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Enterprise Risk Management Effectiveness: Role of Job Embeddedness, Change Management Awareness and Ethical Climate

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ABSTRACT

This study examines the impact of job embeddedness and change management awareness on enterprise risk management (ERM) effectiveness. It also explores the mediating role of change management awareness and the moderating role of ethical climate in these relationships. Additionally, the study investigates industry differences between the service and production sectors using a multi-group analysis (MGA). A quantitative research design was adopted, collecting data from 236 respondents, 143 from the service industry and 93 from the production industry. Respondents were mid-to-senior level employees involved in risk management and organizational decision-making. A structured questionnaire using validated scales was administered, and data were analyzed using Smart-PLS 4.0 for PLS-SEM and multi-group analysis. The results indicate that awareness of change management and job embeddedness have a significant and positive effect on the effectiveness of ERM. Ethical environment, while moderating the relationships between work embeddedness and ERM effectiveness and change management awareness, mediates the relationship between job embeddedness and ERM effectiveness. The MGA results indicated substantial industry variations. Job embeddedness is particularly important in manufacturing, whereas knowledge of change management is more crucial to ERM success in services. This study contributes to ERM literature by integrating job embeddedness and change management awareness into risk management frameworks. It also highlights the role of ethical climate and industry differences, offering theoretical and practical insights for organizations aiming to enhance ERM effectiveness.

1. Introduction

ERM has also received immense focus in the corporate world where companies must promote resilience and sustainability amidst a fast-changing business climate. ERM is a systematic and official process of discovering, evaluating, and controlling risks that could affect the goals and long-term performance of an organization [1]. As compared to conventional risk management, which is usually conducted in silos, ERM combines risk management practices across all the functions of an organization for an integrated uncertainty management approach [2]. With the increasing

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complexity of international markets, compliance pressures, and technology disruption, organizations increasingly seek proactive risk management strategies to ensure stability and competitiveness [3]. Another significant issue influencing the performance of ERM is job embeddedness, which refers to the extent to which employees are bonded to their company by connections, fit, and sacrifices they would lose in the event of departure [4]. Embedded employees are more engaged in organizational processes, such as risk management programs, thereby enhancing the performance of ERM [5].

Change management awareness is also a crucial element that will determine the efficacy of risk management practices within organizations. As companies are always evolving as a result of technological advancement, globalization, and regulation, employees' awareness and adaptability towards change are essential to avoiding risks [6]. High change management awareness organizations create a culture in which employees anticipate, understand, and manage changing risks effectively, thereby strengthening ERM frameworks [7]. Moreover, ethical climate, which refers to the shared perceptions of ethical behavior within an organization, has been recognized as a critical moderator that affects employees' attitudes and behaviors towards risk management [8]. Strong ethical climate encourages trust, transparency, and accountability and ensures employees to make decisions as per ethical risk mitigation practices [9].

There have been wide-ranging studies on different factors affecting the effectiveness of ERM, such as organizational culture, leadership, and employee participation in affecting risk management [5]. Research indicates that organizations with robust ERM systems are more risk-resilient, make better decisions, and are financially healthier [10]. Empirical evidence reveals that enterprises integrating ERM as a component of strategic planning are well-placed to address risks and uncertainties effectively [11]. Specifically, research has demonstrated that employee participation in ERM remains a driving factor behind its effectiveness because committed staff actively participate in risk identification, their assessment, and response mechanisms [12]. This is consistent with research showing that job embeddedness generates perceptions of responsibility and commitment, which lead workers to conform to risk management procedures and aid in the implementation of risk-decreasing practices.

Change management awareness has also been studied extensively in organizational flexibility and risk mitigation. Studies indicate that staff possessing knowledge of change processes are more likely to embrace ERM activities because they recognize the need for proactive handling of risks in uncertain environments [11]. Empirical evidence suggests that change-knowledgeable organizations are more responsive in managing issues related to risk, ensuring long-term sustainability and business continuity [7]. In addition, evidence has proved a very good association between ethical climate and effectiveness in risk management since it has been observed that organizations with ethical leadership and open policy excel best in implementing risk reduction policies [13]. Empirical evidence has indicated that an ethical workplace improves responsible decision-making and decreased incidence of unethical actions that can sabotage ERM initiatives [14]. These results emphasize the value of job embeddedness, awareness of change management, and ethical climate in affecting the effectiveness of ERM, providing a foundation for further studies of their interdependencies.

Although a vast amount of literature discusses the effectiveness of ERM, there are still some gaps in research that need to be explored. Firstly, although studies affirm the role of employee participation in risk management, there is relatively less research focusing exclusively on the role played by job embeddedness in improving ERM performance [2]. The majority of research concentrates on conventional measures of engagement, i.e., organizational commitment and job satisfaction, ignoring the more profound, multidimensional construct of job embeddedness and its

possible effect on ERM effectiveness [8]. Since job embeddedness represents employees' connections, fit, and sacrifices, it is necessary to explore how these facets make contributions towards risk-aware behavior and adherence to ERM policies [15].

Second, whereas change management awareness has been researched within organizational flexibility, its mediating influence between ERM effectiveness and job embeddedness has yet to be examined extensively. Previous studies have mainly looked at change management as something addressed by leaders, without considering the role played by employees' awareness and readiness for change in their participation in ERM efforts [1]. Looking into this mediating process is capable of enabling enhanced comprehension of organizational effectiveness in ERM that is augmentable through the development of job embeddedness and change readiness of employees [2]. Besides, although ethical climate has been linked with numerous organizational outcomes, its moderation as an element that facilitates the interaction among job embeddedness, awareness of change management, and the efficiency of ERM is something that can be researched in greater detail [16]. Since ethical climate affects employees' fairness, trust, and transparency perceptions, investigating its moderating roles can uncover how organizations can establish ethical cultures to enable risk management engagement [17]. Bridging these gaps will enhance knowledge on what drives ERM effectiveness and provide practical suggestions to organizations that seek to improve their risk management culture.

2. Literature Review

The degree to which workers identify with their company and community and hence more or less likely to remain in their job is represented by job embeddedness. There are three its main components: links, fit, and sacrifice [3]. Formal as well as informal connections between workers and managers, coworkers, and the general organizational community are represented by links. Fit accounts for the values, career, and work climate congruence of an employee, whereas sacrifice accounts for perceived expense of exit from the employment, such as missed benefits, social relationships, and career growth opportunities [4]. Findings indicate job embeddedness having an important bearing on organizational commitment and turnover intent [18]. Highly embedded employees are expected to exhibit active behaviors that impact stability and workplace efficiency. The psychological bonding that embedded staff form can increase readiness to perform discretionary behaviors, which reinforce risk management practices, compliance with rules, and anticipatory problem-solving within an ERM system [10].

ERM success depends on a unified organizational culture in which employees actively spot, evaluate, and manage risks to guarantee sustainability and strategic resilience [1]. Employees that feel high levels of job embeddedness are likely to participate in ERM activities because they feel a strong sense of responsibility and organizational commitment [19]. Their established relationship within the company promotes collaboration and information sharing, which are important elements of efficient risk management. Additionally, embedded staff are less inclined to participate in high-risk behavior that would sabotage ERM procedures since they stand to lose more if organizational performance falters [2]. The feeling of personal investment in the business promotes a risk-aware culture where workers not only adhere to prevailing ERM measures but also actively seek out potential vulnerabilities [14]. Therefore, developing job embeddedness through leadership endorsement, career growth opportunities, and a robust workplace culture can go a long way in making the overall effectiveness of ERM programs more effective, so that risk management is not just a top-down initiative but an organizational effort [20].

Within organizational behavior, embeddedness of work has been a focus of investigation for its significance in influencing commitment, job performance, and turnover among employees.

Workers who experience strong company belonging feel less likely to leave and are likely to participate in voluntary behaviors that help the company [15]. This embeddedness is motivated by solid interpersonal relationships, congruence with organizational culture, and perceived sacrifices on account of leaving [4]. It has also been shown through research that embedded employees stabilize the workplace, ensure operational continuity, and manage risk through their deep-seated knowledge of organizational norms and expectations [20]. Furthermore, job embeddedness has been found to contribute to better organizational citizenship behaviors that are imperative to active risk management [19]. Given the reliance of effective ERM on active involvement in the recognition of, mitigating, and action on risks, embedded employees' commitment and future focus allow an atmosphere of being risk conscious and proactive risk management to always receive support [18].

With employee cooperation in the active identification and mitigation of risk depending on how well ERM can be used effectively, embeddedness in work assumes a focal point in such collaboration [20]. In such a perspective, employees whose job embeddedness is high tend to show improved levels of adhering to policies regarding ERM as well as their willingness to ensure risk management practices are respected as a matter of personal stakes in the fate of the firm [3]. Their good professional and social relationships in the organization create open communication channels, which enable information sharing for potential risks and vulnerabilities [4]. Embedded employees also have a lower inclination towards counterproductive work behaviors that can compromise ERM efforts since they understand the long-term impact of organizational failure on their own careers [15]. These empirical observations imply that job embeddedness promoted through strategic HR policies, leadership backing, and career development prospects can increase ERM effectiveness by ensuring that the workforce is devoted to and motivated about risk management processes.

H1: Job embeddedness has a significant impact on enterprise risk management effectiveness.

Awareness of change management has emerged as an imperative driver of organizational resilience and agility in times of uncertainty [2]. Research has shown that people with good change awareness possess a superior ability to predict danger and react appropriately, and such reactions guarantee company survival and durability [6]. Change management studies emphasize that when employees are notified of and prepared for organizational change, they are likely to be more receptive to risk management programs and comply with evolving policies [7]. Further, good training in change management has been said to increase the confidence of employees to manage disruptions, reduce resistance and encourage a proactive culture towards recognizing risks [3]. Empirical studies have further shown that institutions with a structured change management system are more effective at embedding ERM practice because workers are better placed to handle uncertainties and align their behavior with risk mitigation measures [14]. Since the success of ERM is subject to organizational flexibility, empirical evidence emphasizes the need to prepare employees with the appropriate awareness and skills to control change.

The effectiveness of ERM requires a culture in which the employees acknowledge the necessity for constant adjustment and preparedness for risk, so awareness of change management is a crucial element [8]. Staff members who comprehend change procedures will tend to regard risk management as a part of organizational development, not a mandatory regulatory requirement [12]. Empirical evidence indicates that change-conscious staff actively engage in the detection of emerging risks and, as such, help a dynamic ERM system that updates itself with internal and external risks [21]. Also, when an organization invests in change management training, the staff acquires a mindset of resilience and adaptability, improving their capacity to deal with risk-related contingencies [10]. These results suggest that developing change management awareness by training, leadership communication, and open decision-making processes can greatly enhance the effectiveness of ERM by having workers well-equipped to deal with uncertainties and actively

reduce risks.

H2: Change management awareness has a significant and positive impact on enterprise risk management effectiveness

Change management awareness has been identified as a key driver of employees' flexibility and active participation in organizational processes, such as risk management. Evidence shows that highly job-embedded workers tend towards organizational change due to perceiving long-term career progress in association with firm stability [22]. Empirical research has found workers who have better understanding of the processes of change tend to get aligned to the behaviors with the goals of organizations and thereby tend towards resilience as well as sensitivity towards threats [23]. In addition, employees embedded in change efforts will internalize efforts and make them a part of their habitual behaviors, thereby demonstrating increased commitment to ERM [24]. Additionally, empirical research highlights that organizations building change cultures with directed training programs and leadership support develop a culture where employees are involved in risk assessment and mitigation [25]. Therefore, the relationship between job embeddedness and change management awareness is essential in shaping employees' attitudes towards risk management, in support of the contention that change awareness can act as a mediating factor [7].

The concept behind the mediating role of change management awareness between ERM effectiveness and work embeddedness is that the more committed workers are, the more open to change they become and hence are more committed towards risk management activities [18]. When employees sense job embeddedness, they consider organizational change a chance rather than a threat and become more sensitized to ways in which the risk management culture evolves with differing business environments [19]. Such heightened sensitivity to change provides employees with a platform to internalize risk-cognizant behaviors into job routines, with the result of an effective ERM system [23]. Besides, organizations that are willing to invest in job embeddedness through career growth and leadership development can employ change management consciousness to bridge the gap between risk management and employee commitment [15]. Therefore, this mediation suggests that large change management awareness enhances the beneficial impact of job embeddedness on the performance of ERM so that laborers remain involved and sensitive to new threats.

H3: Change management awareness mediates the relationship between job embeddedness and ERM effectiveness

The ethical climate construct has received much emphasis in risk management and organizational behavior studies as a determinant of the ethical decision-making and compliance behaviors of employees [26]. According to empirical research, organizations that have a strong ethical climate encourage trust, accountability, and openness, which are essential for sound risk management [5]. Research also suggests that job embeddedness may not always translate to proactive risk management behavior on its own unless underpinned by a robust ethical work environment [27]. It has been found that staff in ethically healthy organizations tend to support policies, report unethical acts, and undertake risk-reducing activities [12]. Furthermore, ethical climate reinforces employees' intrinsic motivation for maintaining risk management practices since they view ethical behavior as an organizational collective responsibility [28]. This empirical fact points out that ethical climate has a significant role in influencing employees' attitudes and behaviors toward the effectiveness of ERM, thereby being a salient moderating factor in the relationship between job embeddedness and risk management outcomes [3].

The assumption that employees well embedded in an ethical organization are more likely to act in a risk-aware manner accounts for the intervening role of ethical environment on the relationship between job embeddedness and ERM effectiveness [4]. When there is an ethical climate,

employees realize more congruence between organizational commitment and ethical risk management practices, which enhances their involvement in ERM activities [2]. Alternatively, in weak ethical climates of organizations, embedded workers might give way to personal or departmental concerns rather than mutual risk avoidance and, in so doing, negate the effectiveness of ERM [11]. Additionally, ethical climate increases risk-related communication transparency, enabling workers to move with more clarity and confidence through risk management approaches [29]. Therefore, ethical climate is an important boundary condition that reinforces the positive effect of job embeddedness on ERM effectiveness to ensure that the organizational attachment of employees is translated into ethical and proactive risk management behavior.

H4: Ethical climate moderates the relationship between job embeddedness and ERM effectiveness

Ethical climate has been extensively researched as a determinant that affects employees' attitudes towards organizational change and readiness to accept transformation. Empirical evidence indicates that an ethical workplace promotes a culture of openness and equity, and this increases employees' trust in change [30]. It has been proven that workers in organizations with a high sense of ethical climate are inclined to view change as a strategic imperative rather than a dislocating force [26]. In addition, empirical research has revealed that job embeddedness may provoke resistance to change when workers perceive that changes jeopardize their job security or built-up relationships [31]. Nevertheless, ethical climate prevents such resistance through communication of change processes in an ethically clear and aligned manner with ethical decision-making [26]. Thus, such organizations can promote a better-supportive environment in which embedded employees are more willing to accept change and take active participation in change management awareness activities [19].

The moderating function of ethical climate in the association between job embeddedness and change management awareness stems from the fact that ethical workplaces increase employees' readiness to accept change [4]. Employees who are embedded in an organization with a robust ethical climate will be more inclined to see organizational changes as just and benevolent, hence having higher change management awareness [22]. Conversely, in weakly ethical climate organizations, embedded employees can resist change because of concerns about unethical choices or opacity in the transition process [27]. Ethical climate also enables ethical leadership, which is essential in leading employees through change and emphasizing alignment of organizational changes with ethical principles [12]. Consequently, ethical climate enhances the positive influence of job embeddedness on change management awareness through strengthening trust, mitigating uncertainty, and maintaining workers' participation in change-oriented learning and adaptation exercises.

H5: Ethical climate moderates the relationship between job embeddedness and change management awareness

2.1 Theoretical Framework Supporting the Research

The theoretical foundation for accounting for the relationships within this research derives from Conservation of Resources (COR) Theory and Institutional Theory. COR Theory, as developed by [32], suggests that individuals will try to acquire, maintain, and protect resources like job security, organizational support, and career membership. Job embeddedness is a valuable asset that gives employees higher levels of safety and belonging feelings and prompts them to embrace behaviors helpful for organizational sustainability, such as investment in ERM effectiveness. Employees are most likely to exert effort toward risk management activities, particularly when empowered by an ethical climate that stresses ethical decision making and transparency [2]. Furthermore,

Institutional Theory [33] illustrates how organizational norms, policies, and change management awareness shape the behavior of employees towards risk management. Organizations that formalize change management systems develop institutionalized risk-mitigation practices so that employees are properly equipped to address uncertainties and are involved in ERM [10]. Ethical climate acts as a moderator that increases the relationship between employees' embeddedness and their responsiveness to organizational change, imposing compliance with risk management processes and creating an organizational culture for proactive risk mitigation [29]. These theoretical frames are shown in Figure 1, which is a graphical illustration of the supposed relationships between job embeddedness, change management sensitivity, ethical climate, and effectiveness of ERM. The model identifies change management awareness as the mediating variable that connects job embeddedness and ERM effectiveness, and that ethical climate acts to moderate the inter-relationships among job embeddedness, change management awareness, and ERM effectiveness. The model integrates a full and complete understanding of the ways in which employees' organizational attachment, ethical work environment, and change preparedness all drive effective risk management.

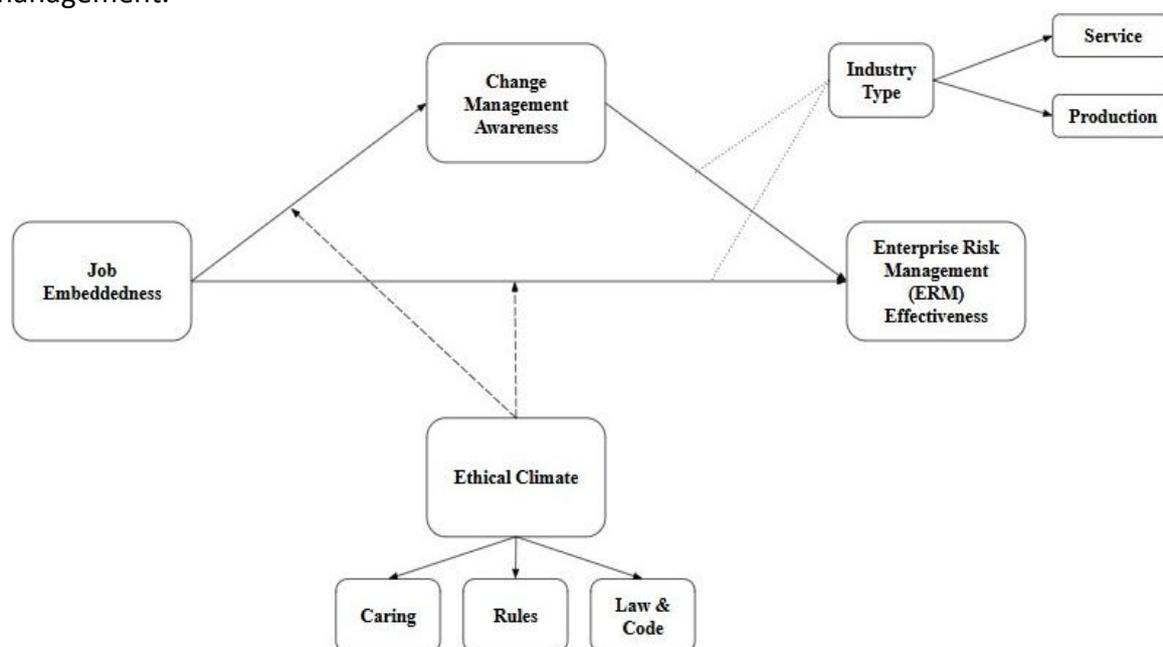


Fig.1. Conceptual Framework

3. Methodology

This research utilises a quantitative research design to examine the influence of job embeddedness, awareness of change management, and ethical climate on the effectiveness of ERM. The study was carried out in two different industrial sectors, namely the service sector and the manufacturing sector. Responses amounting to 236 were gathered, out of which 143 subjects belonged to the service sector and 93 to the manufacturing sector. The participants included senior-level and mid-level personnel directly engaged in risk management processes, organizational change management, and ethical decision-making in their organizations. They were chosen because they were actively participating in ERM practice, sharing significant insights regarding the organizational influences on risk management effectiveness. The research used a purposive sampling method to make sure that only staff with the right experience in risk management and organizational activities were selected.

To operationalize the key constructs, validated scales from existing literature were used, guaranteeing reliability and validity of the measurement items. Items that measured job

embeddedness, change management awareness, ethical climate, and ERM effectiveness were included in the questionnaire. The study incorporates four key variables, each measured using established scales from prior research. Change Management Awareness is assessed using five items adapted from [6]. Enterprise Risk Management (ERM) Effectiveness is measured with seven items derived from the work of [34]. To evaluate the Ethical Climate, a 14-item scale developed by [35] is employed. Lastly, Job Embeddedness is measured using a seven-item scale introduced by [36]. These validated instruments ensure the reliability and comprehensiveness of the constructs under investigation.

Partial least squares structural equation modeling (PLS-SEM) was carried out on the data with the assistance of Smart-PLS 4.0. Being the most suitable for complex causal relations, particularly for studies entailing latent variables, it was opted for. PLS-SEM provides helpful insights on factor loadings, validity, reliability, and path relationships through evaluation of the measurement model and structural model together. Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) were used for validity and reliability measurement. Discriminant validity was checked to ensure that the constructs were not quite similar to one another by using the Heterotrait-Monotrait (HTMT) criteria. Explanatory power and predictability of the suggested model were examined with model fit statistics like R-square and Q-square values. In order to investigate in greater detail the structural relationships between the service and production sectors and to determine sectoral differences in the impact of ethical environment, change management awareness, and job embeddedness on ERM effectiveness, a multi-group analysis (MGA) was performed.

4. Results

Table 1, Figure 2 and Figure 3 shows reliability and validity tests of the measures applied in this study, including measurement consistency, convergent validity. The outer loadings, Cronbach's Alpha (α), Composite Reliability (CR), and Average Variance Extracted (AVE) are recorded for two business sectors: Production and Service. In the case of the Production industry, constructs are found with high reliability and validity. The Caring construct shows outer loadings between 0.793 and 0.904, a Cronbach's Alpha of 0.903, CR of 0.928, and AVE of 0.722, representing high internal consistency and construct validity. Change Management Awareness also displays good reliability ($\alpha = 0.875$, CR = 0.909) and convergent validity (AVE = 0.667), and all outer loadings are higher than the threshold of 0.4. ERM Effectiveness has satisfactory reliability ($\alpha = 0.901$, CR = 0.922) and validity (AVE = 0.627), with loadings between 0.730 and 0.822. The Job Embeddedness construct also demonstrates adequate internal consistency ($\alpha = 0.899$, CR = 0.921), with an AVE of 0.626, although JE1 has the lowest outer loading (0.681), still higher than 0.4. Law & Code ($\alpha = 0.868$, CR = 0.905, AVE = 0.655) and Rules ($\alpha = 0.758$, CR = 0.848, AVE = 0.586) are two constructs that are well-measured. Rules' only notable weak outer loading is for R4 (0.613), yet since it passes the 0.4 benchmark, it is acceptable. In the Service industry, findings equally reflect high reliability and validity. Caring shows high internal consistency ($\alpha = 0.918$, CR = 0.939, AVE = 0.754), with outer loadings ranging from 0.837 to 0.905. Change Management Readiness ($\alpha = 0.859$, CR = 0.898, AVE = 0.640) is highly valid, though CMA2 (0.709) is lowest loading indicator. ERM Effectiveness is highly reliable ($\alpha = 0.888$, CR = 0.912), but with somewhat lower AVE (0.598). The lowest loaded is ERME7 (0.679), which is still in the acceptable interval. Job embeddedness ($\alpha = 0.909$, CR = 0.928, AVE = 0.650) validates its quality of measurement, with loadings ranging from 0.705 to 0.887. Law & Code ($\alpha = 0.903$, CR = 0.928, AVE = 0.720) is reliable, while Rules is moderately reliable ($\alpha = 0.729$, CR = 0.834, AVE = 0.565), with R4 recording the lowest outer loading value of 0.488, but above the 0.4 value. All the constructs have been validated, ensuring that the measurement model is robust.

Table 1
 Variables reliability and validity

Industry Type	Variables	Items	Outer Loading	Cronbach's Alpha	CR	AVE
Production	Caring	C1	0.891	0.903	0.928	0.722
		C2	0.829			
		C3	0.904			
		C4	0.825			
		C5	0.793			
	Change Management Awareness	CMA1	0.806	0.875	0.909	0.667
		CMA2	0.783			
		CMA3	0.816			
		CMA4	0.837			
		CMA5	0.841			
	Enterprise Risk Management (ERM) Effectiveness	ERME1	0.819	0.901	0.922	0.627
		ERME2	0.814			
		ERME3	0.792			
		ERME4	0.785			
		ERME5	0.775			
		ERME6	0.822			
		ERME7	0.730			
	Job Embeddedness	JE1	0.681	0.899	0.921	0.626
		JE2	0.832			
		JE3	0.805			
		JE4	0.850			
		JE5	0.816			
		JE6	0.790			
		JE7	0.751			
	Law & Code	LC1	0.798	0.868	0.905	0.655
LC2		0.800				
LC3		0.853				
LC4		0.766				
LC5		0.829				
Rules	R1	0.859	0.758	0.848	0.586	
	R2	0.777				
	R3	0.792				
	R4	0.613				
Service	Caring	C1	0.872	0.918	0.939	0.754
		C2	0.840			
		C3	0.905			
		C4	0.837			
		C5	0.885			
	Change Management Readiness	CMA1	0.744	0.859	0.898	0.640
		CMA2	0.709			
		CMA3	0.840			
		CMA4	0.848			
		CMA5	0.849			
	Enterprise Risk Management (ERM) Effectiveness	ERME1	0.806	0.888	0.912	0.598
		ERME2	0.793			
		ERME3	0.808			
		ERME4	0.799			
		ERME5	0.784			
		ERME6	0.736			
		ERME7	0.679			
	Job Embeddedness	JE1	0.705	0.909	0.928	0.650
		JE2	0.852			
		JE3	0.806			
		JE4	0.887			
		JE5	0.808			
		JE6	0.784			
		JE7	0.790			
	Law & Code	LC1	0.831	0.903	0.928	0.720
LC2		0.861				
LC3		0.857				
LC4		0.834				
LC5		0.859				
Rules	R1	0.853	0.729	0.834	0.565	
	R2	0.787				
	R3	0.823				
	R4	0.488				

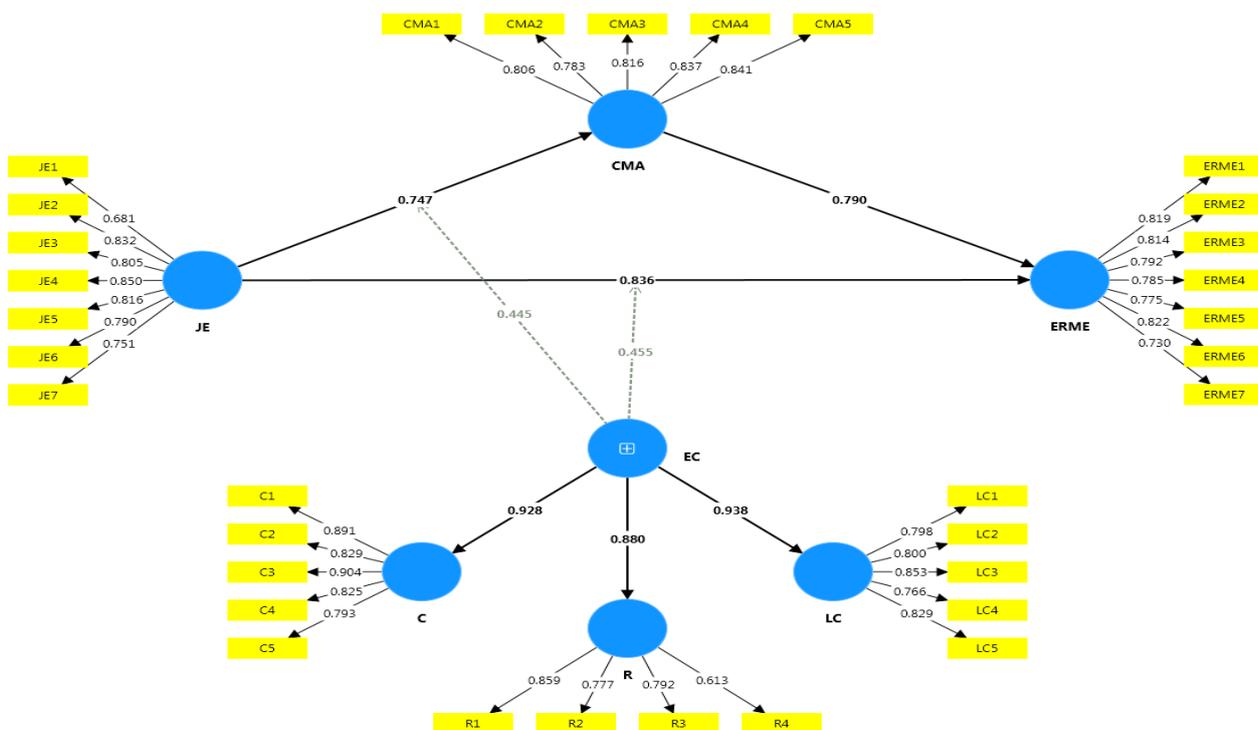


Fig.2. Estimated Model of Production

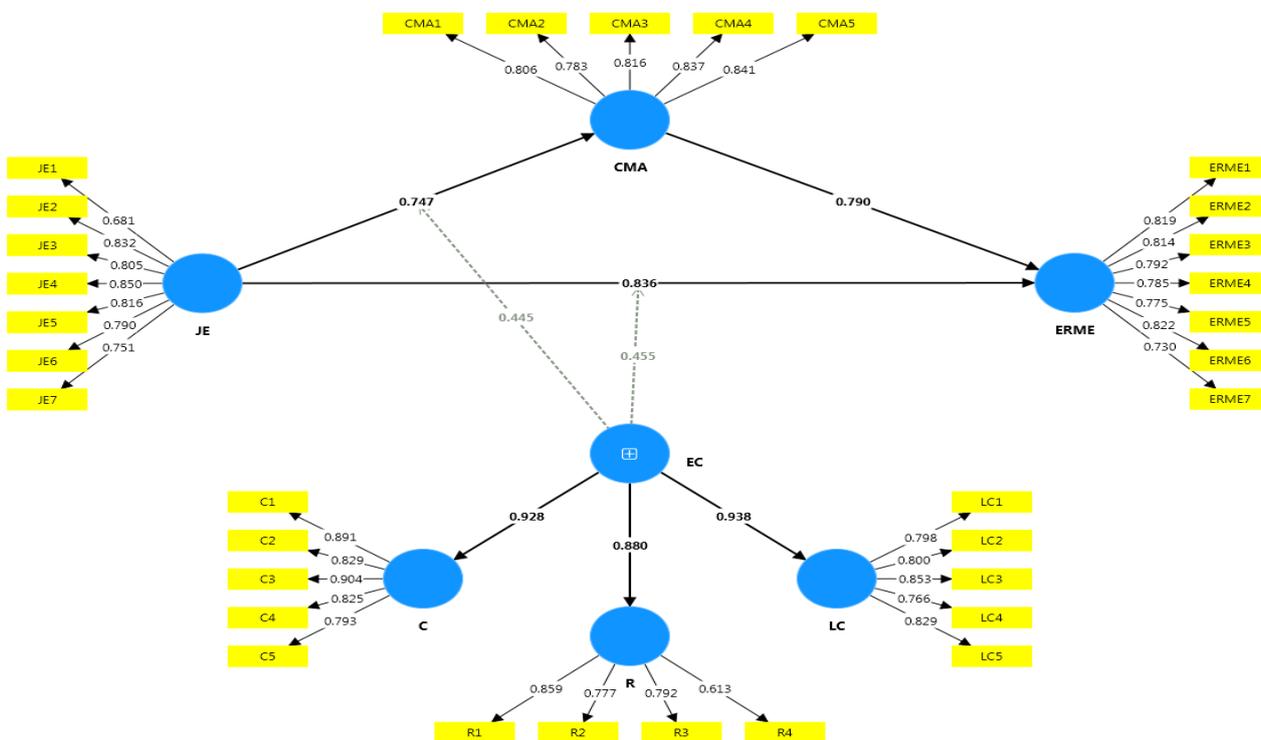


Fig.3. Estimated Model of Services

Table 2 shows the discriminant validity test based on the Heterotrait-Monotrait (HTMT) criterion, which tests the uniqueness of each construct. Discriminant validity is established when HTMT values are below the 0.85 threshold. In the Production sector, the majority of constructs show good discriminant validity. The HTMT measures between Caring and Change Management Awareness (0.723), Caring and ERM Effectiveness (0.724), and Caring and Job Embeddedness (0.759) all suggest that these variables are different. But the HTMT value for Rules and Caring (0.856) just surpasses the threshold, suggesting overlap between these two constructs. The same

can be said of Change Management Awareness and ERM Effectiveness (0.839), which are very close to the 0.85 cut-off, representing a strong but nevertheless different relationship. Others like Law & Code and Rules (0.558) are all within tolerable limits, substantiating their concept uniqueness.

For the Service sector, the same trends are witnessed. Caring and Change Management Awareness (0.691) and Caring and ERM Effectiveness (0.674) show clear distinctions. Rules and Caring (0.842) are close to the upper limit, indicating that there could be a possibility of overlap. Change Management Awareness and ERM Effectiveness (0.850) are on the verge of the suggested limit, pointing towards a high correlation but within an acceptable limit. The HTMT value for Law & Code and Rules (0.841) is also high and needs to be further examined. Apart from these borderline cases, most constructs have sufficient discriminant validity, validating the structural model.

Table 2
 Discriminant Validity (HTMT)

Industry Type	Variables	C	CMA	ERME	JE	LC	R
Production	Caring						
	Change Management Awareness	0.723					
	Enterprise Risk Management (ERM) Effectiveness	0.724	0.839				
	Job Embeddedness	0.759	0.834	0.822			
	Law & Code	0.848	0.618	0.672	0.680		
Service	Rules	0.856	0.822	0.819	0.563	0.558	
	Caring						
	Change Management Awareness	0.691					
	Enterprise Risk Management (ERM) Effectiveness	0.674	0.850				
	Job Embeddedness	0.602	0.711	0.772			
Law & Code		0.831	0.635	0.675	0.578		
	Rules	0.842	0.808	0.742	0.710	0.841	

Table 3 presents the R-square (R^2), adjusted R-square, Q^2 , and Standardized Root Mean Square Residual (SRMR) statistics to assess explanatory power and model fit. R^2 statistics represent the percentage of variance explained by independent variables, whereas Q^2 statistics measure predictive relevance. A value of SRMR less than 0.08 suggests a good model fit. For the Production industry, Change Management Awareness has an R^2 of 0.613, signifying that 61.3% of its variance is accounted for by predictors. The adjusted R^2 of 0.600 indicates little overfitting, and the Q^2 value of 0.534 validates high predictive relevance. ERM Effectiveness comes with a high R^2 of 0.767, implying 76.7% of its variance explained by independent variables, with an adjusted R^2 of 0.757. The Q^2 value of 0.636 also validates the predictive power of the model. The SRMR value of 0.067 is less than 0.08, establishing a well-fitting model. For the Service sector, Change Management Awareness has an R^2 of 0.529, indicating that 52.9% of its variance is accounted for by the predictors. The adjusted R^2 of 0.519 indicates high predictive power, and the Q^2 value of 0.449 shows good predictive accuracy. ERM Effectiveness measures 0.679 for R^2 , indicating that 67.9% of its variance is captured with an adjusted R^2 of 0.670. The Q^2 of 0.509 is also indicative of predictive relevance. Nevertheless, an SRMR of 0.083 is just above the 0.08 threshold required, indicating that small model adjustments might enhance fit.

Table 3
 R-square statistics Model Goodness of Fit Statistics

		R-square	R-square adjusted	Q2	SRMR
Production	Change Management Awareness	0.613	0.600	0.534	0.067
	Enterprise Risk Management (ERM) Effectiveness	0.767	0.757	0.636	
Service	Change Management Awareness	0.529	0.519	0.449	0.083
	Enterprise Risk Management (ERM) Effectiveness	0.679	0.670	0.509	

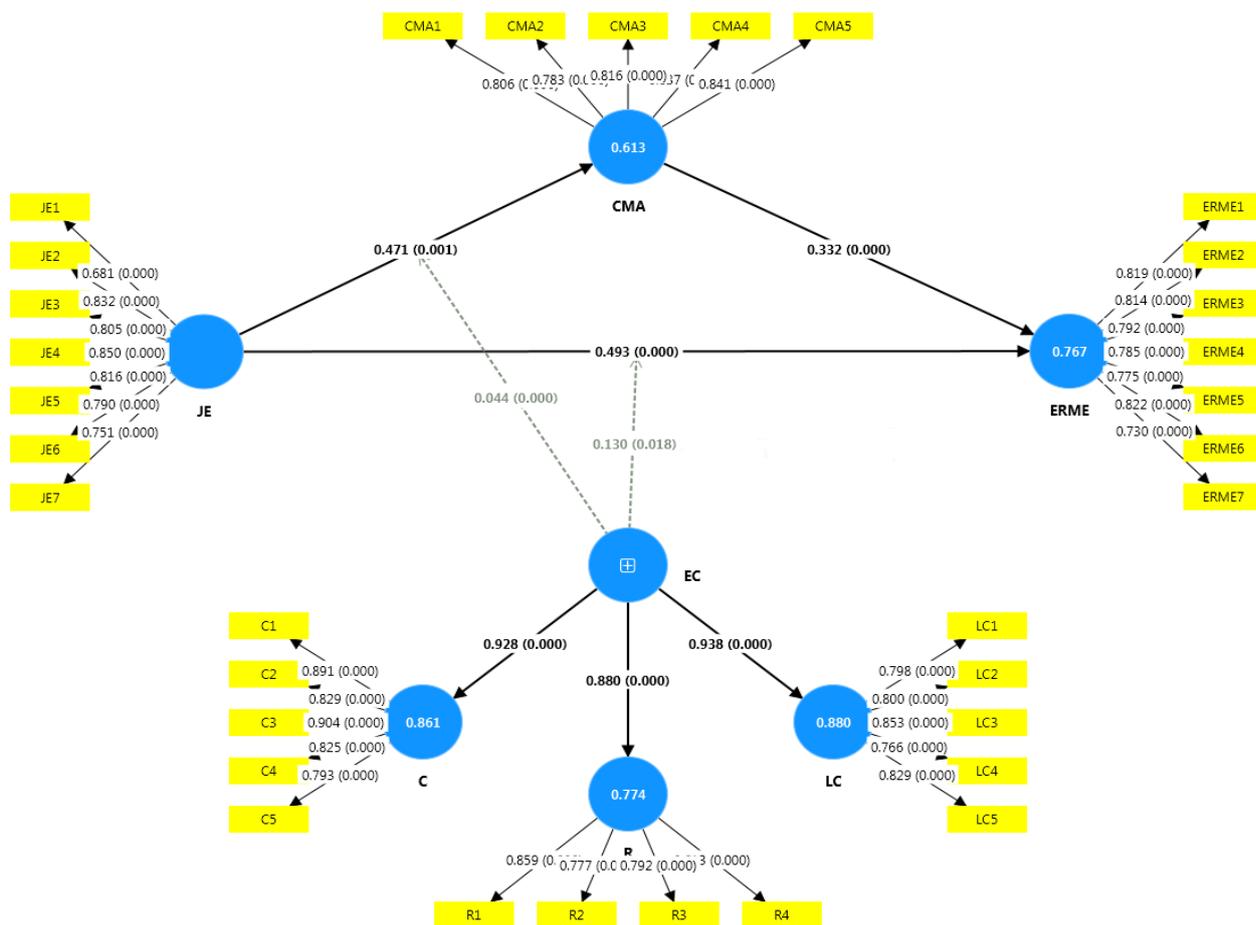


Fig.4. Structural Model for Path Analysis of Production

The findings in Table 4, Figure 4 and Figure 5 show the effect of job embeddedness, change management awareness, and ethical climate on ERM effectiveness in the production and service sectors. Job embeddedness in the production sector reveals a significant positive impact on the effectiveness of ERM ($\beta = 0.493$, $t = 4.999$, $p = 0.000$), revealing that highly embedded employees make greater contributions to risk management activities. Furthermore, awareness of change management is also important for enhancing the effectiveness of ERM ($\beta = 0.332$, $t = 3.509$, $p = 0.000$), indicating that readiness and adaptability of employees towards change help the organization respond to risks more effectively. Such findings support prior literature emphasizing the role of organizational commitment and change preparedness in facilitating effective risk management practice. In addition, the findings demonstrate that change management awareness acts as a mediator for the relationship between job embeddedness and ERM effectiveness ($\beta = 0.156$, $t = 2.533$, $p = 0.006$), signifying that the more employees perceive themselves to be embedded in their jobs, the more they would be aware of change management practices, which enhance ERM effectiveness. Ethical climate also has a moderating effect on such relationships. It significantly reinforces the effect of job embeddedness on ERM effectiveness ($\beta = 0.130$, $t = 2.543$, $p = 0.018$), supporting the notion that high ethical culture in a company reinforces employees' role in risk management. Also, ethical climate mediates the association between job embeddedness and awareness of change management ($\beta = 0.044$, $t = 4.412$, $p = 0.000$), so in firms with a robust ethical climate, workers are more apt to be involved in change management activities, further enhancing ERM performance. In the service industry, job embeddedness also has a significant positive impact on ERM effectiveness ($\beta = 0.298$, $t = 3.297$, $p = 0.000$), but the effect is slightly weaker than in

production. This difference suggests that while job embeddedness remains important, service-based organizations may rely more on other factors such as customer interactions and regulatory compliance to drive ERM effectiveness. Notably, awareness of change management contributes even more significantly to the effectiveness of ERM in the service sector ($\beta = 0.471$, $t = 5.235$, $p = 0.000$), reflecting that flexibility towards change is especially important in service organizations where changing market conditions and evolving customer demands necessitate ongoing adjustments.

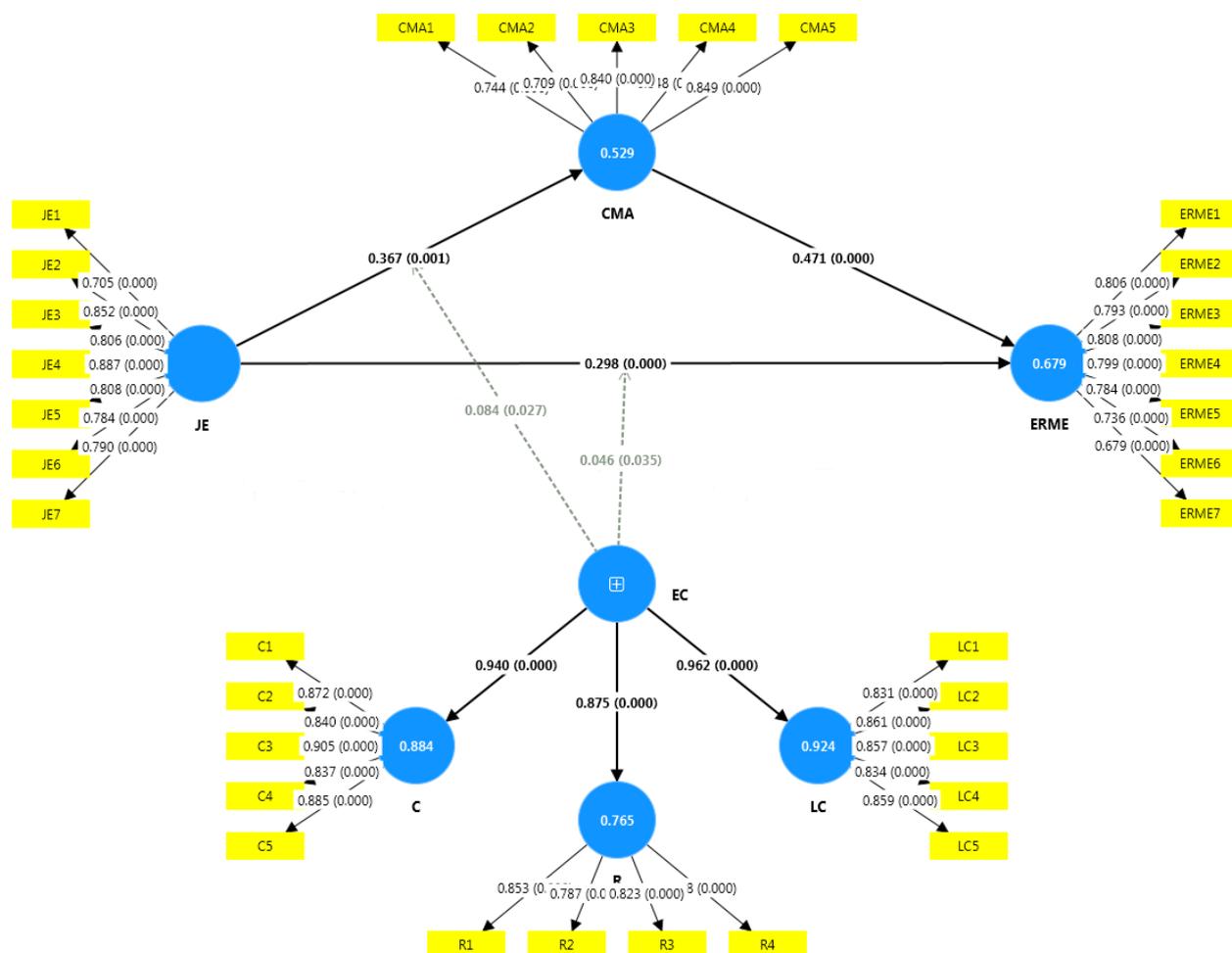


Fig.5. Structural Model for Path Analysis of Services

The change management awareness mediation effect is also established in the service sector ($\beta = 0.173$, $t = 2.536$, $p = 0.006$), further affirming its position in connecting job embeddedness with ERM effectiveness. Ethical climate is still an important moderator for both sectors, although its effects on the path between job embeddedness and effectiveness of ERM are slightly more modest in services ($\beta = 0.046$, $t = 2.145$, $p = 0.035$). Also, the moderating role of ethical climate in the effect of job embeddedness on change management awareness is supported ($\beta = 0.084$, $t = 1.956$, $p = 0.027$), albeit with a less significant effect than in the case of production. These findings stress that ethical corporate culture boosts employees' capability to adopt change management practices, eventually producing better outcomes in terms of risk management. Overall, the results highlight the significance of job embeddedness, change management awareness, and ethical climate in determining the effectiveness of ERM, with differing levels of influence across various industry sectors.

Table 4
 Path Analysis

		β	S.E	t	p
Production	Job embeddedness has a significant and positive impact on ERM effectiveness	0.493	0.099	4.999	0.000
	Change management awareness has a significant and positive impact on ERM effectiveness	0.332	0.094	3.509	0.000
	Change management awareness mediates the relationship between job embeddedness and ERM effectiveness	0.156	0.062	2.533	0.006
	Ethical climate moderates the relationship between job embeddedness and ERM effectiveness	0.130	0.052	2.543	0.018
	Ethical climate moderates the relationship between job embeddedness and change management awareness	0.044	0.009	4.412	0.000
Service	Job embeddedness has a significant and positive impact on ERM effectiveness	0.298	0.090	3.297	0.000
	Change management awareness has a significant and positive impact on ERM effectiveness	0.471	0.090	5.235	0.000
	Change management awareness mediates the relationship between job embeddedness and ERM effectiveness	0.173	0.068	2.536	0.006
	Ethical climate moderates the relationship between job embeddedness and ERM effectiveness	0.046	0.021	2.145	0.035
	Ethical climate moderates the relationship between job embeddedness and change management awareness	0.084	0.042	1.956	0.027

The results of the multigroup analysis (MGA) shown in Table 5 compare the structural relationships between job embeddedness, change management awareness, ethical climate, and ERM effectiveness in the production and service sectors. The results show that there are significant differences for some relationships and identical consistency in others between both sectors. The effect of job embeddedness on the effectiveness of ERM varies considerably between manufacturing ($\beta = 0.493$) and service ($\beta = 0.298$) sectors, with a p-value of 0.015, indicating that workers' embeddedness in an organization has a greater influence on the effectiveness of ERM in manufacturing environments. This could be because of the formal structure of production-based jobs, in which high commitment from employees and high organizational embeddedness play a greater role in risk management practices. Likewise, the impact of change management sensitivity on the effectiveness of ERM also reflects a highly significant difference ($p = 0.041$) between the two sectors. Though it is a strong predictor in both scenarios, the effect is greater in the service sector ($\beta = 0.471$) than production ($\beta = 0.332$). This implies that awareness of change management practices and adaptability are most important in service-based organizations, where changing customer needs and operational flexibility demand that employees be more responsive to changes. As compared to production, in which risk management efficacy is more determined by structural processes, service industries depend on the responsiveness and adaptability of employees to changes, hence making awareness in change management more essential.

Conversely, the mediating effect of change management awareness between job embeddedness and ERM effectiveness is not significantly different between the two industries ($p = 0.612$). This suggests that in both production and service industries, job embeddedness is a factor in ERM effectiveness through increased change management awareness, and this channel is consistent irrespective of industry type. More embedded employees tend to be more committed to change management efforts, and hence favorably impact ERM, irrespective of whether they are employed in a formal manufacturing environment or a fluid service culture. As for the moderating role of ethical climate, there is a statistically significant difference between its influence on the interaction between job embeddedness and ERM effectiveness ($p = 0.032$). In the manufacturing sector ($\beta = 0.130$), ethical climate has a greater effect than in the service sector ($\beta = 0.046$),

indicating that in formalized settings, ethical values and norms are more influential in determining the extent to which job-embedded employees contribute to ERM. Yet, upon comparison of ethical climate as a moderator between embeddedness and change awareness of management, there is no difference ($p = 0.278$) and therefore neither industry consistently builds the connection between embeddedness and change awareness of management with or without ethical climate. This then suggests that even though ethical climate reinforces the effect of ERM more in the production industry, its function towards reinforcing change awareness of management does not differ in industries. In general, the research emphasizes how industry-related characteristics determine the interlinks among job embeddedness, change management, ethical climate, and ERM effectiveness.

Table 5
Multigroup Analysis

	Production (β)	Service (β)	p-value (MGA)	Significance
Job embeddedness has a significant and positive impact on ERM effectiveness	0.493	0.298	0.015	Significant Difference
Change management awareness has a significant and positive impact on ERM effectiveness	0.332	0.471	0.041	Significant Difference
Change management awareness mediates the relationship between job embeddedness and ERM effectiveness	0.156	0.173	0.612	No Significant Difference
Ethical climate moderates the relationship between job embeddedness and ERM effectiveness	0.130	0.046	0.032	Significant Difference
Ethical climate moderates the relationship between job embeddedness and change management awareness	0.044	0.084	0.278	No Significant Difference

5. Discussion

Successful ERM is not a standalone function but a two-way dynamic between a number of organizational drivers such as job embeddedness, change management sensitivity, and moral climate. As organizations are faced more and more with sophisticated risk profiles, employee engagement, change adaptability, and moral consciousness built into the process of ERM become resilience and sustainability drivers in the long run. This study teaches us how such factors individually and collectively drive the efficacy of ERM controls. Job embeddedness acts as an anchor, connecting employees with work, thereby stabilizing and steadying the course, critical when making risk decisions. In contrast, awareness in change management gives organizations greater preparedness for forecasting, responding, and dampening emerging threats through the employee base by bestowing flexibility. Moreover, ethical climate provides a framework for direction that guarantees risk-related choices are responsibly and ethically made. This analysis explores the importance of each of these associations, the mediating and moderating roles they serve, and how their effect varies by industry sector. Through the analysis of these dynamics, this study provides further insight on what is driving the success of ERM and presents data on how organizations can strategically harness these drivers to conduct risk management more effectively.

The findings for H1, which indicate that job embeddedness is a significant and positive predictor of ERM effectiveness, provide the empirical basis for this relationship. Employees who are highly embedded in their firms are likely to exhibit greater responsibility and commitment, which manifests in more positive risk management process activity [31]. The more significant effect of job embeddedness in the manufacturing sector indicates that within formal, process-oriented settings, workers with stronger organizational attachments are more likely to comply with risk procedures, observe compliance guidelines, and take an active role in risk prevention measures. Conversely, although job embeddedness is also a substantial predictor in the services industry, its strength seems comparatively lower, perhaps because service-based jobs are more dynamic and customer

facing in nature and therefore more influenced by flexibility and change management sensitivity in risk management [11]. These results support previous studies that highlighted the importance of employees being more embedded in an organization in that they establish a sense of belonging and psychological ownership, and thus are more responsible for the long-term viability of the organization and the effectiveness of its risk management [2]. This supports the argument that organizations looking to bolster ERM should invest in strategies that enhance job embeddedness, including building organizational support, career development activities, and a sense of inclusivity and participation.

For H2, which discussed how awareness of change management affects the effectiveness of ERM, the research supports the fact that employees with higher awareness of change management processes support risk management programs more effectively. Awareness of change management allows employees to be able to foresee, respond to, and neutralize possible threats arising from organizational change, regulation, and market volatility [14]. The findings indicate that though this connection holds in the service and production sectors, awareness of change management has a stronger hold in service-based organizations. This may be because the service industry is highly dynamic, with workers often encountering fluctuating customer needs, changing market requirements, and ongoing technological evolution, all which require an emphasis on change management to enable them to handle risks effectively [5]. Conversely, although still very much in the production environment, awareness of change management can be a shade less crucial than structural procedures and risk management approaches motivated by compliance. This conclusion is in line with existing literature indicating organizations that have good change management systems in place enable employees to better manage risks, cut down on resistance to change, and develop the risk management practice culture of continuous improvement [8]. Therefore, organizations need to emphasize training programs, leadership, and communication strategies that improve the knowledge of change management principles among the employees to enhance ERM effectiveness.

H3 findings, that change management awareness mediates between job embeddedness and the effectiveness of ERM, support the fact that workers who are strongly embedded in organizations are likely to adopt and internalize change management processes, and this boosts the effectiveness of ERM. This mediation effect implies that although job embeddedness provides a basis of commitment and stability, it is the employees' knowledge and awareness of change management that allow them to successfully convert this commitment into proactive risk management practices [12]. In the production and service sectors, employees who are aware of the significance of change management are more capable of foreseeing risks related to organizational changes, regulatory changes, and market changes. But this mediating effect seems to be more pronounced in service-based organizations, where ongoing adaptation and responsiveness to change are of the essence [24]. This is in line with earlier research, which points out that organizations that develop both job embeddedness and change management awareness develop a workforce that is not just loyal and committed but also agile and proactive in managing risks [22]. Thus, the cultivation of change management awareness through focused training, leadership involvement, and open communication can further increase the beneficial impact of job embeddedness on ERM effectiveness.

For H4, which tested the moderating effect of ethical climate on the relationship between job embeddedness and ERM effectiveness, the results indicate that an organization's ethical climate has a significant impact on how job-embedded employees engage in risk management processes [26]. A robust ethical climate creates a culture of accountability, integrity, and ethical decision-making, which increases the chances that employees who perceive themselves as embedded in the

organization will engage in ERM practices. Within the manufacturing sector, where process adherence and rule-following are more salient, an established ethical culture seems to support the beneficial influence of job embeddedness on ERM effectiveness such that employees follow ethical guidelines in risk-relevant decision-making [8]. In the service sector, though the moderating role of ethical climate is also strong, its magnitude is relatively weaker, probably because of the more adaptive and customer-oriented character of service-type jobs, in which risk control can encompass a wider array of situational and interpersonal variables [10]. These results corroborate earlier work highlighting the primacy of ethical culture in framing employees' perceptions of risk, compliance, and accountability. Organizations who want to optimize ERM efficiency should thus foster a robust ethical culture through the adoption of explicit ethical codes, ensuring openness, and developing a leadership culture that emphasizes ethical decision-making.

The results for H5, testing whether ethical climate moderates change management awareness-work embeddedness relationship, show that ethical climate tends to strengthen this relationship but its impact is not consistent across industries. Employees see efforts in that direction as critical to the long-term success and moral foundation of the organization, they deeply rooted in a company with a sound ethical climate will be more inclined to accept change management practices [29]. In the manufacturing sector, the effect of ethical climate on such a relationship seems to be less strong, possibly because of the formalized and compliance-oriented environments of manufacturing that change management processes may already be significantly articulated and are less subject to ethical influences. In service organizations, however, ethical climate has a stronger influence on how rooted employees view and respond to change management efforts [27]. Because service industries tend to ask their employees to work through intricate interpersonal relationships and changing customer demands, an ethical work environment gives them a foundation that ensures trust, justice, and receptiveness to change [28].

MGA results indicate dramatic differences in how job embeddedness, change management awareness, and ethical climate influence ERM effectiveness across production and service organizations. Specifically, job embeddedness plays a more important role in ERM effectiveness in production organizations, where procedural processes, employee commitment, and monitoring risk management processes are of greatest concern [15]. Conversely, in services, management awareness of change plays a greater role in ERM effectiveness, possibly due to the dynamism of service delivery, customer interaction, and the need for continuous adaptation. Also, the moderating effect of ethical climate on the job embeddedness and effectiveness relationship of ERM is greater in production environments, substantiating the argument that ethical guidelines are especially critical in sectors where there are rules and procedures that must be adhered to [5]. There were no differences by industry, however, in testing the moderating role of ethical environment in change management awareness and work embeddedness, implying that ethical climate across all industries supports employees' change management capability [3]. Such outcomes highlight the requirement for industry-centric approaches in fostering risk management culture, whereas production companies have to focus more on job embeddedness and normative reinforcement, service companies are likely to get more mileage through raising change management consciousness to augment ERM impact.

6. Implications

By expanding the boundaries of ERM effectiveness through the use of work embeddedness, change management awareness, and ethical climate, this study significantly advances theoretical knowledge. To advance existing theory and add the influence of employee-centered variables on shaping risk management processes, this study employs methods from organizational behavior, risk

management, and ethical decision-making. The results concur with the Conservation of Resources (COR) Theory, which suggests that people work to preserve and acquire valuable resources, such as job security and organizational support, and thereby translate into their commitment to risk management programs. Embeddedness at work, as theorized in this study, is consistent with COR because it demonstrates that employees who feel a high level of identification with their firm are bound to exhibit behaviors promoting effective ERM implementation. The research also adds to Change Management Theory because it explains how awareness and readiness play a pivotal role in allowing companies to handle risks and uncertainties. The mediating effect of change management awareness proposes that organizations need to develop a responsive workforce in order to maintain ERM performance in the face of changing challenges. Furthermore, the moderating function of ethical environment validates the applicability of the theory of ethical climate, in other words, that organizational decisions and employees' ethical risk management practices are shaped by common norms and values. With an emphasis on ethical considerations as being more than compliance-oriented but as a fundamental aspect of risk-related decision-making, the study adds to the literature by making ethical climate an environmental factor that strengthens the relationship between job embeddedness and ERM effectiveness. The multi-group analysis also contributes to Contingency Theory by showing that the efficacy of the relationships differs by industry, supplementing the idea that organizational strategies need to be context-dependent as opposed to having a one-size-fits-all approach. Through this integration of theoretical views, this research fills gaps in current literature and offers a broader framework for understanding how employee-based factors lead to ERM effectiveness. Future studies can extend these theoretical findings by investigating other boundary conditions and contextual factors that further influence the efficacy of risk management policies in various organizational contexts.

The conclusions of this study have serious practical implications for organizations wanting to maximize the effectiveness of their ERM systems. Firstly, the important role of job embeddedness in promoting ERM effectiveness implies that organizations need to pay attention to promoting greater employee attachment through career opportunities, organizational stability, and extensive social networks in the organization. Whereas employees experience belonging in the work setting, there is high probability that they will be proactively involved in recognizing and lessening risks to improve ERM processes. Second, the mediation function of awareness on change further underlines organizations to spend funds on in-depth training sessions as well as inner communications to orient staff to transform changing risks. By cultivating adaptability and awareness as a culture, companies can make sure that all levels of employees are prepared to contribute to risk-effective practices of management. Ethical climate's moderating effect again underlines the need to integrate ethical values in organizational decision-making processes. Companies must actively encourage integrity, accountability, and ethical leadership because these qualities increase workers' intention to exhibit risk-sensitive behaviors. The multi-group analysis also shows that the validity of these relationships differs by industry, which emphasizes that risk management must be tailored by industry. Production companies might need to emphasize structural and procedural reinforcement, whereas service organizations must emphasize building a risk-aware culture through commitment and ethical leadership. By incorporating these findings into policymaking and strategic planning, organizations will be in a position to improve their ERM effectiveness, minimize operational uncertainties, and establish a healthy workforce that is an indicator of long-term business sustainability. Manager and policymakers ought to tap into these implications to construct evidence-based interventions that integrate employee engagement strategies with risk management agendas towards the final goal of organizational prosperity being established on a well-embedded, ethics-guided, and risk-sensitive workforce.

7. Limitations and Future Directions

In spite of the rich wealth of findings offered by this research, there are a number of limitations to be noted, which also offer future research avenues. To begin with, this study was carried out in a particular industrial and geographical setting, which might restrict the generalizability of the results. The research was carried out on service and production industries, which, while providing useful contrasts, might not represent differences in technology, healthcare, or financial industries as fully. Future studies could broaden coverage by conducting research in other industries and cross-cultural settings to establish if job embeddedness, change management awareness, and ethical climate impact ERM effectiveness in the same manner across various organizational settings. Second, the present study mostly used a quantitative design, which, although powerful in specifying relationships between variables, fails to offer detailed information about the underlying mechanisms responsible for these relationships. Qualitative research, including in-depth interviews or case studies, may augment these findings by revealing subtle determinants of employees' attitudes and behaviors toward ERM. Longitudinal studies may also be useful in measuring how these relations change over time, especially due to organizational transformation, economic instability, or changes in regulations.

This second primary limitation of this study is that it relies on self-report measures, which are subject to subject opinion and pervasive method bias. While statistical controls were used with these problems, future research will require multi-source data collection, e.g., management ratings or objective performance indicators, to cross-validate the findings. In addition, the primary focus of this study was how ethical environment mediates the relationship between work embeddedness and ERM and change management awareness. Nevertheless, other organizational variables like leadership behavior, corporate governance controls, and organizational culture may also have important moderating roles and should be explored in future studies. In addition, while this study established the mediating role of change management awareness, future research could investigate additional potential mediators, such as organizational learning capabilities, psychological safety, or innovation climate, to develop a richer understanding of the mechanisms through which job embeddedness affects ERM effectiveness. Finally, with increasing incorporation of digital technologies and artificial intelligence by organizations into risk management, there may be an exploration in the future of how advancements in technology come together with organizational factors like ethical climate and job embeddedness and impact risk management outcomes. These limitations, upon being addressed in future research, can draw lessons from this work and enhance better and more agile ERM structures.

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