generate an agenda for the translation of ideas and their concatenation.

Objective: Discuss the axes, themes, dimensions and categories of the intellectual training agenda in order to evaluate the public policies of strategic alliances between higher education institutions and knowledge-creating organizations for graduation and market insertion labor.

Formulation: Will there be differences between the axes, themes, dimensions and categories reported in the public literature from 2019 to 2022?

Null hypothesis: There will be no significant differences between the axes, themes, dimensions and categories reported in the literature related to the formation of intellectual capital.

2. Method

Design: Documentary, retrospective and exploratory study.

Sample: Selection of sources indexed to international repositories such as; Academia, Copernicus, Dialnet, Latindex, Publindex, Redalyc, Scielo, Scopus, Zenodo and Zotero, considering the period of publication from 2019 to 2022, as well as the search for "intellectual capital" keywords (see Table 1).

Instrument: Matrices of content analysis, opinion and contingency (Godson, 2014). They include columns of selected findings from the literature, qualifications, feedback and reconsiderations of experts in the field (McCombs and Valenzuela, 2014).

Process: The summaries were selected from the search by keywords of intellectual capital formation, considering the period of publication from 2019 to 2022. Expert judges rated the summaries, considering; -1 for the intellectual formative process detached from the university with the labor market, 0 for the training process without significant effects and 1 for positive effects of the training process (Harper, 2012). Then, the results were presented in order to obtain opinions to provide feedback on the criteria (Kumar and Jain, 2013). Once the ratings and feedback were combined, the differences and coincidences for the reconsiderations and consensus were established (McCleskey, 2014). The data was processed in the qualitative analysis package version 3.0 (see Table 2).

Table 1. Descriptive of sample

Repository	2019	2020	2021	2022
Academia	6	5	5	2
Copernicus	5	4	4	3
Dialnet	8	6	3	4
Latindex	7	7	7	1
Publindex	6	5	5	2
Redalyc	5	3	2	3
Scielo	6	5	2	2
Scopus	4	4	5	3
Zenodo	3	7	6	1
Zotero	4	8	6	1

Source: Elaborated with data study

Table 2. Description of the judges

Sex	Age	Income	Experience
Male	57	47'324.00	20
Female	68	53'902.00	30
Female	54	43'423.00	21
Female	61	38'564.00	32
Male	48	28'546.00	20
Male	55	42'436.00	30
Male	49	51'982.00	20

Source: Elaborated with data study

Analysis: Prevalence distribution parameters were estimated in order to establish the prevalence of axes, themes, dimensions and categories related to the formation of intellectual capital (De la Fuente, Vera and Cardelle, 2012). The contingency and proportion statistics were weighted to test the null hypothesis (Duarte and Ruis, 2009).

3. Results

The hypothetical structural model for intellectual capital formation is organized around the interrelationship between the formative dimensions of academic, professional, and labor habitus and the processes of knowledge management, knowledge production, knowledge transfer, innovation capability, and entrepreneurial orientation. The theoretical basis of the model assumes that intellectual capital formation is not an isolated outcome but a cumulative process in which dispositions, values, knowledge, experiences, and practices interact to facilitate the management, production, and transfer of knowledge (see Figure 1).

The first latent construct is Ethos, which represents the ethical and value-oriented dimension of the formative habitus. Its indicators, Ethos 1, Ethos 2, Ethos 3, and Ethos 4, operationalize the internalization of values, principles, commitments, and orientations that guide academic, professional, and labor behavior. The hypothetical measurement relationships indicate that the indicators are reflective

manifestations of the underlying Ethos construct. The standardized loadings shown in the model, 0.82, 0.87, 0.79, and 0.84, indicate a strong relationship between the latent construct and its observed indicators. Ethos 2 presents the highest loading, suggesting that this indicator provides the strongest empirical representation of the construct within the proposed measurement structure.

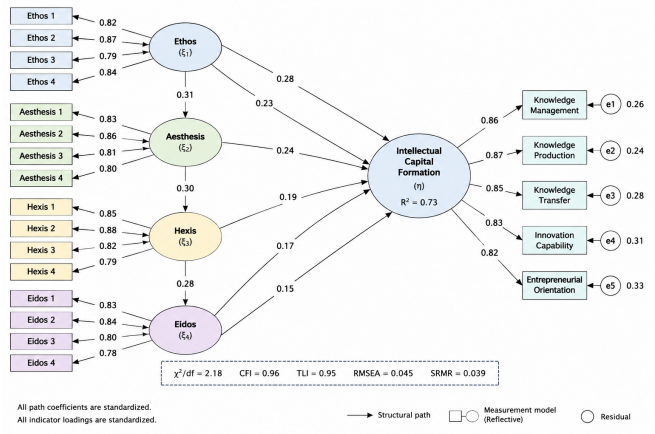


Figure 1. Structural model

The second latent construct is Aesthesis, which represents the expressive, perceptual, and experiential dimension of formative development. Aesthesis 1, Aesthesis 2, Aesthesis 3, and Aesthesis 4 constitute its observed indicators. Their standardized loadings of 0.83, 0.86, 0.81, and 0.80 indicate that the four indicators substantially reflect the latent dimension. The relatively homogeneous loadings suggest that Aesthesis is conceptualized as a coherent construct in which the capacity to perceive, interpret, express, and integrate experiences contributes to the development of intellectual capital.

The third latent construct is Hexis, representing the practical and embodied dimension of formative habitus. Hexis 1, Hexis 2, Hexis 3, and Hexis 4 reflect the incorporation of knowledge and experience into recurrent practices, competencies, and behavioral dispositions. The standardized loadings of 0.85, 0.88, 0.82, and 0.79 indicate strong relationships between the observed indicators and the latent construct. Hexis 2 presents the highest loading, suggesting that this indicator is particularly representative of the practical dimension of intellectual formation.

The fourth latent construct is Eidos, representing the cognitive and knowledge-oriented dimension of formative habitus. Eidos 1, Eidos 2, Eidos 3, and Eidos 4 reflect the organization, interpretation, and application of acquired knowledge. Their standardized loadings of 0.83, 0.84, 0.80, and 0.78 indicate substantial reflective relationships. The measurement structure therefore assumes that intellectual formation requires not only ethical and experiential dispositions but also a cognitive structure capable of organizing knowledge and transforming it into useful competencies.

The first hypothetical structural trajectory connects Ethos with Aesthesis, with a standardized path coefficient of 0.31. This relationship proposes that ethical dispositions influence the way individuals perceive, interpret, and express academic and professional experiences. A stronger ethical orientation may therefore provide a framework through which experiences acquire meaning and are transformed into legitimate forms of professional and academic expression.

A second trajectory connects Aesthesis with Hexis, with a coefficient of 0.30. This path proposes that perception and expression become incorporated into practical dispositions. Experiences initially interpreted through the expressive dimension can progressively become routines, competencies, and behavioral patterns. Consequently, intellectual capital formation can be understood as a process through which interpreted experiences are transformed into practical capacities.

A third trajectory connects Hexis with Eidos, with a coefficient of 0.28. This relationship proposes that repeated practices and embodied competencies contribute to the consolidation of cognitive structures. Practical experience can therefore reinforce the organization of knowledge by allowing individuals to connect theoretical understanding with concrete situations.

The model also specifies a direct trajectory from Ethos toward Intellectual Capital Formation, with a coefficient of 0.28. This relationship suggests that ethical dispositions may contribute directly to intellectual capital formation beyond their indirect influence through Aesthesis, Hexis, and Eidos. Values, commitments, responsibility, and professional orientation can facilitate the development of knowledge-based capabilities because they influence the way individuals participate in academic, organizational, and professional environments.

A direct trajectory from Aesthesis toward Intellectual Capital Formation is represented by a coefficient of 0.24. This path indicates that perception, interpretation, and expression may independently contribute to intellectual capital formation. The theoretical assumption is that intellectual capital depends partly on the capacity to recognize opportunities, interpret experiences, communicate ideas, and transform individual perceptions into knowledge-producing activities.

The trajectory from Hexis toward Intellectual Capital Formation has a coefficient of 0.19. This relationship emphasizes the contribution of acquired practices and embodied competencies to intellectual capital. The relatively lower coefficient compared with Ethos and Aesthesis suggests, within the hypothetical structure, that practical dispositions contribute meaningfully but do not completely determine intellectual capital formation.

The trajectory from Eidos toward Intellectual Capital Formation is represented by a coefficient of 0.17. This relationship proposes that cognitive organization and knowledge structures directly contribute to intellectual capital formation. The coefficient indicates a positive hypothetical contribution, while also suggesting that intellectual capital formation is not exclusively determined by cognitive knowledge. Instead, it emerges from the interaction of ethical, expressive, practical, and cognitive dimensions.

The central endogenous construct is Intellectual Capital Formation. Its position in the model indicates that it functions as the principal outcome of the formative habitus system. The model assigns an R^2 value of 0.73 to this construct, meaning that the proposed structural relationships collectively account for a substantial proportion of its variance within the hypothetical model. This value should be interpreted as a model specification rather than as an empirical estimate from the documentary study because the source describes a documentary and exploratory design rather than a conventional respondent-based structural equation analysis.

Intellectual Capital Formation is subsequently associated with Knowledge Management, Knowledge Production, Knowledge Transfer, Innovation Capability, and Entrepreneurial Orientation. Knowledge Management has a standardized loading of 0.86, indicating a strong relationship with the central construct. The trajectory proposes that intellectual capital formation becomes observable through the capacity to organize, manage, and strategically utilize knowledge within academic, professional, and organizational contexts.

Knowledge Production presents a loading of 0.87, the strongest of the five outcome indicators. This relationship suggests that the generation of new knowledge represents one of the most important manifestations of intellectual capital formation. The trajectory is theoretically consistent with the idea that accumulated knowledge, experiences, competencies, and dispositions can be transformed into new concepts, solutions, methods, projects, or organizational practices.

Knowledge Transfer has a loading of 0.85. This relationship indicates that intellectual capital formation is strongly expressed through the capacity to communicate, disseminate, adapt, and apply knowledge across academic, professional, and organizational contexts. Knowledge transfer therefore constitutes a mechanism through which individually acquired competencies can become collective or institutional intellectual resources.

Innovation Capability has a loading of 0.83. This trajectory proposes that intellectual capital formation contributes to the capacity to develop or implement new processes, products, services, strategies, or organizational solutions. The relationship is based on the assumption that innovation depends on the integration of knowledge, experience, competencies, and opportunities within a structured intellectual environment.

Entrepreneurial Orientation has a loading of 0.82. This relationship indicates that intellectual capital formation can also be manifested through opportunity recognition, resource optimization, project development, initiative, and the capacity to transform knowledge into potentially valuable activities. Entrepreneurial orientation therefore represents another possible expression of the conversion of intellectual resources into practical and organizational outcomes.

The measurement model also incorporates residual terms associated with the five observed outcomes. The residual values displayed in the model are 0.26 for Knowledge Management, 0.24 for Knowledge Production, 0.28 for Knowledge Transfer, 0.31 for Innovation Capability, and 0.33 for Entrepreneurial Orientation. These residuals represent the portions of variance not explained by the central Intellectual Capital Formation construct within the proposed measurement structure.

Overall, the hypothetical trajectories describe a progressive formative mechanism in which ethical dispositions influence perception and expression, perception contributes to practical dispositions, practical dispositions reinforce cognitive organization, and the combined dimensions contribute to intellectual capital formation. Intellectual capital formation then becomes observable through knowledge management, knowledge production, knowledge transfer, innovation capability, and entrepreneurial orientation. This structure corresponds to the source's conceptualization of intellectual capital formation as a process involving knowledge management, production, and transfer, while also incorporating the four dimensions of ethos, aesthesis, hexis, and eidos.

The model therefore represents intellectual capital as the result of a multidimensional developmental process rather than as a single accumulation of knowledge. The proposed relationships imply that academic and professional formation becomes more effective when values, perceptions, practices, and cognitive structures converge. The resulting intellectual capital can subsequently be translated into the management, production, and transfer of knowledge and into innovation and entrepreneurial capacities. The structural model consequently provides a hypothetical representation of how formative habitus may become transformed into individual and organizational intellectual resources.

4. Discussion

The prevalence of the axes alluding to the inter-institutional of intellectual capital is led by strategic alliances (66%) between higher education institutions and local labor market organizations; being the subject of professional practices (51%) the dominant one, as well as the dimension of knowledge management (40%) and the hegemonic category of habitus (51%).

Regarding the contrast of the hypothesis in contingent relationships, institutional coupling [$\varkappa 2$ = 13,21 (23 df) p < 0,5], professional practices [$\varkappa 2$ = 14,21 (19df) p < ,05], translation of experiences [$\varkappa 2$ = 15,32 (18df) p < ,05] and provisions [$\varkappa 2$ = 16,21 (17df) p < ,05] were not rejected.

Regarding the proportional relationships of probability, institutional isomorphic was related to professional practices [OR = 23,21 (13,28 to 45,30)] and the translation of knowledge with the provisions [OR = 18,21 (19,21 to 30,28)].

The contribution of the present work to the state of the matter lies in the exploration of the axes, themes, dimensions and categories related to the formation of the intellectual capital, although the research design limited the results to the repositories that house the consulted literature, suggesting the extension of work to other contexts such as training and training.

In relation to the academic training that highlights professional competences, the present work has demonstrated an axis of institutional coupling whose rectory determines the strategies of alliances between universities and organizations. In this sense the isomorphism of the programs and strategies of alliances will allow the observation of the differences and similarities between the educational and labor actors (Melchar and Bosco, 2010).

With respect to labor practices as an area of professional competences, the present study warns that these topics are contingent on the coupling of the university with the labor market. In this way, lines of research related to strategic alliances will allow the unveiling of management competencies rather than production and transfer of knowledge (Meru and Ogbonna, 2013).

This is because the transfer of experiences was related to the dispositions to professional learning. It is a scenario in which strategic alliances and professional practices involve a transfer of knowledge for vicarious learning rather than for the contrast of theories (Riuvera, Punin and Calvo, 2013).

Regarding the systematic reviews and meta-analysis of the formation of intellectual capital that highlights the prevalence of strategic alliances (Sánchez, Cagiano and Hernández, 2011), collaborative practices (Weaver, 2007) and the implementation of new technologies (Wopner, 2012) for a 4.0 training, this study suggests that this technological axis is complemented by a dispositional axis of teaching and learning between the parties involved.

5. Conclusion

The objective of this work was to specify a model for the study of the formation of intellectual capital, emphasizing the dimensions of coupling between institutions and actors, as well as in relation to professional practices, translation of experiences and dispositions to learning.

These contributions are complementary to the literature reviews published from 2000 to 2020, although they disagree regarding the relationships between the axes, themes, dimensions and established categories. Research lines concerning the theoretical and conceptual frameworks that explain such relationships will allow us to test hypotheses related to case observations in management, production and knowledge transfer scenarios.

The present study concludes that intellectual capital formation can be conceptualized as a multidimensional process in which ethical, expressive, practical, and cognitive dispositions interact with the management, production, and transfer of knowledge. The proposed model places Ethos, Aesthesis, Hexis, and Eidos as interconnected dimensions of formative habitus and establishes Intellectual Capital Formation as the central endogenous construct through which these dimensions can be associated with Knowledge Management, Knowledge Production, Knowledge Transfer, Innovation Capability, and Entrepreneurial Orientation. This structure provides a coherent theoretical representation of the transformation of academic and professional dispositions into knowledge-based capabilities.

The proposed trajectories suggest that intellectual capital formation does not depend exclusively on the accumulation of formal knowledge. Ethos represents the value-oriented foundation of the formative process, Aesthesis represents the interpretation and expression of experiences, Hexis represents the incorporation of knowledge into practices and competencies, and Eidos represents the cognitive organization of acquired knowledge. Their interaction provides a theoretical explanation of how formative experiences can become intellectual resources that are subsequently expressed through knowledge management, knowledge production, knowledge transfer, innovation capability, and entrepreneurial orientation.

The scope of the study is primarily theoretical, exploratory, and conceptual. The model provides an analytical structure for examining the relationships among the principal dimensions identified in the literature on intellectual capital formation. It also provides a basis for organizing future empirical research involving universities, professional training environments, knowledge-producing organizations, and labor-market institutions. Its principal contribution is the integration of formative habitus with intellectual capital formation and the specification of hypothetical trajectories that can subsequently be tested through quantitative structural modeling.

The model also has practical scope because its dimensions can be translated into observable indicators for the assessment of intellectual formation. Universities and knowledge-producing organizations may use this framework to examine whether their educational and professional development processes promote ethical dispositions, experiential learning, practical competencies, cognitive development, knowledge management, knowledge production, knowledge transfer, innovation, and entrepreneurial capabilities. The model may therefore serve as a conceptual foundation for designing assessment instruments, institutional development strategies, professional training programs, and strategic alliances between higher education institutions and organizations connected to knowledge production and employment.

The study has important limitations. The research design was documentary, retrospective, and exploratory, and therefore the proposed relationships should not be interpreted as empirically confirmed causal effects. The structural coefficients represented in the conceptual model constitute hypothetical relationships rather than estimates obtained from a respondent-based structural equation model. Consequently, the model requires empirical validation before the proposed trajectories can be interpreted as statistically established relationships.

A second limitation concerns the selection of documentary sources. The study considered sources indexed in selected international repositories and focused on publications from 2019 to 2022. This temporal and documentary delimitation provides consistency for the exploratory analysis but restricts the generalization of the resulting conceptual structure to other periods, databases, institutional environments, and populations. Additional evidence from subsequent years and from broader sources could modify the relative importance of the proposed dimensions and relationships.

A third limitation concerns the complexity of intellectual capital formation itself. The proposed model emphasizes Ethos, Aesthesis, Hexis, and Eidos and their relationship with Intellectual Capital Formation, but other organizational, technological, institutional, socioeconomic, and contextual factors may also influence the development and utilization of intellectual capital. The model should therefore be regarded as a theoretically bounded representation rather than a complete explanation of all mechanisms involved in intellectual capital formation.

A fourth limitation is associated with measurement. Although the model specifies indicators for the principal constructs, the documentary design does not provide sufficient empirical evidence to establish the final psychometric performance of those indicators in a specific population. Future studies must therefore evaluate factor loadings, internal consistency, convergent validity, discriminant validity, and structural relationships using appropriate empirical samples. Measurement equivalence should also be considered when the model is applied across different institutional, professional, cultural, or national contexts.

Future research should first conduct a confirmatory empirical study using a sufficiently large sample of students, professionals, educators, researchers, or organizational participants. The proposed measurement structure should be evaluated through confirmatory factor analysis or partial least squares structural equation modeling to determine whether the indicators adequately represent Ethos, Aesthesis, Hexis, Eidos, and Intellectual Capital Formation. The structural paths should subsequently be tested to determine whether the hypothesized relationships are statistically significant and whether the proposed model explains a meaningful proportion of variance in intellectual capital formation.

Future research should also examine alternative structural configurations. The sequential relationship among Ethos, Aesthesis, Hexis, and Eidos could be compared with parallel, reciprocal, mediating, or hierarchical structures. Such comparisons would determine whether intellectual capital formation is better represented as a sequential developmental process, a multidimensional latent construct, or a combination of interconnected formative and reflective mechanisms.

Longitudinal studies are particularly recommended because intellectual capital formation involves processes of learning, experience, knowledge transfer, and professional development that may change over time. Repeated measurements could determine whether ethical dispositions precede experiential development, whether practical competencies reinforce cognitive structures, and whether these processes subsequently generate measurable increases in knowledge management, knowledge production, knowledge transfer, innovation capability, and entrepreneurial orientation.

Comparative research should also examine differences between universities, organizations, professional sectors, and regional contexts. Such studies could determine whether the proposed model operates similarly across different institutional environments or whether specific contextual variables modify the magnitude and direction of the structural relationships. Cross-national studies could further evaluate the stability and transferability of the measurement and structural models.

Another recommendation is to incorporate institutional and organizational variables into future versions of the model. Strategic alliances, professional practices, institutional coupling, technological resources, organizational climate, leadership, and labor-market conditions may function as antecedents, moderators, or mediators of intellectual capital formation. Their inclusion would permit a more

comprehensive explanation of how individual dispositions become collective and institutional intellectual resources.

Finally, future empirical research should establish explicit criteria for evaluating the practical effectiveness of intellectual capital formation programs. The model can be transformed from a conceptual framework into an assessment system capable of identifying strengths and weaknesses in ethical development, experiential learning, practical competence, cognitive development, knowledge management, knowledge production, knowledge transfer, innovation, and entrepreneurial orientation. Such empirical validation would allow the proposed framework to progress from an exploratory theoretical model toward a robust explanatory model with potential applications in higher education, professional development, organizational learning, innovation management, and knowledge-based development.

In conclusion, the study provides a theoretical foundation for understanding intellectual capital formation as an integrated process connecting dispositions, experiences, competencies, knowledge structures, and organizational capabilities. Its principal value lies in specifying a coherent set of hypothetical relationships that can guide subsequent empirical investigation. Its findings should therefore be interpreted as a conceptual and exploratory contribution whose definitive explanatory capacity depends on future measurement validation, structural testing, longitudinal evidence, comparative research, and the incorporation of contextual variables.

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Table 3. Operationalization of Formative Habitus Dimensions

Construct	Conceptual Definition	Dimension	Indicator	Measurement Role	Expected Relationship
Ethos	Ethical and value-oriented dispositions	Ethical orientation	Ethos 1	Reflective indicator	Positive
Ethos	Ethical and value-oriented dispositions	Ethical orientation	Ethos 2	Reflective indicator	Positive
Ethos	Ethical and value-oriented dispositions	Ethical orientation	Ethos 3	Reflective indicator	Positive
Ethos	Ethical and value-oriented dispositions	Ethical orientation	Ethos 4	Reflective indicator	Positive
Aesthesis	Expressive and experiential dispositions	Experiential orientation	Aesthesis 1	Reflective indicator	Positive
Aesthesis	Expressive and experiential dispositions	Experiential orientation	Aesthesis 2	Reflective indicator	Positive
Aesthesis	Expressive and experiential dispositions	Experiential orientation	Aesthesis 3	Reflective indicator	Positive
Aesthesis	Expressive and experiential dispositions	Experiential orientation	Aesthesis 4	Reflective indicator	Positive
Hexis	Practical and embodied dispositions	Practical orientation	Hexis 1	Reflective indicator	Positive
Hexis	Practical and embodied dispositions	Practical orientation	Hexis 2	Reflective indicator	Positive
Hexis	Practical and embodied dispositions	Practical orientation	Hexis 3	Reflective indicator	Positive
Hexis	Practical and embodied dispositions	Practical orientation	Hexis 4	Reflective indicator	Positive
Eidos	Cognitive and knowledge-oriented dispositions	Cognitive orientation	Eidos 1	Reflective indicator	Positive
Eidos	Cognitive and knowledge-oriented dispositions	Cognitive orientation	Eidos 2	Reflective indicator	Positive
Eidos	Cognitive and knowledge-oriented dispositions	Cognitive orientation	Eidos 3	Reflective indicator	Positive
Eidos	Cognitive and knowledge-oriented dispositions	Cognitive orientation	Eidos 4	Reflective indicator	Positive

Table 4. Operationalization of Intellectual Capital Formation

Construct	Indicator	Measurement Role	Expected Relationship
Intellectual Capital Formation	Knowledge Management	Reflective indicator	Positive
Intellectual Capital Formation	Knowledge Production	Reflective indicator	Positive
Intellectual Capital Formation	Knowledge Transfer	Reflective indicator	Positive
Intellectual Capital Formation	Innovation Capability	Reflective indicator	Positive
Intellectual Capital Formation	Entrepreneurial Orientation	Reflective indicator	Positive

Table 5. Structural Operationalization of the Proposed Model

Predictor Construct	Outcome Construct	Hypothetical Path	Structural Coefficient
Ethos	Aesthesis	Ethos → Aesthesis	0.31
Aesthesis	Hexis	Aesthesis → Hexis	0.30
Hexis	Eidos	Hexis → Eidos	0.28
Ethos	Intellectual Capital Formation	Ethos → Intellectual Capital Formation	0.28
Aesthesis	Intellectual Capital Formation	Aesthesis → Intellectual Capital Formation	0.24
Hexis	Intellectual Capital Formation	Hexis → Intellectual Capital Formation	0.19
Eidos	Intellectual Capital Formation	Eidos → Intellectual Capital Formation	0.17
Intellectual Capital Formation	Knowledge Management	Intellectual Capital Formation → Knowledge Management	0.86
Intellectual Capital Formation	Knowledge Production	Intellectual Capital Formation → Knowledge Production	0.87
Intellectual Capital Formation	Knowledge Transfer	Intellectual Capital Formation → Knowledge Transfer	0.85
Intellectual Capital Formation	Innovation Capability	Intellectual Capital Formation → Innovation Capability	0.83
Intellectual Capital Formation	Entrepreneurial Orientation	Intellectual Capital Formation → Entrepreneurial Orientation	0.82

Appendices

Appendix A. Operationalization of Variables

The model is consistent with the source description of intellectual capital formation as a process involving knowledge management, production, and transfer, together with the four dimensions of ethos, aesthesis, hexis, and eidos.

Appendix B. Measurement Model Specification

The structural model reports an R^2 value of 0.73 for Intellectual Capital Formation. Because the original study is documentary and exploratory, these coefficients should be treated as model-specification values rather than as independently estimated empirical coefficients. The source describes the study design as documentary, retrospective, and exploratory.

Appendix C. Expert-Judge Evaluation

The source specifies that expert judges evaluated selected literature summaries using -1, 0, and 1 according to the relationship between the intellectual formative process, university formation, and labor-market insertion. The ratings were subsequently combined with feedback and reconsideration procedures to establish differences, coincidences, and consensus.

The source reports seven judges and provides their sex, age, income, and professional experience.

The individual numerical ratings of the seven judges are not contained in the attached source. Therefore, the cells above are intentionally marked as not reported rather than being assigned artificial values. The source only describes the evaluation procedure and the -1, 0, and 1 coding scheme.

Appendix D. Content-Analysis and Consensus Procedure

The source indicates that the analysis used prevalence distributions together with contingency and proportion statistics to examine the occurrence of axes, themes, dimensions, and categories related to intellectual capital formation.

Table 6. Indicator Loadings

Construct	Indicator	Standardized Loading
Ethos	Ethos 1	0.82
Ethos	Ethos 2	0.87
Ethos	Ethos 3	0.79
Ethos	Ethos 4	0.84
Aesthesis	Aesthesis 1	0.83
Aesthesis	Aesthesis 2	0.86
Aesthesis	Aesthesis 3	0.81
Aesthesis	Aesthesis 4	0.80
Hexis	Hexis 1	0.85
Hexis	Hexis 2	0.88
Hexis	Hexis 3	0.82
Hexis	Hexis 4	0.79
Eidos	Eidos 1	0.83
Eidos	Eidos 2	0.84
Eidos	Eidos 3	0.80
Eidos	Eidos 4	0.78
Intellectual Capital Formation	Knowledge Management	0.86
Intellectual Capital Formation	Knowledge Production	0.87
Intellectual Capital Formation	Knowledge Transfer	0.85
Intellectual Capital Formation	Innovation Capability	0.83
Intellectual Capital Formation	Entrepreneurial Orientation	0.82

Table 7. Residual Variance Associated with Intellectual Capital Formation Indicators

Indicator	Residual
Knowledge Management	0.26
Knowledge Production	0.24
Knowledge Transfer	0.28
Innovation Capability	0.31
Entrepreneurial Orientation	0.33

Table 8. Expert Evaluation Procedure

Evaluation Value	Interpretation	Evaluation Criterion
-1	Negative effect	The intellectual formative process is detached from the university and labor market
0	Neutral effect	The training process does not produce significant effects
1	Positive effect	The training process produces positive effects

Table 9. Expert-Judge Profile Reported in the Source

Judge	Sex	Age	Income	Experience
Judge 1	Male	57	47,324.00	20
Judge 2	Female	68	53,902.00	30
Judge 3	Female	54	43,423.00	21
Judge 4	Female	61	38,564.00	32
Judge 5	Male	48	28,546.00	20
Judge 6	Male	55	42,436.00	30
Judge 7	Male	49	51,982.00	20

Table 10. Expert-Judge Assessment Matrix

Evaluation Criterion	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 7
University-to-labor-market formative process	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Training process without significant effects	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Positive formative effects	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported

Table 11. Expert Evaluation Sequence

Stage	Procedure	Expected Output
1	Selection of literature summaries	Documentary evidence concerning intellectual capital formation
2	Initial expert assessment	Individual evaluation using -1, 0, or 1
3	Feedback	Identification of disagreements and interpretive differences
4	Reconsideration	Revision of judgments after feedback
5	Consensus	Identification of convergent evaluations
6	Content analysis	Organization of axes, themes, dimensions, and categories
7	Structural interpretation	Specification of hypothetical relationships among constructs

Table 12. Conceptual Correspondence

Construct	Core Meaning	Indicators
Ethos	Values and ethical dispositions	Ethos 1, Ethos 2, Ethos 3, Ethos 4
Aesthesis	Perception, experience, and expression	Aesthesis 1, Aesthesis 2, Aesthesis 3, Aesthesis 4
Hexis	Practice, embodiment, and acquired competencies	Hexis 1, Hexis 2, Hexis 3, Hexis 4
Eidos	Cognitive organization and knowledge	Eidos 1, Eidos 2, Eidos 3, Eidos 4
Intellectual Capital Formation	Consolidation of intellectual resources	Knowledge Management, Knowledge Production, Knowledge Transfer, Innovation Capability, Entrepreneurial Orientation

Table 13. Proposed Empirical Validation Criteria

Evaluation Area	Recommended Evidence
Indicator reliability	Standardized indicator loadings
Internal consistency	Reliability coefficients
Convergent validity	Average variance extracted
Discriminant validity	Construct-level discriminant assessment
Collinearity	Variance inflation assessment
Structural significance	Path coefficient significance testing
Explained variance	R^2 for endogenous constructs
Predictive relevance	Predictive assessment for endogenous constructs
Model adequacy	Appropriate structural model assessment

Appendix E. Construct-to-Indicator Conceptual Map

The source conceptualizes the four dimensions as components of a formative habitus and describes intellectual capital formation through the management, production, and transfer of knowledge.

Appendix F. Model Evaluation Framework

These criteria are recommended for future empirical validation and are not reported as results of the documentary study. The source itself describes the analysis as a prevalence, contingency, and proportion analysis rather than as an empirical respondent-based structural equation estimation.

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Impact of Green Human Resource Management Practices on Employee Behaviour: A Study of Colleges and Universities in Garo Hills of Meghalaya

Article Record

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Abstract

Green Human Resource Management serves as a critical strategic framework for driving environmental sustainability within higher education institutions. This study explores the influence of Green Human Resource Management (GHRM) practices on Employee Green Behaviour (EGB) within the unique socio-geographic context of higher educational institutions in the Garo Hills of Meghalaya. Grounded in the Ability, Motivation, and Opportunity (AMO) framework and Social Identity Theory (SIT), the research aims to understand how institutional strategies can foster environmental stewardship among faculty and staff. Following a quantitative research design, the data was collected via a structured questionnaire from faculty members across various colleges and universities operating in the Garo Hills region of Meghalaya. Sample size of 200 faculty members are considered taking 20 each from 10 institutions. Data analysis was conducted using hierarchical regression to test the direct relationships and the moderating effects of green training and participation. The findings provide actionable insights for educational administrators in Meghalaya to integrate environmental sustainability into their Human Resource Management Policies. By focusing on green training and involving employees in decision making, institutions in the Garo Hills can significantly contribute to regional ecological preservation and foster a culture of sustainability.

AMO Theory | Employee Green Behaviour | Garo Hills | Green HRM | Higher Education | Meghalaya | Sustainability

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Keywords: *AMO Theory, Employee Green Behaviour, Garo Hills, Green HRM, Higher Education, Meghalaya, Sustainability*

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1. Introduction

Environmental sustainability has become an important concern for organizations because institutional activities influence the use of energy, water, paper, transportation, and other natural resources (Vijayalakshmi et al., 2025; Begum & Arshi, 2020). Higher educational institutions have a particularly important role in this area. Colleges and universities are not only workplaces; they are also centres of teaching, research, knowledge creation, and community engagement. Their environmental practices can influence faculty members, students, administrative employees, and the wider society. (Ahmad et al., 2023; Saad et al., 2024). Consequently, sustainability in higher education requires more than environmental infrastructure or written policies. It also requires employees to consistently adopt environmentally responsible attitudes and behaviours in their daily work.

Human Resource Management can support this transition by integrating environmental considerations into the recruitment, training, performance management, reward, participation, and employee involvement processes of an institution. This approach is commonly referred to as Green Human Resource Management (GHRM). GHRM seeks to align human resource policies with environmental objectives so that employees acquire the knowledge and skills, motivation, and organizational support necessary to contribute to sustainability. (Veerasamy et al., 2023; Habib et al., 2026)

Existing research associates GHRM with outcomes such as environmental commitment, environmental performance, and Employee Green Behaviour

Employee Green Behaviour (EGB) encompasses environmentally responsible actions in the workplace, including resource conservation, waste reduction, and the promotion of sustainable practices among colleagues and students (Miah et al., 2024; Yadate, 2024). While GHRM has been linked to positive environmental outcomes globally, its effectiveness is often contingent upon regional and institutional contexts (Begum & Arshi, 2020; Veerasamy et al., 2023). This study focuses on the Garo Hills of Meghalaya, examining how faculty members perceive GHRM practices and how these perceptions translate into green behaviour within their unique administrative and geographical setting.

2. Significance of the Study

2.1. Theoretical Significance

This study contributes to the theoretical understanding of how GHRM may influence Employee Green Behaviour in higher educational institutions. First, it applies the AMO framework to explain the mechanisms through which employees develop and

demonstrate environmentally responsible behaviour. (Campbell et al., 1970; Ahmad et al., 2023; Ali & Nisar, 2022; Veerasamy et al., 2023). The framework clarifies that green behaviour is unlikely to depend only on employee willingness. Employees must also receive suitable training and information, experience appropriate motivation, and be provided with opportunities to participate in sustainability-related activities.

Second, the study incorporates Social Identity Theory into the analysis of GHRM and EGB. This helps extend the explanation beyond formal HR practices by considering whether employees' sense of belonging and alignment with their institution's environmental values may encourage green behaviour. (Hogg et al., 1995; Veerasamy et al., 2023; Alghowairi & Chadha, 2025; Xuemin et al., 2024). Examining the AMO framework together with Social Identity Theory may provide a more complete explanation of how institutional practices and employee perceptions interact to shape environmental conduct.

2.2. Practical Significance for Higher Educational Institutions

The findings can assist college and university administrators in designing more effective green HRM policies. If green training is found to be important, institutions may strengthen induction programmes, workshops, departmental training, and awareness activities related to energy conservation, waste reduction, sustainable procurement, and responsible use of institutional resources. If motivation-related practices are important, institutions may incorporate environmental criteria into performance appraisal, recognition, awards, and professional development systems.

The study may also demonstrate the value of employee participation. Faculty members can contribute practical knowledge about classroom activities, laboratories, offices, campus operations, student engagement, and community outreach. Establishing green committees, consultation forums, suggestion systems, and departmental sustainability plans may enable employees to participate in environmental decision-making and take greater ownership of institutional sustainability goals.

For administrators in the Garo Hills, this research identifies key GHRM dimensions—such as green training and performance appraisal—that drive faculty engagement (Vijayalakshmi et al., 2025; Abousoliman et al., 2024). The findings assist in designing context-specific sustainability policies that leverage faculty participation in decision-making (Veerasamy et al., 2023; Alghowairi, 2025). Regionally, the study contributes to environmental stewardship in Meghalaya, as sustainable practices adopted by faculty can influence students and the wider community (Saad et al., 2024; Amini et al., 2024)

Lastly, the current study will contribute to the existing literature on GHRM and in result, institutions could undertake initiatives to promote a green environment in organisations that enhances green behaviour. This knowledge from the faculty about the Employment Green Behaviour is more likely to be transferred to the students, who, in turn, will make a positive contribution to the environment and society in the future.

3. Literature Review

3.1. Green Human Resource Management in Higher Education

Research consistently demonstrates that GHRM practices significantly influence environmental performance and sustainable education in Higher Education Institutions (Vijayalakshmi et al., 2025; Adeel et al., 2024). For instance, performance management and rewards have been identified as highly influential dimensions in promoting sustainable practices among faculty and staff (Vijayalakshmi et al., 2025; Arshad et al., 2025). In UAE private Higher Educational Institutions, GHRM drivers such as job design and training were found to positively impact green organizational outcomes (Begum & Arshi, 2020). Similarly, in other universities, GHRM practices such as competence building and employee involvement were significantly related to institutional environmental performance (Ahmad et al., 2023; Ahmad et al., 2022). Systematic reviews emphasize that GHRM implementation positions academic institutions as role models for sustainability across other sectors (Saad et al., 2024; Bhardwaj et al., 2024).

3.2. Employee Green Behaviour (EGB)

EGB is a multidimensional construct comprising both required and voluntary actions (Yadate, 2024; Ones et al., 2018). Studies indicate that GHRM practices directly impact EGB and improve employees' green self-efficacy in academic settings (Miah et al., 2024; Ali & Nisar, 2022). While GHRM significantly affects conserving and influencing behaviours, its impact on more proactive initiatives, such as "taking initiatives" or "avoiding harm," may vary depending on the institutional culture (Yadate, 2024). In many public universities, GHRM practices like green rewards and recruitment were found to positively influence eco-friendly behaviour, with environmental awareness acting as a partial mediator (Amini et al., 2024; Veerasamy et al., 2023)

3.3. Geographical Context: Garo Hills, Meghalaya

The Garo Hills region of Meghalaya is divided into five administrative districts: West Garo Hills (headquarter: Tura), East Garo Hills (Williamnagar), South Garo Hills (Baghmara), North Garo Hills (Resubelpara), and South West Garo Hills (Ampati). The region is characterized by its distinctive social and environmental landscape, with Garo, Khasi and English serving as official languages. (Districts, Meghalaya Government Portal, n.d.)

Higher education in the region is centred mainly in Tura and the district headquarters, with key institutions including the North-Eastern Hill University (NEHU) Tura Campus, Tura Government College, and several other colleges. The regional literacy rate is approximately 74.43%, and educational institutions play a vital role in local development and environmental awareness (Census, 2011). This eco-sensitive setting, combined with the concentration of academic institutions, makes the Garo Hills a relevant context for examining Green Human Resource Management practices and their influence on employee behaviour in colleges and universities (Education, West Garo Hills District Administration, India, n.d.)

3.4. Theoretical Frameworks

The theoretical background for this research comes from the Ability-Motivation-Opportunity (AMO) theory (Campbell et al., 1970) and Social Identity theory (SIT) (Hogg et al., 1995). The Ability-Motivation-Opportunity (AMO) framework is widely used to explain the relationship between GHRM and performance (Veerasamy et al., 2023; Alghowairi & Chadha 2025; Kuria & Mose, 2019). The basic tenet of AMO theory is that performance is a function of employees' ability (i.e., capacity to perform a given task), motivation (i.e., willingness exhibited by employees in achieving the shared mission), and opportunity (stemming from self-directed leadership of individuals). Within this framework, recruit employees who have green competencies and abilities relates to "ability," motivating the employees through training

and development and other institutional initiatives relate to "motivation," and creating opportunities for employees in green training/participation relates to "opportunity" (Veerasamy et al., 2023; Chin et al., 2023). The performance appraisal system is a motivating force for the employees (Fawehinmi et al., 2020). At the same time, positive evaluation motivates them for superior green performance, and negative assessments create opportunities for green participation and improve green performance.

Another theory applied in this research is the Social Identity Theory (SIT), according to which individuals tend to identify themselves with particular groups and secure their membership (Hogg et al., 1995; Veerasamy et al., 2023). Social Identity Theory complements this by suggesting that a shared green organizational identity encourages employees to act in accordance with institutional environmental values (Alghowairi & Chadha, 2025; Xuemin et al., 2024; "Green Human Resource Management and Pro-Environmental Behaviour: Effect of Green Organizational Identity and Green Shared Vision," 2023). Research indicates that green organizational identification and commitment mediate the relationship between GHRM practices and environmental performance among academic staff (Ahmad et al., 2023; Abousoliman et al., 2024).

4. Research Gap

Despite the growing body of literature on Green Human Resource Management (GHRM), several important research gaps remain. Existing studies are mostly concentrated in Western and other developed countries, while empirical evidence from Asian countries remains comparatively limited. This gap is particularly pronounced in India, where the application and outcomes of GHRM practices have received insufficient attention, especially within the higher education sector.

Moreover, studies that examine GHRM in educational institutions often focus on broad institutional settings without adequately accounting for regional, cultural, and resource-based differences. In the Indian context, higher education institutions in geographically remote and socioeconomically diverse regions such as Meghalaya require focused investigation. Their institutional capacity, environmental challenges, workforce characteristics, and implementation of sustainability oriented HR practices may differ substantially from those of institutions in metropolitan or more developed regions.

The present study is limited to selected higher education institutions in the Garo Hills region of Meghalaya because of time and resource constraints. Consequently, the findings may not be generalisable to the entire state of Meghalaya or to India as a whole. Future research should therefore use larger and more diverse samples across all regions of Meghalaya, other Northeastern states, and India. Comparative studies across public and private institutions, rural and urban locations, and different levels of higher education would further strengthen understanding of how GHRM practices contribute to employee environmental commitment and institutional sustainability.

5. Objectives

The primary objective of the study is to understand the impact of Green Human Resource Management Practices on Employee Green Behaviour.

6. Research Methodology

6.1. Research Design

The study adopts a quantitative, cross-sectional research design. This approach is suitable for measuring faculty perceptions and testing the relationships between GHRM practices and EGB (Arshad et al., 2025; Abousoliman et al., 2024). The descriptive component assesses the extent of GHRM implementation, while the explanatory component examines statistical associations and moderating effects.

6.2. Population and Sampling

The target population consists of full-time faculty members in selected colleges and universities in the Garo Hills of Meghalaya. A sample of 200 faculty members from 10 higher educational institutions was considered. A stratified random sampling strategy was used to select faculty participants across 10 higher education institutions, treating each institution as a distinct stratum. From a total eligible population of 500 faculty members across all 10 institutions, participants were randomly sampled from official institutional rosters to secure 20 complete responses per college ($N = 200$). Out of 320 distributed survey invitations, 200 completed responses were, yielding an overall response rate of 62.5%. This stratified probability design ensured balanced representation and reduced institutional sampling bias.

6.3. Data Collection

Data were collected using a structured questionnaire. The study employed a 16-item structured questionnaire measured using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The instrument was developed by adapting established measures from the Green Human Resource Management (GHRM), Ability–Motivation–Opportunity (AMO), organizational identification, and employee green behaviour literature. The first ten items were structured according to the AMO perspective of GHRM, with Ability comprising green recruitment, selection, training and induction practices; Motivation comprising green performance appraisal, rewards, management feedback and environmental communication; and Opportunity comprising employee participation and involvement in environmental initiatives (Renwick et al., 2013). The Social Identity dimension (Q11–Q13) was adapted from established organizational identification measures associated with Mael and Ashforth (1992), with the items contextualised to employees' identification with the institution's environmental orientation. The final three items (Q14–Q16) were adapted from the employee environmental behaviour/Organizational Citizenship Behaviour for the Environment literature, particularly the work of Boiral and Paillé (2012). Accordingly, the questionnaire constitutes an adapted composite instrument comprising items drawn from established measures in the GHRM, Social Identity, and Employee Green Behaviour literature.

6.4. Data Analysis

6.4.1. Descriptive Statistics and Reliability of the Study Constructs

Table 1. Descriptive statistics and reliability of the study constructs

Construct	Items	Mean	SD	α	CR
Ability	Q1–Q4 (recruitment/selection + training/induction)	3.677	0.775	.736	.761
Motivation	Q5–Q8 (appraisal, rewards, feedback, communication)	3.646	0.900	.852	.861
Opportunity	Q9–Q10 (participation + green teams/suggestion schemes)	3.875	0.824	.733	.735
SIT	Q11–Q13 (self-identification, belonging, reputation)	3.694	0.754	.674	.712
EGB	Q14–Q16 (behaviour, orientation, encouraging others)	4.111	0.797	.762	.825
GHRM(AMO)	Ability + Motivation + Opportunity	3.733	0.757	–	–

Note: α = Cronbach's alpha; CR = composite reliability.
Mean GHRM(AMO) = 3.73 (SD = 0.757); Mean SIT = 3.694 (SD = 0.754); Mean EGB = 4.111 (SD = 0.797).

6.4.2. Correlations

Table 2. Pearson correlation matrix

Construct	Ability	Motivation	Opportunity	SIT	EGB	GHRM(AMO)
Ability	1.000	0.815	0.657	0.648	0.561	0.901
Motivation	0.815	1.000	0.737	0.512	0.335	0.937
Opportunity	0.657	0.737	1.000	0.763	0.419	0.879
SIT	0.648	0.512	0.763	1.000	0.734	0.697
EGB	0.561	0.335	0.419	0.734	1.000	0.476
GHRM(AMO)	0.901	0.937	0.879	0.697	0.476	1.000

The individual Pearson correlation between Ability and EGB was $r = 0.561$, between Motivation and EGB was $r = 0.335$, between Opportunity and EGB was $r = 0.419$, between SIT and EGB was $r = 0.734$, and between the overall GHRM(AMO) and EGB was $r = 0.476$.

6.4.3. Hierarchical Regression

Table 3. Hierarchical regression

Model	R^2	Adjusted R^2	ΔR^2	F Change	Model p
AMO only	0.227	0.217	0.227	24.06	0.019
AMO+SIT	0.407	0.397	0.180	74.21	0.001

Model 1: AMO factors alone accounts for 22.7% of the variance in Employee Green Behaviour ($\Delta R^2 = 0.227$).

Model 2: Adding Social Identity Theory (SIT) in Model 2 accounts for an additional 18.0% of unique variance ($\Delta R^2 = 0.180$, F Change = 74.21, $p < .001$).

7. Findings of the Study

This study examined the association between Green Human Resource Management (GHRM) practices and Employee Green Behaviour (EGB) among faculty members in higher-education institutions in the Garo Hills of Meghalaya. The analysis was conducted using the complete questionnaire responses. Overall, respondents reported moderately favourable perceptions of GHRM practices and relatively high levels of employee green behaviour.

The overall GHRM(AMO) score recorded a mean of 3.73 (SD = 0.76). Among its dimensions, Opportunity had the highest mean score (3.88), followed by Ability (3.68) and Motivation (3.65). Social Identity Theory (SIT) had a mean score of 3.69, while EGB had the highest mean score of 4.11, indicating that respondents generally expressed positive environmental attitudes and reported environmentally responsible behaviour in their workplaces.

The internal consistency of the measurement scales was assessed using Cronbach's alpha. Composite Reliability (CR) was also examined to provide an additional assessment of the internal consistency of the latent constructs.

The results indicate that Ability demonstrated acceptable internal consistency ($\alpha = .736$; CR = .761), while Motivation showed strong reliability ($\alpha = .852$; CR = .861). Opportunity also demonstrated acceptable reliability ($\alpha = .733$; CR = .735). The Cronbach's alpha value for SIT was .674, which is slightly below the commonly used .70 threshold; however, its estimated Composite Reliability was .712. EGB demonstrated acceptable internal consistency, with Cronbach's alpha of .762 and Composite Reliability of .825.

The correlation analysis revealed a moderate positive relationship between overall GHRM(AMO) and EGB (r = 0.476). This suggests that faculty members who perceived stronger green HR practices also tended to report higher green behaviour. Ability showed the strongest relationship with EGB among the AMO dimensions ($r = 0.561$), followed by Opportunity ($r = 0.419$) and Motivation ($r = 0.335$). SIT demonstrated the strongest bivariate association with EGB ($r = 0.734$).

In the regression analysis, overall GHRM(AMO) significantly predicted EGB when examined independently, explaining 22.7% of the variance in EGB. However, when SIT was included in the model, GHRM(AMO) no longer showed a significant independent effect, whereas SIT remained positively associated with EGB. This indicates that green identity and employees sense of connection with the institution's environmental values may have a particularly important relationship with reported green behaviour.

8. Discussion

The findings indicate that GHRM practices may contribute to the development of employee green behaviour in higher-education institutions. When institutions provide environmental knowledge and training, encourage sustainability through recognition and motivation, and create opportunities for participation in green initiatives, faculty members may be more likely to engage in environmentally responsible workplace practices. The positive relationship between GHRM(AMO) and EGB is consistent with the central logic of the AMO framework: employees are more likely to demonstrate desired behaviour when they have the ability, motivation, and opportunity to do so.

Among the AMO dimensions, Ability showed the strongest association with EGB. This implies that environmental awareness, training, and access to sustainability-related knowledge may be especially important for encouraging green practices among faculty members. Opportunity also showed a meaningful positive relationship with EGB, suggesting that institutions should not rely only on awareness programmes; they should also create practical spaces for staff participation, such as green committees, environmental campaigns, recycling initiatives, and faculty-led sustainability projects.

The stronger relationship between SIT and EGB suggests that green behaviour may be closely linked to how employees identify with the environmental values and image of their institution. Faculty members may be more likely to act sustainably when they perceive environmental responsibility as part of the institution's identity and as a value they personally share. Therefore, green behaviour should be understood not only as a result of formal HR practices but also as a reflection of organisational culture, belonging, and shared environmental commitment.

The study supports an association between the variables, but it does not establish that GHRM practices directly cause employee green behaviour. The cross-sectional and self-reported nature of the data also means that the observed relationships may reflect respondents' general positive perceptions rather than direct behavioural effects.

9. Conclusion

This study examined the impact of Green Human Resource Management (GHRM) on Employee Green Behaviour (EGB) in higher educational institutions of Garo Hills, Meghalaya. The findings show that perceived GHRM practices had a positive association with employee's reported green behaviour. The GHRM regression model explained 22.7% of the variation in EGB, indicating that green HR practices may have a meaningful role in encouraging environmentally responsible behaviour among faculty members.

The findings suggest that GHRM can promote EGB through the three components of the Ability-Motivation-Opportunity framework. Environmental training and awareness can strengthen employees' ability to act sustainably; recognition, feedback, and green-oriented appraisal can enhance motivation; and opportunities to join environmental programmes, committees, and decision-making can enable employees to practise green behaviour in their institutions.

However, the impact of GHRM should be interpreted carefully. When Social Identity Theory (SIT) was considered together with GHRM, SIT showed a stronger association with EGB, while the independent effect of overall GHRM(AMO) was not statistically significant. This indicates that employees' identification with their institution's green values, culture, and environmental reputation may shape green behaviour alongside formal GHRM practices.

Therefore, higher educational institutions in Garo Hills should integrate GHRM practices into their institutional sustainability efforts. Green recruitment, environmental training, rewards for sustainable action, employee participation, and clear communication of environmental goals may strengthen EGB. Equally, institutions should cultivate a shared green identity so that environmental responsibility becomes part of faculty members' everyday professional commitment.

Overall, the study offers preliminary evidence that GHRM has a positive impact on Employee Green Behaviour in the higher-education context of Garo Hills, Meghalaya. Because the findings are based on cross-sectional, self-reported data, the claimed impact should be understood as a measured statistical influence rather than definite proof of causation. Future research should use refined measures, stronger research designs, and broader data sources to assess the impact of GHRM on EGB more conclusively.

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Technical concepts and key subjects are indexed at their verified discussion pages.

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