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Human Resource Management Configurations and Their Impact on Macroeconomic Indicators in Kazakhstan

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ABSTRACT

Human resource management (hereinafter – HRM) has become a key factor in the adaptability of organisations in the context of instability. The purpose of this study is to investigate the relationship between the types of organisational configurations in HRM and macroeconomic indicators in a hybrid institutional environment in Kazakhstan. The research methods employed include categorical coding of organisational characteristics, multivariate analysis of variance (MANOVA), univariate analysis (ANOVA), and linear regression to assess the relationship between HRM configurations and GDP and employment indicators. The initial data covered the period from 2010 to 2024, including organisational characteristics of 26 small and medium-sized enterprises in Kazakhstan, as well as official industry statistics on GDP and employment, aggregated by four types of HRM configurations. The following key results were obtained: the HRM model in education and science demonstrated the most excellent effectiveness, having a significant impact on both GDP ($F = 2369.3$, $p < 0.001$); the agricultural model showed a high correlation with employment ($F = 116.99$, $p < 0.001$); the digital-creative model was significant only in terms of GDP ($F = 109.4$, $p < 0.001$); the industrial hierarchical model showed the least impact on both indicators. These findings confirm that HRM models embedded in flexible, multifunctional structures with a development focus produce greater institutional and economic resilience. The study contributes to developing HRM typologies in transitional settings and offers evidence-based guidance for redesigning organisational systems aligned with sectoral performance and labor market priorities.

KEYWORDS: Economy, Economic Efficiency, Economic Growth, Employment, Management, Institutional Environment, Business Process

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1. INTRODUCTION

Human resource management (hereinafter – HRM) in contemporary organizations develops in institutional layering, structural diversification, and increasing demands for the internal coherence of managerial systems. The interdependence between organizational architecture and HRM strategies has become a critical area of inquiry, particularly in structural mismatches and fragmented coordination. Inconsistent integration of management structure, functional logic, and personnel practices undermines adaptability, limits performance, and reduces the sustainability of institutional routines. The analytical focus in international research has shifted from standardised instruments toward configurational approaches, which emphasize structural fit and contextual sensitivity.

HRM systems are structured differently in different countries because the specific features of national institutions influence them, namely the formal and informal rules that operate within society. Anglo-Saxon models prioritize individual contracts, performance metrics, and operational flexibility, often downplaying collective procedures. In contrast, continental European systems rely on legal integration and normative coordination through social partnership. Asian and post-industrial systems emphasize hierarchical coherence, loyalty, and procedural stability. Across institutional contexts, architectural consistency, defined by the distribution of authority, functional composition, and sectoral embeddedness, acts as the foundation for HRM implementation.

Human resource management influences the employment-to-unemployment ratio, income distribution, and production indicators, serving as one of the key factors in the establishment of macroeconomic equilibrium (Saha et al., 2025). Its importance is enhanced in conditions where the rate of economic growth depends on the qualitative composition of the labor force. The level of education, professional training, and labor force participation have a direct impact on the efficiency of industries and the dynamics of production expansion (Sarwar et al., 2021). When the institutional environment changes, the sustainability of economic processes largely depends on the quality of the labor force. Embedding management practices in the economic planning system ensures the link between changes in employment and structural restructuring. HRM models developed with consideration for the national economy's specificities form the personnel basis for modernization processes and increased development efficiency (Vîrjan et al., 2023).

The effectiveness of HRM is determined not by a set of universal practices but by the configuration in which they are implemented, taking into account the specifics of the institutional environment, the governance model, and the organization's scale (White et al., 2021). In conditions where market and administrative logic intersect, parameters such as the level of formalization, the degree of autonomy, and the nature of accountability become significant. In small structures deprived of standardized solutions, HRM is built situationally, and the sustainability of such configurations depends on the ability to adapt management procedures to limited resources and external pressures (Kroon & Paauwe, 2022). In semi-autonomous institutions, such as government agencies, HRM is influenced not only by internal organizational goals but also by the requirements of political regulation, normative accountability, and personnel constraints, which necessitate adjusting management approaches to a specific context (Blom et al., 2021).

Kazakhstan is an institutional hybrid where post-Soviet administrative legacies intersect with selectively localized international practices. Organizations, particularly in the SME segment, navigate high regulatory uncertainty, structural inconsistency, and weak normative anchoring of HRM functions. Informal norms, uncoordinated departmental roles, and the absence of standardized HR configurations hinder organizational resilience and limit the internalization of personnel strategies. Addressing these challenges

requires identifying core organizational variables, structure type, departmental design, and sectoral logic—to construct coherent HR models tailored to institutional realities.

This study assesses the relationship between organizational HRM configurations and macro-level outcomes within Kazakhstan's economy. The analysis focuses on the relationship between management style, structural design, and sectoral specialization. The research aims to determine whether distinct HRM models correspond to differences in economic performance and employment distribution across sectors.

2. LITERATURE REVIEW

The conceptual evolution of HRM reflects a shift from administrative and operational models to strategically embedded systems. This transformation redefined HRM as a core element of strategic planning, talent development, and institutional control. Legge (1989) characterized HRM as a tool for aligning personnel practices with organizational goals. Storey (1996) expanded this logic by framing HRM as a mechanism of managerial culture formation and normative reinforcement. Mueller (1996) introduced a resource-based perspective, viewing human capital as an asset capable of generating internal continuity and competitive advantage through accumulated knowledge and motivation.

Subsequent theoretical developments emphasized the architectural alignment of HR functions within the broader organizational structure. Kamoche (1996) conceptualized HRM as an adaptive mechanism for stabilizing internal behavioral systems, placing value on the coherence of HR tools across organizational units. Hiltrop (1996) empirically demonstrated the link between participatory practices and performance outcomes, introducing a configuration-based model of HRM effectiveness.

Dalton and Druker (2012) introduced the focus on cross-contextual transferability and examined HR practices in transnational firms. Institutional adaptability, the capacity to adjust HR mechanisms to external legal and cultural norms, emerged as a critical determinant of organizational resilience. The role of HRM expanded from an efficiency-oriented subsystem to a mediator of institutional identity. Oyler and Golden Pryor (2009), revisiting Drucker's ideas, highlighted the integrative role of HRM in managing cultural diversity and shaping organizational values. This institutional interpretation was reinforced by Armstrong (2009), who framed HRM as a discipline of structural transformation and motivational governance. Dessler et al. (2015) further detailed the operational infrastructure of HR systems, emphasizing the rise of data-driven and behaviorally modelled approaches. Most recently, Diani et al. (2024) defined HRM as a determinant of adaptability, innovation, and systemic sustainability, positioning it as a central mechanism in the evolution of institutions.

The diversity of human resource management (HRM) systems across national and cultural environments is shaped by institutional structures, labor market configurations, and prevailing value systems. Hofstede's (1984) typology of cultural dimensions, power distance, individualism versus collectivism, and uncertainty avoidance, provided a foundation for quantifying behavioral divergence across societies. Later work (Hofstede, 1993) emphasized the limitations of universalist management models that neglect context-specific cultural dynamics. Through a bibliometric analysis, Ferreira et al. (2014) confirmed the enduring influence of cultural variables in international HRM research, particularly in areas such as strategic decision-making, participation structures, and behavioral norms within multinational firms.

A comparative institutional lens, showed a structural divergence between Anglo-Saxon and continental European HRM systems (Sparrow et al. (1994); Brewster (2007). Thus, performance efficiency is the focus of attention, as well as flexible employment arrangements and individualized responsibility, which defines the Anglo-Saxon

model. In contrast, the continental model is embedded in formal institutions and collective agreements. In Asian contexts, there prevail hierarchical coordination, internal career stability, and high organizational loyalty. Asian countries' model is affected by cultural codes and institutional designs, which determine the distribution of authority, decision-making procedures, and HRM integration mechanisms. Differences in coordination mechanisms, interpretative approaches, and institutional expectations determine the diversity of HRM models. According to the conceptual model of Gooderham et al. (2019), normative and cultural foundations shape stable human resource (HR) configurations. High regulatory saturation leads to the centralization and formalization of practices, while institutional flexibility promotes decentralization and coordinated decision-making.

Strauss (2001) identified a divergence between American and British HRM logic within the comparative tradition. The American model regards internal rationalization and operational efficiency. On the contrary, the British model prioritizes collective participation, negotiated compromise, and coordination mechanisms. Cregan et al. (2021) compared calculative and collaborative HR models in post-crisis recovery. It was found that rigid, formalized configurations undermine trust and worsen performance, while collaborative models promote institutional resilience, interpretive predictability, and behavioral consistency. Thus, the structure, distribution of tasks, industry context, and management styles form a configuration that determines the institutionalization of HR practices. This affects organizational effectiveness and macro-level parameters, such as sector profitability and employment levels.

From a micro-structural perspective, Blake and Mouton's managerial grid model (1981) introduced a dual-axis framework balancing task orientation and relational engagement, with the 9.9 position identified as optimal for integrating productivity and team stability. Hersey and Blanchard (1982) criticized universal management models, arguing that management effectiveness depends on the ability to adapt behavior to a specific situation and the employees' readiness level. Therefore, personnel management is a flexible system that must adapt to the changing context of the organization. In this case, HRM acts as an adaptation mechanism built into the structure and dynamics of the management environment.

The type of organizational structure directly influences the degree of involvement, formalization, and adaptability within HRM systems. Comparative analysis by Avdelidou-Fischer (2006) demonstrated higher performance levels in decentralized and matrix configurations compared to hierarchical-administrative models. Lunenburg (2012), following Mintzberg's typology, classified coordination mechanisms—direct control, process standardization, qualification standardization, result standardization, and mutual adjustment, each corresponding to a specific HR function. Departmental architecture defines the extent of strategic participation. In Galbraith's (2012) framework, organizational structure is presented as a set of interrelated decisions on coordination, task allocation, motivation, and resource circulation. Ben-Ner and Ren (2013) linked HRM logic to ownership form: private organizations tend toward formalized and contractual models, while non-profit and public institutions prioritize value identification and flexible inclusion.

Lunenburg's (2017) model introduced strategic and behavioral dimensions to the coordination architecture, identifying leadership roles and internal control as factors that shape HRM's integrative function. Englmaier et al. (2018) conceptualized organizational design as an aggregative mechanism that combines labor division with coordination intensity, determining productivity differences and the depth of institutional resilience. HRM operates as a transmission mechanism between operational capacities and macro-level outcomes within this configuration. Structural logic influences internal organisational performance and

broader sectoral effects, including profitability and employment—parameters empirically examined in the present study.

Self-organizing management models redefine HRM as a regulatory infrastructure in decentralized environments. According to Martela (2019), key organizational functions include task allocation, incentive system, limiting opportunism, strategic direction, and coordination. Their implementation varies: bureaucratic structures rely on hierarchy, adhocracies on flexibility, and self-organization on horizontal connections and autonomy. Industry specificity also influences HRM: in the construction industry, authoritarian practices reduce adaptability, while project-based and client-oriented formats increase flexibility and involvement (Górecki et al., 2022).

The national specifics of human resource management in Kazakhstan are formed under institutional transformations and external adaptation constraints. In the higher education system, structural limitations in the development of human resources and the absence of strategic planning mechanisms are recorded, which indicates the immaturity of the internal HR architecture (Seitova, 2016). Similar limitations are observed in the public sector, where administrative logic, hierarchy, and regulated procedures persist, reducing functional flexibility and adaptability (Nurbekova, 2020). In the private sector, conflict dynamics have been identified between local management norms and attempts to introduce universalized HR practices. A study of Kazakhstani companies showed partial integration of global standards while maintaining elements of informal management and institutional inertia (Latukha & Malko, 2019). In divisions of international companies, the coexistence of corporate standards with locally adapted practices has been observed, confirming the configurational nature of HR systems (Masyhuri, 2022). Shakharova et al. (2025) show that the efficiency of national labor force utilization is determined by the degree of alignment of the personnel structure with industry productivity and employment parameters.

The review revealed gaps in the institutional alignment of HRM models with economic performance, which informs the direction of this study. The purpose of this study is to investigate the relationship between the types of organisational configurations in HRM and macroeconomic indicators in a hybrid institutional environment in Kazakhstan. The following hypotheses are developed:

Hypothesis 1 (H1). There is a statistically significant difference in total GDP values across sectors corresponding to different HR management models.

Hypothesis 2 (H2). There is a statistically significant difference in the number of employed persons across sectors classified by HR management models.

3. METHODOLOGY

The methodological design is based on identifying structural correspondences between organizational characteristics and personnel management styles. This corresponds to the direction of applied research in organizational sociology and strategic management (Mintzberg, 1979; Child, 2005; Burton et al., 2015). The empirical study covered 26 organizations representing small and medium-sized enterprises in Kazakhstan, selected to reflect sectoral diversity and differing internal governance architectures. Organizations were included based on the availability of open data, structural transparency, and relevance to HRM transformation models. The sample size was constrained by access to detailed internal configurations, but it was sufficient for typological comparison.

The study is based on the principles of contingent analysis, which posits that a set of internal organisational parameters determines management practices. The unit of analysis was considered an organization as an integral system in which the structure, functional blocks, and management style form an interdependent model. The analysis was conducted in successive stages using a consistent set of analytical procedures (Figure 1).

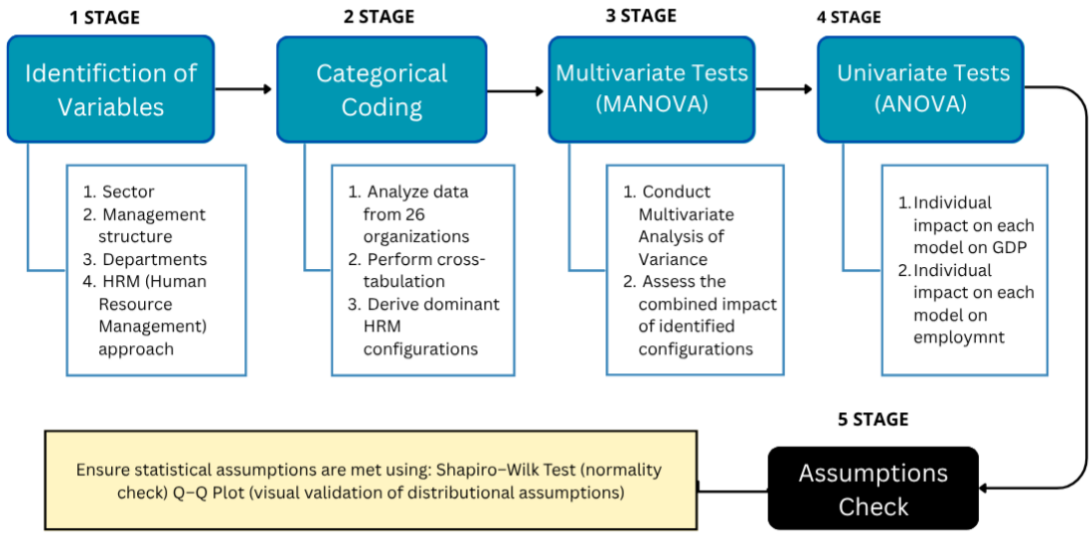

FIGURE 1. Main stages of the analysis

The empirical base comprised 26 organisations from the small and medium sectors. The categorical coding method was employed to ensure comparability, allowing for the unification of qualitative descriptions into analytical variables.

Representativeness within the typological analysis. The number of 26 organizations provided sufficient variability of internal management configurations (by structure, functional blocks, and HR approaches) necessary for constructing a generalized typology. The goal of the study did not imply statistical representativeness at the level of the entire set of enterprises, but to identify recurring management models characteristic of key sectors.

Selection criteria and data quality. The sample included only those organizations for which verified information on their structure, functions, and personnel management style was available. Although, the sample size was limited the analytical reliability and comparability of cases was high. The selection was conducted based on open sources, expert interviews, and internal documentation.

Methodological relevance for the contingent approach. In contingent studies aimed at comparing organizational configurations, the key value is not the sample size but the diversity and completeness of the presented management types. In the presence of structural diversity, even a limited sample allows us to identify stable dependencies between parameters and build an analytical model that is valid in the applied context.

The main variables adopted for the assessment are presented in the table below (Table 1).

The coding reflects the internal architecture of organizations and covers managerial and functional parameters. The variables were selected based on relevance to organizational behavior, the possibility of observation in open sources, and applicability to transformation strategies in the education system.

The choice of the four variables (A–D) is explained by the need to capture the following dimensions: (1) A – sector of activity, which reflects the institutional context in which the HR system functions; (2) B - organizational structure, which determines the degree of centralization and the distribution of authority; (3) C - functional architecture, which sets the managerial focus; (4) D - management approach is interpreted as the behavioral outcome of interactions among the other three dimensions.

TABLE 1. Categorical coding scheme for organizational analysis

Group	Variable	Code and description
A	Sector of Activity	A1 – Services and Consulting; A2 – Production and Distribution; A3 – Trade and Retail; A4 – Construction and Infrastructure; A5 – Resource Extraction
B	Management Structure	B1 – Hierarchical; B2 – Line-Functional; B3 – Functional; B4 – Functional-Project; B5 – Horizontal; B6 – Alternative
C	Key Departments (Functional Focus)	C1 – Marketing/Sales; C2 – Finance/Accounting; C3 – HR/Admin; C4 – IT/Technical; C5 – Production/Logistics; C6 – Legal; C7 – Multifunctional
D	Employee Management Approach	D1 – KPI and Specialization; D2 – Project Teams; D3 – Regulated Hierarchy; D4 – Collective Decisions; D5 – Client Orientation; D6 – Innovation and HR Dev; D7 – Safety and Compliance; D8 – Flexibility

Note: compiled by authors

This approach is based on the conceptual frameworks developed by Storey (1996), Galbraith (2012), and Martela (2019), where HRM is treated as a mechanism of internal alignment contingent upon organizational architecture and contextual constraints.

To ensure further analytical comparability with sectoral performance and employment dynamics, the typology of organizational configurations was extended through the identification of management models recurrently observed in the dataset. These models were not constructed hypothetically but derived from empirical combinations of structures, departments, and HR approaches recorded across the analyzed organizations. Based on these internal configurations, the following sectors were identified as functionally linked to specific managerial models (Table 2).

TABLE 2. Unified sector coding by HR model (for GDP and Employment)

HR Model	Sector Name (OKED)	GDP (KZT)	Employment (people)
Model 1	Education	M1_EDU_GDP	M1_EDU_EMP
	Professional, Scientific and Technical	M1_PST_GDP	M1_PST_EMP
Model 2	Agriculture, Forestry and Fishing	M2_AGR_GDP	M2_AGR_EMP
Model 3	Information and Communication	M3_INF_GDP	M3_INF_EMP
	Arts, Entertainment and Recreation	M3_ART_GDP	M3_ART_EMP
Model 4	Manufacturing	M4_MAN_GDP	M4_MAN_EMP
	Construction	M4_CON_GDP	M4_CON_EMP

Note: compiled by authors

To interpret the empirical data and integrate them with macroeconomic indicators, four typical models of personnel management were identified, corresponding to different sectors of the economy. Each model represents a stable configuration of the organizational structure, functional architecture, and management approach.

Model 1 – Education and Science

Structure: functional-project (B4); departments: multifunctional (C7); approach: D6 (innovation and HR development), partly D2 (project teams). This model exhibits high internal coordination density and a focus on intangible resources, making it particularly relevant for universities and research institutions.

Model 2 – Agriculture and Food Processing

Structure: line-functional (B2); departments: logistics and production (C5); approach: D1 (KPI and specialization), partly D7 (safety and compliance). Characterized by process formalization and internal orientation,

reflecting the operational logic of agro-industrial systems.

Model 3 – Services and Creative Industries

Structure: horizontal or alternative (B5–B6); departments: marketing, IT, design (C1, C4, C6); approach: D5 (client-oriented), partly D8 (flexibility). Marked by decentralization, responsiveness to the external environment, and task fluidity, corresponding to consultancies, media, and digital companies.

Model 4 – Industry and Construction

Structure: hierarchical (B1); departments: production and finance (C2, C5); approach: D3 (regulated hierarchy), partly D7. Characterized by vertical control mechanisms and compliance-driven routines, typical for capital-intensive and infrastructure-heavy sectors.

These models form the foundation for subsequent integration with macroeconomic indicators such as employment volume and sectoral contribution to GDP, enabling comparative evaluation of HR management effectiveness within and across sectors in Kazakhstan. The objective of the analysis is to evaluate whether distinct HRM configurations are statistically associated with macro-level outcomes, specifically, sectoral variation in GDP and employment. The empirical testing stage included multivariate and univariate statistical procedures (MANOVA, ANOVA, linear regression), supported by normality diagnostics.

4. FINDINGS AND DISCUSSION

Recording differences in the distribution of sectors, management structures, functional units, and personnel approaches allows for the identification of institutional features of internal organizational configurations. Each category reflects not only the specifics of the formal organization but also the principles of responsibility distribution, strategic priorities, and the degree of focus on adaptation. Visualization of these parameters demonstrates the characteristic profiles of dominant models and their relationship in the sample (Figure 2).

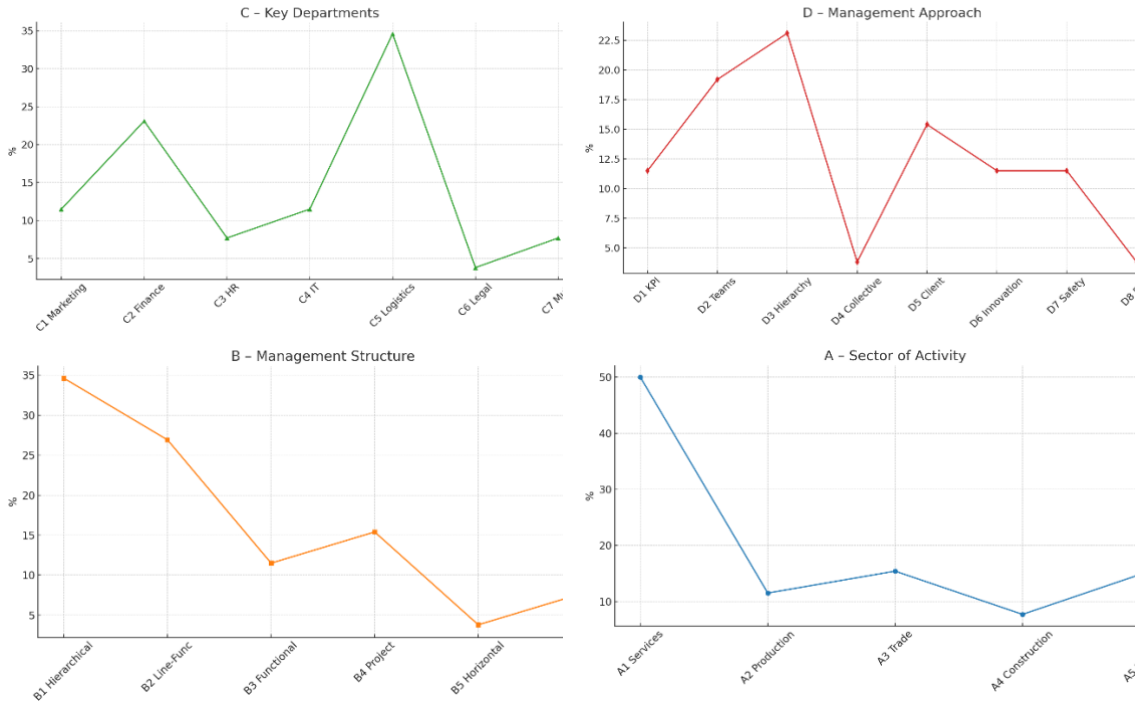

FIGURE 2. Empirical Distribution of HRM Practices Based on Typological Coding

Note: compiled by the authors based on calculations

The distribution by sector (A) reflects the concentration in the services and consulting sector (50.0%), where personnel management is built into flexible, external demand-oriented organizational forms. The manufacturing, trade, and raw materials sectors are more evenly distributed, to identify stable differences in institutional constraints and management practices.

In the distribution of organisational structures (B), the largest share is occupied by hierarchical models (34.6%) and linear-functional configurations (26.9%), reflecting the predominance of centralised management systems. The presence of functional-project structures (15.4%) and alternative solutions (7.7%) indicates the presence of decentralised elements, albeit on a limited scale. Therefore, there is a quantitative predominance of vertical structures with the partial inclusion of hybrid mechanisms that do not form a stable tendency to change the management logic.

Figure 2 shows the distributions by four key variables (A–D), comparing the frequency structure of management practices and assess the degree of their concentration in various institutional environments (Appendix 1).

The functional composition of departments (C) is determined by the predominance of logistics and production blocks (34.6%), ensuring technological and operational continuity. Financial (23.1%) and marketing (11.5%) contours demonstrate a shift in emphasis towards integrating resource and image management.

According to the HR management styles (D), the prevalence of regulated models (23.1%) and project schemes (19.2%) was recorded, reflecting differences in the logic of subordination and distribution of responsibility. Management practices based on a client focus (15.4%) and innovative development (11.5%) form a behavioral strategy in which HR decisions are built into the overall configuration of organizational response.

Table 3 presented cross-dimensional distribution of management approaches.

TABLE 3. Cross-dimensional distribution of management approaches by organizational characteristics (%)

Management approach	Sector of activity (A)	Management structure (B)	Key departments (C)
D1 – KPI and Specialization	11.5 %	11.5 %	11.5 %
D2 – Project Teams	15.4 %	11.5 %	11.5 %
D3 – Regulated Hierarchy	19.2 %	15.4 %	23.1 %
D4 – Collective Decisions	3.8 %	3.8 %	0 %
D5 – Client Orientation	15.4 %	11.5 %	7.7 %
D6 – Innovation and HR Development	7.7 %	7.7 %	11.5 %
D7 – Safety and Compliance	11.5 %	11.5 %	15.4 %
D8 – Flexibility	3.8 %	3.8 %	7.7 %

Note: compiled by the authors based on calculations

A comparison of management approaches with the parameters of the organizational environment reveals differences in coordination methods depending on the sector, type of structure, and functional profile of the units. The stable prevalence of the regulated hierarchy (D3) in all three dimensions indicates the dominance of vertical management mechanisms. At the level of functional blocks, the share of this approach reaches 23.1%, which coincides with the prevalence of logistics and production units in the overall sample. The linkage of hierarchical management to operationally oriented structures forms a closed configuration in which control is strengthened at each level. The presence of project teams (D2) in 15.4% of organizations by sector and 11.5% by structure and unit indicates a partial diversification of management practices. The distribution is close to uniform, indicating adaptation to the hybrid coordination logic without destroying the

vertical core. The emergence of the KPI and specialization model (D1) is recorded mainly in functionally oriented structures and service sectors, where a high standardization of processes is observed.

Forms oriented towards innovation and personnel development (D6), as well as safety and compliance with regulations (D7), are more often tied to the internal architecture of departments. The functional core's influence on the management style is manifested in a higher share of D6 and D7 in block C compared to the sectoral or structural binding. This distribution reflects the dependence of personnel decisions on the depth of specialization and resource provision of specific areas.

Horizontal forms of coordination, including collective decision-making (D4) and flexibility (D8), occupy minimal shares and do not form a stable configuration. Low values at the intersection of all three axes indicate weak institutionalization of decentralized practices. The distribution structure emphasizes the preservation of a rigid coordination logic with limited space for behavioral autonomy.

The analysis of associations between personnel management styles and organizational environment parameters is based on calculations of the χ^2 criterion and Cramer's V correlation coefficient. The statistical test covers three areas: sector of activity, type of management structure, and functional composition of key divisions. The results are presented in Table 4, where the χ^2 values, degree of freedom, significance level, strength of correlation, and sample size (n = 26 organizations) are recorded.

TABLE 4. Chi-Square Test and cramer's v for associations between management approach and organizational characteristics

Association	Chi-Square	df	p-value	Cramer's V
Management Approach ~ Sector	38.894	28	0.08264	0.612
Management Approach ~ Structure	48.858	35	0.05997	0.613
Management Approach ~ Departments	59.126	42	0.04159	0.616

Note: compiled by the authors based on calculations

The relationship between management styles and the sector of activity turned out to be moderately strong (Cramer's V = 0.612) at p = 0.08264. The value does not reach the standard level of statistical significance. However, it approaches the threshold, which indicates a possible influence of the industry context on the choice of management practices when expanding the sample.

A similar picture is observed for the variable "structure type": coefficient V = 0.613, p = 0.05997. The statistical boundary is at the level of the assumption that the structural configuration can influence the distribution of management approaches, especially in the context of maintaining vertical management and introducing project elements.

The only direction with confirmed statistical significance is the relationship between the management style and the functional focus of the divisions (p = 0.04159, V = 0.616). The internal structure of the divisions has a more direct impact on the coordination style and personnel policy than external institutional binding or formal structure. The choice of management approach is mediated by the function that the division performs within the overall system, including the degree of specialization, resource autonomy, and technological load.

A compatibility matrix was created to assess the consistency between the types of organizational structures and HR management styles. This procedure enables us to determine how various management approaches align with the architecture of role distribution, coordination mechanisms, and levels of responsibility. The assessment was based on the frequency of coincidences in a sample of 26 organisations, followed by verbal

categorisation from high to low compatibility. Table 5 reflects which combinations of structural models and HR approaches form stable configurations and which do not appear in the observed array.

TABLE 5. Compatibility Matrix between Organizational Structures and Management Approaches

Structure I am running a few minutes late; my previous meeting is running over. Approach	**D1 – KPI**	**D2 – Project Teams**	**D3 – Regulated Hierarchy**	**D4 – Collective**	**D5 – Client-Oriented**	**D6 – Innovation**	**D7 – Safety**	**D8 – Flexibility**
LCB1 – Hierarchical	NC	NC	HC	NC	LC	MC	NC	NC
B2 – Line-Functional	NC	NC	MC	NC	MC	NC	MC	LC
NCB3 – Functional	NC	HC	NC	NC	NC	NC	HC	NC
B4 – Functional-Project	HC	MC	NC	NC	MC	NC	NC	NC
NCB5 – Horizontal	NC	HC	NC	NC	NC	NC	NC	NC
*Verbal Scale, High compatibility – HC; Moderate compatibility – MC; Low compatibility – LC; No compatibility – NC								

Note: compiled by the authors based on calculations

The compatibility matrix allows us to identify stable dependencies between the management architecture and HR practices. The high compatibility of the KPI approach (D1) with functional-project structures (B4), as well as the high stability of the hierarchical approach (D3) in classical verticals (B1), confirm the presence of fixed interaction models that are reproduced regardless of the specific context. At the same time, the lack of compatibility between project teams (D2) and innovation-oriented practices (D6) with horizontal and alternative structures (B5, B6) may indicate that flexible forms of organisation are underestimated in the sample or have not yet received institutional consolidation. The transition to the following analysis stage involves expanding the interpretation beyond the internal configuration.

The typology, built on the basis of the compatibility of structures and management approaches, allows us to identify several stable models. Each of them is characterised by a repeatable combination of organisational architecture and personnel decisions, which provides grounds to associate it with a particular employment sector reflected in Kazakhstan's socio-economic structure.

A multivariate analysis was conducted to test the proposed hypotheses regarding the association between HR management models and economic output and employment size. This approach made it possible to assess the joint influence of selected sectoral variables, each representing a specific HR configuration—on two dependent variables: total GDP and total employment.

Table 6 presents the results of the multivariate tests (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Root) for each predictor variable included in the model.

The multivariate statistics demonstrate statistically significant effects for several sectors. In particular, M1_EDU_GDP, M2_AGR_GDP, and M3_ART_GDP show highly significant multivariate effects ($p < 0.001$), indicating that HR configurations

TABLE 6. Multivariate Tests

Variable	Test	value	F	df1	df2	p
M1_EDU_ GDP	Pillai's Trace	0.998	1168.68	2	5	<.001
	Wilks' Lambda	0.00213	1168.68	2	5	<.001
	Hotelling's Trace	467.472	1168.68	2	5	<.001
	Roy's Largest Root	467.472	1168.68	2	5	<.001
M2_AGR_ GDP	Pillai's Trace	0.932	34.53	2	5	0.001
	Wilks' Lambda	0.06751	34.53	2	5	0.001
	Hotelling's Trace	13.812	34.53	2	5	0.001
	Roy's Largest Root	13.812	34.53	2	5	0.001
M3_ART_ GDP	Pillai's Trace	0.948	45.60	2	5	<.001
	Wilks' Lambda	0.05198	45.60	2	5	<.001
	Hotelling's Trace	18.238	45.60	2	5	<.001
	Roy's Largest Root	18.238	45.60	2	5	<.001
M4_CON_ GDP	Pillai's Trace	0.321	1.18	2	5	0.381
	Wilks' Lambda	0.67943	1.18	2	5	0.381
	Hotelling's Trace	0.472	1.18	2	5	0.381
	Roy's Largest Root	0.472	1.18	2	5	0.381
M1_EDU_ EMP	Pillai's Trace	0.437	1.94	2	5	0.238
	Wilks' Lambda	0.56308	1.94	2	5	0.238
	Hotelling's Trace	0.776	1.94	2	5	0.238
	Roy's Largest Root	0.776	1.94	2	5	0.238
M2_AGR_ EMP	Pillai's Trace	0.959	59.20	2	5	<.001
	Wilks' Lambda	0.04052	59.20	2	5	<.001
	Hotelling's Trace	23.682	59.20	2	5	<.001
	Roy's Largest Root	23.682	59.20	2	5	<.001
M3_ART_ EMP	Pillai's Trace	0.572	3.34	2	5	0.120
	Wilks' Lambda	0.42841	3.34	2	5	0.120
	Hotelling's Trace	1.334	3.34	2	5	0.120
	Roy's Largest Root	1.334	3.34	2	5	0.120
M4_CON_ EMP	Pillai's Trace	0.738	7.02	2	5	0.035
	Wilks' Lambda	0.26247	7.02	2	5	0.035
	Hotelling's Trace	2.810	7.02	2	5	0.035
	Roy's Largest Root	2.810	7.02	2	5	0.035

Note: compiled by the authors based on calculations

represented in these sectors are strongly associated with variations in both GDP and employment. In contrast, M4_CON_GDP and M1_EDU_EMP did not produce significant results, suggesting weaker or more context-dependent associations.

The findings confirm that selected HR management models are not only structurally distinct but also differentially embedded in their respective sectors' economic and employment architecture. The strong multivariate effects for the education, agricultural, and creative sectors point to the relevance of institutional and functional HR characteristics in explaining variations in macroeconomic performance and labor distribution. To complement the multivariate results, univariate tests were conducted to evaluate the individual contribution of each HR-related sectoral indicator to GDP and employment separately.

Table 7 displays the results of these tests for both dependent variables across all predictor variables.

TABLE 7. Univariate Tests

Independent variable	Dependent variable	Sum of squares	df	Mean Square	F	p
M1_EDU_GDP	GDP_TOTAL	1.52e+16	1	1.52e+16	2369.311	<.001
	EMPLOYED_TOTAL	1.06e0+6	1	1.06e0+6	1794.201	<.001
M2_AGR_GDP	GDP_TOTAL	5.29e+14	1	5.29e+14	82.461	<.001
	EMPLOYED_TOTAL	9358	1	9358	15.789	0.007
M3_ART_GDP	GDP_TOTAL	7.02e+14	1	7.02e+14	109.419	<.001
	EMPLOYED_TOTAL	15566	1	15566	26.264	0.002
M4_CON_GDP	GDP_TOTAL	5.29e+12	1	5.29e+12	0.826	0.399
	EMPLOYED_TOTAL	355	1	355	0.600	0.468
M1_EDU_EMP	GDP_TOTAL	7.65e+12	1	7.65e+12	1.194	0.317
	EMPLOYED_TOTAL	676	1	676	1.141	0.326
M2_AGR_EMP	GDP_TOTAL	7.06e+12	1	7.06e+12	1.101	0.334
	EMPLOYED_TOTAL	69338	1	69338	116.990	<.001
M3_ART_EMP	GDP_TOTAL	6.25e+12	1	6.25e+12	0.974	0.362
	EMPLOYED_TOTAL	4616	1	4616	7.788	0.032
M4_CON_EMP	GDP_TOTAL	7.94e+11	1	7.94e+11	0.124	0.737
	EMPLOYED_TOTAL	6735	1	6735	11.363	0.015
Residuals	GDP_TOTAL	3.85e+13	6	6.41e+12		
	EMPLOYED_TOTAL	3556	6	593		

Note: compiled by the authors based on calculations

The univariate results confirm that M1_EDU_GDP, M2_AGR_GDP, and M3_ART_GDP exert a statistically significant effect on GDP ($p < 0.001$), while M4_CON_GDP does not show significance ($p = 0.399$). A similar pattern is observed for employment: M1_EDU_GDP, M2_AGR_EMP, M3_ART_EMP, and M4_CON_EMP all demonstrate significant effects on employment size ($p < 0.05$), with M2_AGR_EMP being especially influential ($p < 0.001$).

These results indicate that HR models associated with the education, agricultural, and creative sectors influence macroeconomic outcomes and labor distribution. In contrast, the construction sector exhibits weaker associations with GDP and employment, suggesting a lower strategic alignment between its HR practices and performance outcomes.

The results of the Shapiro–Wilk test showed a non-normal data distribution ($W = 0.822$, $p = 0.007$). Given the small sample size, this result is typical and does not reduce the reliability of the core effects. Significant results in both multivariate and univariate tests confirmed the analytical consistency of the findings, though the scope of their application remains limited.

This method allows for a visual interpretation of the degree of deviation of the empirical distribution from the theoretical model underlying the parametric tests and multivariate models.

A Q-Q plot was constructed based on the Mahalanobis distances and χ^2 distribution quantiles to assess the data compliance with the assumption of multivariate normality (Figure 3).

A visual analysis of the plot confirms a satisfactory approximation of the observed values to the diagonal, indicating an acceptable level of compliance with multivariate normality. The trend line covers most points, allowing the assumption of normality to be met at a level sufficient for interpreting the results of the multivariate tests and linear regression models used in this study.

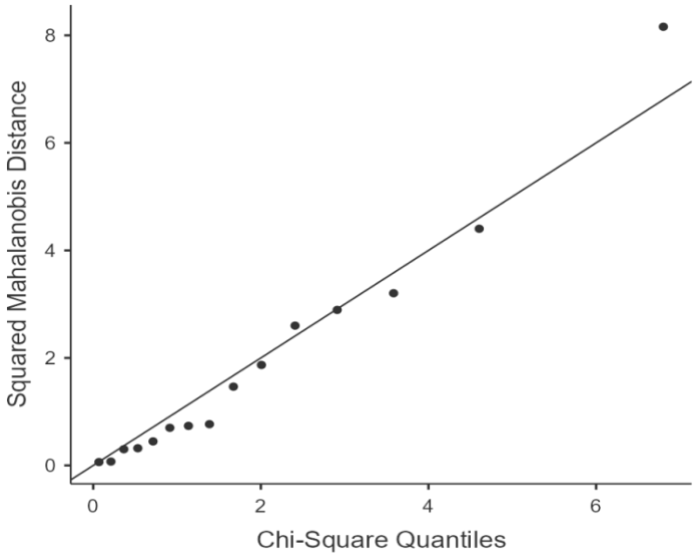

FIGURE 3. Q-Q Plot assessing multivariate normality

5. DISCUSSION

The results showed a statistically significant relationship between the management models and two key indicators - employment and gross value added. All four configurations demonstrated significant effects for at least one of the parameters. Still, the most excellent stability and severity of the relationship were recorded in the model related to the education sector (M1). The significance both for GDP ($p < .001$) and employment ($p < .001$) allows us to consider this configuration as the least vulnerable to institutional and behavioral constraints. Seitova (2016) emphasizes that staff sustainability in higher education is impossible without the strategic institutionalization of HRM and the transition from administrative functions to holistic staff development models. Masyhuri (2022) shows that an internal focus on learning and project-based approaches shape the ability to adapt in the face of transnational pressure. Shakharova et al. (2025) reveal a relationship between the coherence of HR configurations and macro-level outcomes: sectors with a developed HR architecture demonstrate a higher contribution to employment and gross value added. These studies confirm that the M1 model, based on a functional project structure, multifunctional units, and a focus on personnel development, ensures high performance in both organizational and economic dimensions.

The other three models - agricultural (M2), digital-creative (M3), and industrial-hierarchical (M4) - demonstrated partial significance. Model M2 showed a stable relationship with the employment level ($p = 0.007$) but a weak one with GDP ($p = 0.128$), indicating its labor-intensive but low-productivity nature. This relationship is confirmed by the findings of Shakharova et al. (2025), who focus on the imbalance of labor resources in agricultural sectors. Model M3 was significant for gross value added ($p < .001$) but not for employment ($p = .120$), indicating limited HR engagement with a high share of intangible assets, an effect confirmed by Latukha and Malko (2019), which found weak institutional integration of flexible HR practices. In contrast, Model M4 was significant for employment ($p = .015$) but not for GDP ($p = .399$), which may indicate a high administrative burden with limited productive output. These results are consistent with Nurbekova's (2020) observations on the institutional rigidity of government structures and with Górecki et al.'s (2022) findings on the

negative impact of vertical management models on innovative adaptation. Thus, models M3 and M4, which showed significance only for one of the parameters, can be classified as configurations with limited integration potential. At the same time, model M2 is a resource-dependent structure with high personnel involvement but limited economic efficiency.

6. CONCLUSIONS

The analysis confirmed a stable relationship between the types of management configurations and two key macroeconomic indicators - gross value added and employment. All four models showed significant relationships, but the greatest expression and stability of results were recorded in the configuration focused on personnel development in education. This model demonstrated high efficiency in both economic and social directions, which allows us to consider it a systemic example of institutionally coordinated human resource management.

The remaining models – agrarian, digital-creative, and industrial-hierarchical showed effectiveness in only one of the parameters. The agricultural sector model demonstrated a strong connection with employment with limited profitability, while the digital-creative model ensured an economic contribution with weak personnel participation. The hierarchical-industrial configuration was limited in both indicators, indicating institutional inertia and weak adaptability in the context of transformation. The differences confirmed that the structure of departments, the degree of functional integration, and the type of management logic determine the internal efficiency and the macroeconomic return of HR systems. The transition from vertical models to hybrid functional-project configurations is significant, especially in sectors with a high potential for intangible capital. The methodological substantiation of the analysis through a comparison of models made it possible to record the uneven influence of various HR architectures on socioeconomic indicators. The results of the study can be used to develop recommendations in the field of institutional modernization of HR policy, primarily in the higher education system and sectors with high social involvement. The findings make it possible to formulate structural guidelines for the transition to effective, adaptive, and sustainable models of human resource management in the context of the national economy.

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Appendix 1

Frequencies by organizational characteristics (%)

Code	Variable	%
A1	Services and Consulting	50.0
A2	Production and Distribution	11.5
A3	Trade and Retail	15.4
A4	Construction and Infrastructure	7.7
A5	Resource Extraction	15.4
B1	Hierarchical Structure	34.6
B2	Line-Functional Structure	26.9
B3	Functional Structure	11.5
B4	Functional-Project Structure	15.4
B5	Horizontal Structure	3.8
B6	Alternative Structure	7.7
C1	Marketing/Sales	11.5
C2	Finance/Accounting	23.1
C3	HR/Admin	7.7
C4	IT/Technical	11.5
C5	Production/Logistics	34.6
C6	Legal	3.8
C7	Multifunctional	7.7
D1	KPI and Specialization	11.5
D2	Project Teams	19.2
D3	Regulated Hierarchy	23.1
D4	Collective Decisions	3.8
D5	Client Orientation	15.4
D6	Innovation and HR Dev	11.5
D7	Safety and Compliance	11.5
D8	Flexibility	3.8