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A Model for Fostering Labor Productivity and Wage Management: A Long-Term Outlook to 2034

Evgeniy V. Kostyrin [1*], Loua Moussa Pascal [1], Dmitriy Kostyrin [1]

[1] *Bauman Moscow State Technical University, Moscow, Russian Federation.*

Abstract

This research aims to develop a complex system of managerial decision-making support, which includes an economic-mathematical model of maximizing the salary share in the company's revenue, consistent with the financial interests of business owners and the state, analyzing the sensitivity of the maximum wage share to key parameters of the model, and developing software based on MS Excel and PTC Mathcad Prime 3.1. The research methodology included system analysis, non-linear programming, sensitivity analysis, and dynamic system modeling linking time-related changes in wages, labor productivity, enterprises' reinvestment, and financial stability. Modeling results showed that a balanced policy allows employees to increase wages by 59.83% and net profit by 2.97. The return on sales increased by 2.28 times, and government revenues from taxes and social contributions increased by 58.78%. The maximum sustainable share of wages in revenue reaches 54.73%, which is 9.83% higher than the base indicator. The novelty of the research lies in the development and practical implementation of an economic and mathematical model that maximizes the share of wages in the company's revenue while balancing the financial results of employees, owners, and the state within the framework of the Russian fiscal system.

JEL Classification: C44, I11, J31, M21.

Keywords:

Simulation Modeling; Sales Profitability; Nonlinear Programming; Wage Policy; Labor Productivity; Fiscal Forecasting; Tax Revenue; Social Contributions.

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1- Introduction

The integration of comprehensive systems and economic-mathematical models into wage policy management enables a more coherent alignment between the stakeholder objectives: employee wage, owner profitability, and state revenue. By linking labor compensation to enterprise revenue per employee (used in this study as a proxy for labor productivity), achieving a full and consistent representation of financial system dynamics at the microeconomic level becomes possible [1]. This approach establishes a clear correspondence between functions, information flows, and actors in the interactions among employees, business owners, and government institutions at the individual enterprise or divisional level. It supports the replication of successful practices and helps define accountability centers across different levels of the national financial system [2-4], thereby enabling more effective organizational design and reducing implementation errors that lead to inefficiencies, opportunity costs, and resource misallocation [5-7].

Currently, global economies face growing tensions between rising demands for higher wages, labor productivity trends, and fiscal sustainability. These pressures are exacerbated by geopolitical instability and external uncertainty [8-10]. Moreover, deviations in the wage-to-revenue ratio from international benchmarks often fuel social discontent and increase societal polarization [11-13]. Such challenges emphasize the need for scientifically grounded approaches (models, methods, and institutional mechanisms and tools) that can systematically balance stakeholder outcomes. A well-calibrated model can help avoid fragmentation and polarization within key social and economic institutions.

* **CONTACT**: evgeniy.kostyrin@yandex.ru

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The above makes it possible to assume that economic justification based on economic and mathematical modeling of the optimal level of wages, which is consistent with the growth of revenue (labor productivity); contributions to enterprise development, which are relevant for the employer and the entire workforce; and taxation and social contributions (important for the state) will create a state's financial system that is balanced in terms of stakeholder objectives and outcomes and resilient to external challenges. The study of the developed economic and mathematical model's variables, influencing factors, and limitations will contribute to the reliability of forecasting the sustainability of economic development and the employees' well-being growth.

The model contributes to balanced decision-making in financial governance by formalizing these interdependencies. Its scientific novelty lies in combining stakeholder-oriented constraints with dynamic forecasting capabilities, distinguishing it from existing financial economics models [14-16]. Nonlinear programming allows policymakers and managers to simulate scenarios, optimize trade-offs, and develop standardized decision-support systems that can be integrated into enterprise-level analytical platforms.

The issues of productivity growth in enterprises are of interest to financial management scientists and specialists. For example, Oleynik et al. [17] noted that the construction industry demonstrates high positive dynamics, but its development is hampered by several factors, the most stable of which is the lack of productivity growth, as well as methods and models of its stimulation. Khramchenkova et al. [18] also draw attention to the need to apply methods and models to increase labor productivity in the Russian agricultural sector. Putra & Budiasih [19] used spatial data analysis and a geographically weighted regression model to analyze the impact of investment, technological change, healthcare, and the minimum wage on economic growth and labor productivity in 34 Indonesian provinces.

The issues of increasing labor productivity are closely correlated with the growth of workers' wages, as well as the tasks of finding financial resources to increase it, which is the subject of close attention of scientists around the world [20-22]. Previous research models employee salary fluctuations depending on the effects of COVID-19 on the financial stability of organizations worldwide [20]. Another study used quantitative and qualitative research methods to determine the degree of influence of organizational culture on the perception of wage policy by employees of commercial banks in Vietnam, such as assessing the accuracy of convergent and discriminant validity [21]. Another study analyzed the impact of the frequency and method of payment of wages on the well-being and behavior of employees of public and private institutions in the region. Accra, Ghana, using a stratified and targeted sample [22].

Analysis of the above-mentioned sources allowed us to identify the main gaps that this study aims to address. Thus, in the above-mentioned works, we did not see predictive and economic-mathematical models linking wage increases with increased labor productivity, profitability of private and public companies and organizations, tax obligations, and social contributions. From the analysis of the aforementioned works [17-22] and other similar studies [23-29], the authors mainly consider these issues separately without linking the level of financial remuneration of employees to key indicators of the development of organizations and the country's economy as a whole. Moreover, the authors practically do not use economic and mathematical tools to solve the problems of determining the optimal level of employee material remuneration, which, in addition to increasing the well-being of working citizens, ensures an increase in the availability of high-tech, highly efficient equipment in workplaces, an increase in financial resources allocated to the development of the enterprise, and an increase in tax deductions and contributions to extra-budgetary funds. These issues are usually considered separately and without economic, mathematical, and software tools, which limits such studies and reduces their theoretical and practical significance.

In addition, as a gap in existing research, we consider it necessary to note the extremely limited coverage in the works of Russian and foreign scientists and specialists in the field of financial management of the role and place of labor incentives and wage management models in the state's financial system, which, in our opinion, should be represented from a systemic perspective by a closed integrated model, including public finances, finances of business entities, enterprises, organizations, and household finances (personal finances of citizens), the impact on a single element of which invariably affects the entire system as a whole, causing the system to respond in all its elements as an interconnected set of links and chains. For example, models of labor productivity management and wage growth of employees should be considered in conjunction with public and enterprise finances, since labor productivity growth due to effective and scientifically based motivation of personnel, expressed in material and moral incentives for labor, inevitably increases the amount of resources accumulated in the enterprise development fund, which subsequently management of this enterprises can focus on meeting future needs, for example, in staff qualification growth, workplace facilities, sustainable development, or a socially oriented policy toward the company's employees. As for the relationship between wage management models consistent with employee productivity growth and public finances, it is extremely important to note the role of such models in filling budgets at all levels of the state, which is returned to business in the form of government support, tax incentives, and other government measures to motivate business development, investment attractiveness of regions and individual sectors, and attracting additional investments and innovations in various fields of activity.

Thus, it appears that there is a fairly extensive class, set of models, methods, mechanisms, and tools that, if combined, make it possible to optimize employee salaries, considering the interests of many stakeholders, such as business owners, the state, and investors. Such models are considered in [24, 27]. However, the theoretical and methodological advancements that are supposed to distinguish this study from previous works are the mutual alignment of the financial interests of all participants in the country's financial system (emerging economies primarily) and the use of powerful scientifically based economic and mathematical tools and software products based on the well-known MS Excel and the equally popular software product PTC Mathcad Prime 3.1. This set of tools allowed the authors to determine the optimal values of the wage share in the company's revenue for a representative Russian enterprise with an average return on sales and an average salary for a 10-year period (2025-2034) and analyze the sensitivity of wages to key parameters of the company's activities by conducting a scenario analysis and estimating the maximum wage share for various influencing factors. All this allows the authors of this study to talk about a significant breakthrough in modeling long-term labor productivity growth and wage management for employees, which is unprecedented in world practice.

This study proposes an economic-mathematical model to maximize sustainable wage growth while ensuring sufficient returns for capital reinvestment and stable fiscal inflows. The model integrates nonlinear programming and simulation techniques to align wage increases with revenue growth per employee, corporate profitability, tax obligations, and social contributions. Thus, it addresses the needs of all three stakeholders: employees seeking fair compensation, employers requiring development funds, and the state relying on tax and non-budgetary revenues [23-25]. The integration of nonlinear programming and simulation modeling not only enables balanced wage policy design but also aligns with the broader applications of these methods in sustainable development research. For instance, Korotun & Goncharov [26] demonstrated the effectiveness of simulation modeling in assessing environmental sustainability within the retail sector, which is a complementary domain that shares similar challenges in balancing economic performance with social and ecological responsibilities.

2- Research Model and Hypotheses

2-1- Research Model

This study is grounded in three core approaches to developing a new model for labor productivity growth and wage management through 2034: contemporary and effective labor incentive models, established optimization methods, models, algorithms, and decision-support tools, and explicit consideration of the financial outcomes of all participants in the national financial system (employees, enterprises, and the state). Together, these approaches provide a comprehensive foundation for understanding how wage policy influences corporate and enterprise performance, particularly during ongoing geopolitical shifts, economic transformations, and rapid technological change. The model incorporates key determinants of successful technological and managerial transformation, including labor productivity growth, employee motivation (both material and non-material), and enterprise resilience to external challenges, enhanced by accumulated development funds.

These factors are critical to assessing how the proposed model for enhancing labor productivity and wage management implemented at the enterprise level can contribute to macroeconomic stability, sectoral development, and the national economy's overall efficiency through 2034.

This study draws on social financial technologies [27] and economic-mathematical modeling approaches [28] to argue that modern optimization methodologies, labor incentive models, and stakeholder objectives alignment (among firms, households, and the state) are essential for achieving competitive advantage. Such alignment is particularly critical for driving breakthrough innovations, including successful digital transformation, technological advancement, and sustainable economic progress. Enterprises that implement advanced incentive systems, social financial tools, digital transformation, and performance-linked reward mechanisms are better positioned to define strategic direction, foster creativity, and align organizational goals with individual employee engagement. This is especially relevant for multinational corporations with complex subsidiaries and branches across jurisdictions, where consistent motivation and transparent governance are key to operational coherence. These conclusions align with certain previous findings [29, 30], demonstrating that PBC tied directly to productivity and output quality significantly enhances employee effectiveness and involvement in core business processes and strategic decision-making. Notably, results-oriented remuneration systems, including incentives and overtime pay, are crucial for motivating employees and boosting productivity in small businesses. Such systems offer practical strategies for talent retention and performance improvement by linking fair compensation to outcomes, even under economic strain. The study further recommends the use of transparent, regularly reviewed wage structures and non-monetary rewards tailored to diverse employee preferences. Material incentives form a leadership attitude toward long-term organizational resilience [30, 31]. Effective leaders reduce resistance among employees when introducing progressive incentive systems by ensuring transparency, fairness, and continuous communication, which are key factors in successful organizational change.

Employee engagement and readiness for change are critical drivers of organizational success. Engaged and motivated employees, particularly those receiving competitive wages, are more likely to actively contribute to enterprise

performance and support the adoption of advanced technologies [32]. This dynamic enhances competitiveness in high-tech and knowledge-intensive sectors. These findings suggest that committed employees become catalysts for innovation, helping them overcome resistance from less motivated staff or rigid management structures. The importance of organizational readiness is further supported by observations on enterprises with proactive approaches to productivity growth and wage management being better prepared for both internal transformation and external competition [33]. Such organizations respond faster to market shifts and implement structural changes with greater coherence.

Previous works suggest that transparent, evidence-based incentive system not only boosts employee trust but also strengthens investment appeal and expected market value [34]. Transparent remuneration practices signal institutional maturity and long-term strategic orientation, which are key factors for investor confidence. Moreover, sustained investment potential is closely linked to quality of leadership and organizational culture. Effective leaders foster a climate of lifelong learning, innovation, and adaptability, enabling firms to efficiently perform operational and technological improvements. These cultural elements (lifelong learning, flexibility, and shared responsibility) support successful DT and resilience in volatile economic environments.

Thus, enterprises must strengthen their innovation capacity through integrated investments in employee motivation, workplace design, skills development, and the adoption of modern production technologies, services, and knowledge-sharing practices. Continuous learning, skill transfer, and collaborative problem-solving are key to successfully improving organizational climate and implementing advanced technological solutions. This holistic approach is an alternative to traditional change models that often fail to consider the readiness of firms, owners, employees, and even state institutions to align wage policies with productivity growth and sustainable labor incentives. Similarly, many organizations use isolated performance evaluation tools, such as anonymous questionnaire surveys, key performance indicator (KPI) systems, or recognition programs (e.g., "employee of the month," recognition letters, and certificates of appreciation), but rarely integrate them into broader human capital strategies. Such tools have a real impact only when they are combined with tangible support for employees, including improved working conditions, professional development, and career advancement opportunities. When used in isolation, they become symbolic gestures rather than drivers of meaningful productivity gains.

In today's rapidly evolving environment marked by accelerating innovation and increasing operational complexity, these complementary factors are increasingly critical. They enable firms to align internal capabilities with strategic development goals, ensuring that workforce engagement is a long-term competitive advantage. The model developed in this study builds upon these insights by integrating core findings from prior research on labor productivity, wage dynamics, and institutional alignment. It inherits fundamental principles from established frameworks while introducing dynamic simulation and NLO to forecast outcomes under varying policy scenarios. As illustrated in Figure 1, the model synthesizes these interdependencies into a coherent system that reflects both direct and indirect productivity and compensation structures' influence on managerial decision-making and national economic development.

2-2- Hypotheses Related to Labor Incentive Models

Prior research on regional economic dynamics informs the development of this study's incentive framework. Understanding how wages are linked to economic processes contributes to the development of a balanced policy aimed at sustainable regional development and can be useful for decision-makers in developing financial and economic policies.

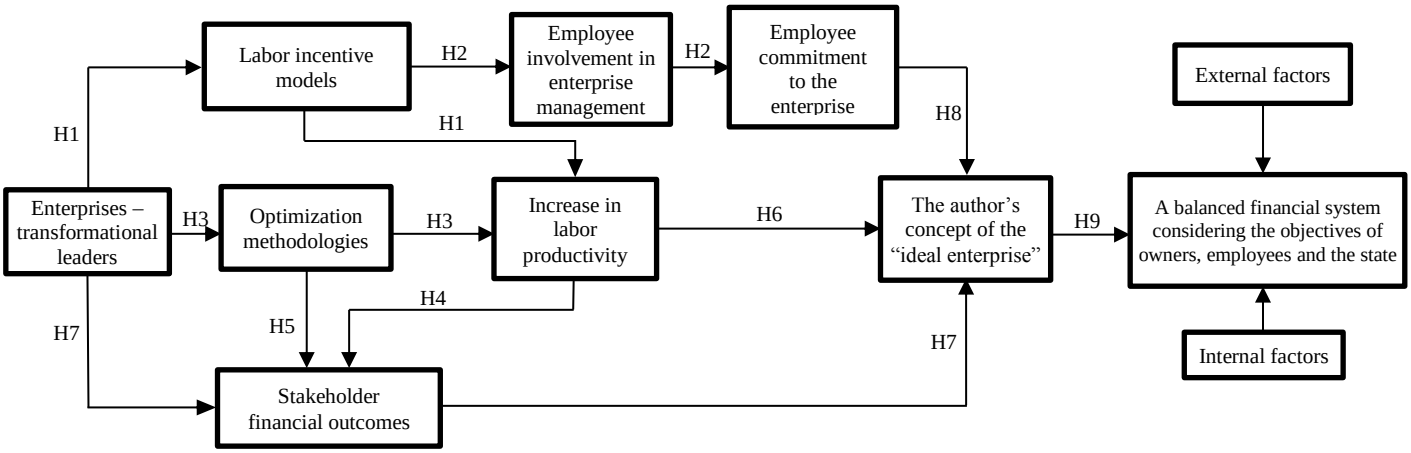

Figure 1. Research model

For instance, an analysis of the relationship between wage levels and socioeconomic development in the Irkutsk region of Russia [35] reveals that wages are not only an outcome of economic growth but also a driver of regional

sustainability. Using statistical data from 2010 to 2023, the study identifies strong correlations between rising labor compensation and key indicators, such as gross regional product, household income, employment rates, and consumer spending, highlighting the bidirectional nature of wage-driven development. The findings suggest that stagnant wages can hinder regional progress by limiting domestic demand and human capital retention, while targeted increases, tied to productivity gains, contribute to broader socioeconomic resilience. Challenges to wage growth, including structural unemployment, skill mismatches, and uneven investment distribution, are also identified, reinforcing the need for coordinated policy interventions. These insights support the hypothesis that sustainable wage growth at the enterprise level must be embedded within a larger developmental context, where financial incentives align with regional economic goals. This justifies the integration of the proposed ECM into a dynamic system linking firm-level productivity, reinvestment, and public finance.

One of previous research found that employers should cover housing costs for employees when calculating corporate income tax while forming a payroll system, particularly in regions with high labor mobility [36]. This study argues that such expenditures should be classified as in-kind wage compensation to minimize tax risks. When treated as general business expenses, these payments face non-recognition during audits; however, when integrated into payroll accounting, they are more likely to be accepted by tax authorities. The study emphasizes that such benefits, while enhancing employee attraction and retention, must be managed carefully: their share should not exceed 20% of total wage accruals to comply with Russian tax regulations. This insight supports our model's peculiarity of treating non-monetary components of compensation as part of a broader wage structure that balances employer obligations, employee welfare, and fiscal compliance.

Similarly, the relationship between the minimum wage trends and labor productivity in Mexico was examined across 32 states (2005-2023) [37]. This correlation analysis reveals that labor productivity has consistently outpaced minimum wage growth, suggesting room for raising statutory wages without compromising economic stability. A regional comparison with Latin American data for 2022 further confirms this trend. The authors conclude that aligning increases in minimum wage with productivity gains can lift employees above the poverty line while maintaining competitiveness. These findings reinforce our central hypothesis: sustainable wage growth is only possible when measurable improvements in labor productivity are anchored.

Together, these studies underline the importance of context-sensitive compensation design, where both cash and in-kind elements are aligned with institutional, fiscal, and economic realities.

H1: A 3% annual increase in enterprise revenue per employee, used as a proxy for labor productivity over the 2025-2034 period, is expected to lead to a 5.98% annual growth in average wages. This implies that wage growth outpaces productivity gains by a factor of nearly two, suggesting a progressive redistribution of labor value under conditions of sustained efficiency improvements.

H2: Aligning wage increases with productivity growth enhances employee engagement in enterprise management and strengthens organizational commitment. Employees are more likely to participate in decision-making processes and demonstrate long-term loyalty to the enterprise when compensation is perceived as fair and linked to measurable output.

2-3- Hypotheses Related to Optimization Methodologies

Volokhova & Shakhruev [38] demonstrated the feasibility of aligning wage growth, enterprise development, and fiscal obligations through integrated optimization models. In their study of a mining enterprise in Russia, the authors developed an economic-mathematical model that links labor productivity gains to employee compensation increases, capital development reinvestment, and social contributions. By implementing wage policy within a unified system of revenue allocation, including taxation, development funds, and payroll, the model enabled a significant and sustained improvement in key financial indicators over 5 years. Specifically, the simulation results for 2023-2028 project consistent growth in revenue per employee and average wages, reflecting rising productivity and strengthened financial performance. The model achieved a 2.187-fold increase in average wages over five years and a 1.71-fold increase in per-employee investment in the company's development fund. Progressive cost-efficiency measures supported these improvements, with annual savings positively contributing to net profitability. This evidence supports the hypothesis that when grounded in realistic enterprise dynamics, optimization-based approaches can successfully balance stakeholder outcomes and generate mutually reinforcing outcomes for employees, firms, and the state.

Shofyuddin & Primandhana [39] empirically support the role of wage policy in labor market dynamics. Regression analysis of panel data processed by EViews 13 software from 2018 to 2024 for districts in East Kalimantan (Indonesia) demonstrates that minimum wage increases exert a statistically significant negative effect on open unemployment, indicating that higher statutory wages can stimulate employment when embedded in a supportive economic environment. Notably, economic growth is strongly negatively associated with unemployment, while foreign investment alone has no significant impact, underscoring that capital inflows require complementary institutional and human capital conditions to generate jobs. These findings reinforce the view that wage policy is not merely a cost but a potential catalyst for inclusive labor market outcomes. Building on this evidence, the present study proposes the following hypotheses:

H3: A comprehensive decision-support system that integrates an economic-mathematical model of stakeholder financial outcomes (for employees, enterprises, and the state) can sustainably increase labor productivity by 3% per year per employee over the 2025-2034 period.

H4: A 3% annual increase in labor productivity per employee will lead to a 5.88% annual growth in tax revenues and social security contributions.

H5: The wage-to-revenue ratio is the key control variable in the proposed model. This variable is constrained by enterprise owners, investors, and the state's legitimate financial outcomes, ensuring balanced outcomes across all stakeholders.

2-4- Hypotheses Related to Stakeholder Financial Outcomes

Adventri & Syafitri [40] examined the impact of education, health, and minimum wage on labor productivity in Indonesia using panel data from 2013-2023 collected by national and regional statistical agencies from 2013 to 2023. Their findings confirm that education and wage levels are positively associated with productivity, which is consistent with the theories of human capital and wage efficiency. However, health indicators show no significant positive effect, and the overall model fit suggests that these factors explain only a portion of the variation in labor output. This partial explanatory power highlights a critical gap: without institutional alignment and fair income distribution, traditional drivers of productivity may be insufficient. Notably, Java, a region with high educational attainment and strong public health systems, still exhibits the lowest labor productivity in the country. This anomaly underlines that productivity is determined not only by individual capabilities but also by organizational design, incentive structures, and equitable compensation policies. These insights reinforce the need for integrated models, such as the one proposed in this study, where wage growth is not isolated but coordinated with enterprise performance and state fiscal flows.

Kapoor [41] provides a comprehensive analysis of AI as a general-purpose technology that is reshaping labor markets and aggravating wage inequality. The study argues that AI functions as both a substitute for routine-based tasks and an enhancer of high-skill cognitive work, leading to labor market polarization. Employees in middle-skill occupations, particularly those involving repetitive or procedural activities, are disproportionately affected by automation, while demand rises for highly skilled professionals who develop, manage, and interact with artificial intelligence systems. Simultaneously, low-skilled service roles that resist automation also persist, creating a split workforce. This dual dynamic widens the wage gap between skill groups, contributing to growing income disparities. Notably, the effects of AI on employment and earnings are not inevitable: they are mediated by education policy, lifelong learning initiatives, corporate strategies, and social safety nets. Kapoor [41] emphasizes that without proactive interventions, such as equitable access to digital skills training, progressive taxation, and inclusive innovation policies, capital owners and high-skilled employees will be the most likely to benefit from AI-driven productivity gains, while others will face displacement and stagnant wages. These findings reinforce the relevance of the proposed model: sustainable wage growth must be embedded in productivity improvements and supported by institutional mechanisms that ensure fair distribution across all levels of the labor force during technological transformation.

H6: A sustained 3% annual increase in labor productivity is expected to drive a statistically significant 2.50% annual growth in enterprise development fund contributions.

H7: A sustained 3% annual increase in labor productivity and consideration of the financial outcomes of all stakeholders (employees, owners, investors, and the state) exert a statistically significant impact on the enterprise's net profit, increasing it by 29.70% per year.

H8: A 3% annual gain in labor productivity, combined with high levels of employee commitment and organizational loyalty, will lead to a 22.80% annual improvement in sales profitability.

H9: Full implementation of the proposed productivity-wage model at "leader enterprises" through 2034 will generate a replicable author's concept for ideal, "high-performance organizations." This concept is defined by the balanced alignment of stakeholders' outcomes within a dynamic system that responds to external challenges, internal factors, and national fiscal objectives, thereby enhancing macroeconomic stability.

To avoid the enclosed circle of reasoning, the cause applied in Hypotheses 1, 4, 6-8 is a 3% annual increase in labor productivity, and the effects combine: an increase in average wages by 5.98% (H1), an increase in tax revenues and social security contributions by 5.88% (H4), an increase in contributions to the enterprise development fund by 2.50% (H6), an increase in the company's net profit by 29.70% (H7), and an increase in return on sales by 22.80% (H8).

3- Research Method

3-1- Research Design Methodology

This study employs a quantitative research design to investigate the relationship between labor productivity growth and the maximum sustainable share of wages in enterprise revenue while balancing the financial objectives of owners, investors, shareholders, and the state. The research follows a systematic approach that includes problem identification, research question formulation, review of 101 scholarly sources, hypotheses development (H1-H9), and the construction

of an economic-mathematical simulation model grounded in nonlinear programming. Figure 2 shows a schematic overview of the research workflow. It illustrates the progression from problem identification through literature analysis and model development to simulation and interpretation of the results. This structured approach ensures transparency, logical consistency, and replicability across institutional and economic contexts. The methodology integrates theoretical insights with empirical forecasting, enabling both short- and long-term scenario testing and projections up to 2034. The model supports evidence-based policy design for balanced economic development by anchoring wage dynamics to productivity trends and stakeholder constraints.

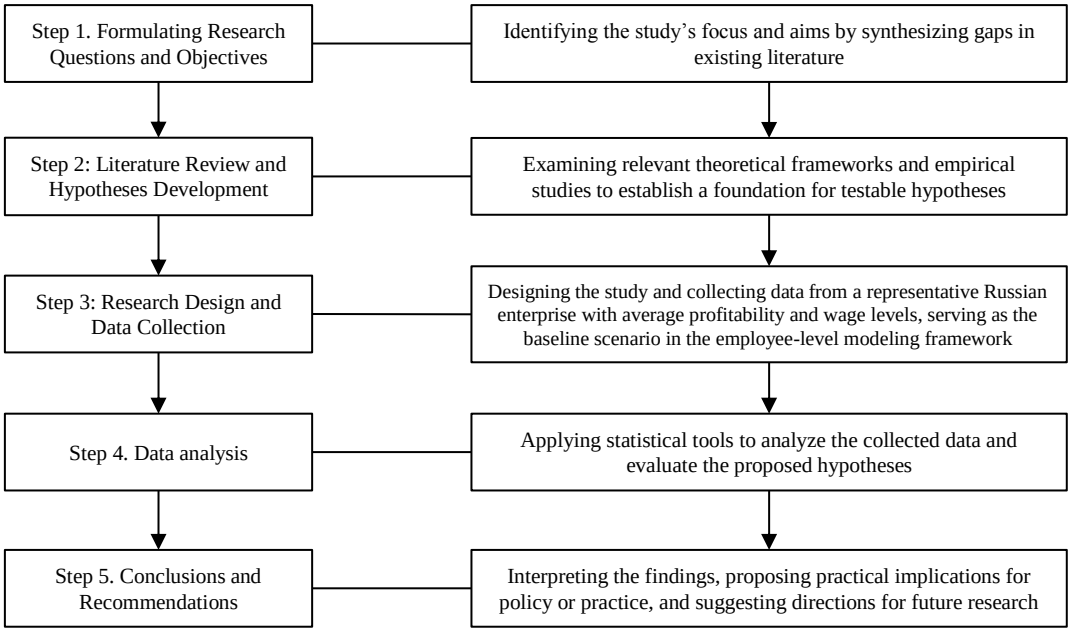

Figure 2. Research methodology framework

Table 1 presents a comparative analysis of the authors' findings against those of other scholars and practitioners addressing various aspects of the issues examined in this study.

Table 1. Comparison with previous scholarly contributions and advancements in the field of knowledge

Research Avenues	Scientific Results	Scientific Novelty
Labor Incentive Models	The authors develop an economic-mathematical model designed to maximize labor wages aligned with enterprise revenue growth and allocations toward enterprise development. This structure aligns the objectives of owners, employers, and employees.	In contrast to prevailing practical models of labor incentive systems [23-25, 42-47] and others), the proposed model is grounded in progressive incentive system. This approach directly links employee compensation to increases in production output and reinvestment allocations, enabling the entire workforce to meaningfully participate in enterprise governance. By tying rewards to both performance and long-term development, the model facilitates the channeling of resources toward workplace modernization, equipment upgrades, and employee upskilling, thereby fostering sustainable organizational growth and shared value creation.
Optimization Methodologies	An economic-mathematical model has been developed to coordinate the labor force, enterprise owners, and the state's financial outcomes.	This approach differs from conventional optimization methods employed in practice for addressing complex socioeconomic challenges [23; 43; 48-57] by systematically integrating nonlinear programming with simulation modeling. This integration enables a coherent linkage between enterprise revenue and key financial indicators: wage growth for the labor force, sales profitability, tax liabilities, and social security contributions, thereby ensuring balanced and mutually reinforcing outcomes across stakeholder groups.
Stakeholder Financial Outcomes	This study proposes a comprehensive managerial decision-making model that integrates a progressive labor incentive system with an economic-mathematical model for managing the financial objectives of employees, enterprise owners, and the state. This integrated model enhances enterprise and national financial development's key indicators, including enterprise revenue, financial performance, goods and services pricing, product volume and variety, employee wages, sales profitability, tax payments, and social security contributions.	This model distinguishes itself from existing approaches to evaluating and managing stakeholders' financial outcomes [23; 46; 58-70] by explicitly defining the structural role of the economic-mathematical model within the broader financial system. Unlike prior methods that treat incentives or financial coordination in isolation, this model operationalizes the interdependence among wage growth, profitability, taxation, and reinvestment. Its practical implementation across diverse industries enables the design of standardized decision-support systems, with clear pathways for integration into existing enterprise-level information and analytical platforms, thereby promoting scalable, data-driven governance aligned with national economic priorities.

The study conceptualizes the national financial system and identifies the financial objectives of core participants: the state, enterprise owners (economic agents), and employees (hired employees), which serve as the primary input parameters of an integrated managerial decision-making system. This system comprises two interdependent

components: a progressive labor incentive mechanism and an economic-mathematical model for coordinating stakeholder financial outcomes. The output of the system encompasses key macro- and micro-level indicators of enterprise and national financial system development: enterprise revenue from sales of goods, works, and services; financial result (profitability); prices of goods, works, and services; physical output volumes and product mix; employee wages; sales profitability; tax payments and social security contributions.

Each stakeholder group's financial objective is operationalized as follows: public revenue is measured by the growth rate of tax revenues and social security contributions; enterprise owners' revenue is assessed through the growth rate of sales profitability; and employees' wage outcome is defined by the level and growth rate of wages, aligned with labor productivity

A central aim of the research is to demonstrate the feasibility of harmonizing these often-competing objectives. Specifically, the model seeks to determine the maximum feasible wage share in enterprise revenue that can be attained without compromising the financial objectives of either the state or enterprise owners.

Given that employed citizens constitute the primary engine of national financial system development, the objective function of the model is formulated as the sustained growth of collective wages over time at a rate no lower than the growth rate of enterprise revenue from the sale of goods, works, and services:

Objective function:

$$\frac{W_t}{R_t} = x_t \rightarrow \max\ (t = 1,2, \dots, n), \tag{1}$$

where, W(t) denotes aggregate wage expenditures at time *t*, in RUB; and R(t) represents enterprise revenue from the sale of goods, works, and services at time *t*, in RUB; x_t is the share of wages in revenue (labor productivity) at time *t*, in units; *n* is the forecasting horizon for the enterprise revenue from the sale of goods, works, and services, in years

This formulation ensures that wage growth remains endogenously tied to enterprise performance, thereby fostering equitable value distribution while preserving fiscal sustainability and owner returns, which is an essential condition for long-term systemic stability and inclusive economic development.

The constraint that reconciles wage growth with the financial outcomes of all key stakeholders, namely, enterprise owners and the state, is expressed as follows:

$$0 \leq \frac{W_t}{R_t} + \frac{Development\ Fund_t}{R_t} + \frac{Tax\ payments\ \&\ Social\ Security\ Contributions_t}{R_t} \leq 1 \tag{2}$$

where each term represents the respective share of enterprise revenue allocated to wages, reinvestment, and fiscal obligations. This inequality ensures that total outflows do not exceed total revenue, preserving financial feasibility. Furthermore, only non-negative values of the wage share variable x_t, are economically meaningful, which yields the lower-bound constraint:

$$x_t \geq 0 \tag{3}$$

The dynamics of *x* can theoretically arise from four distinct scenarios:

1) Wage growth outpacing revenue (or labor productivity) growth;
2) Declining revenue with fixed wages;
3) Wage growth amid stable revenue (labor productivity);
4) Wages declining at a slower rate than revenue (labor productivity).

However, only Scenario 1 is considered in the model formulation and practical implementation consistent with the research objective (to develop an economic-mathematical model that harmonizes the financial objectives of employees, enterprise owners, and the state): sustained wage growth at a rate exceeding that of enterprise revenue (or labor productivity). This choice reflects a proactive, development-oriented equilibrium: higher wage growth incentivizes labor effort and human capital investment, while the model's structural constraints (e.g., Equation 2) ensure that enterprise profitability and fiscal contributions remain intact. Thus, Scenario 1 aligns with the collective objectives of all stakeholders and supports long-term economic resilience and inclusive growth within the national financial system.

To stimulate accelerated growth in enterprise revenue (labor productivity), the state may employ sovereign monetary emission as a policy instrument to boost both household incomes and macroeconomic expansion [71]. The core idea of sovereign money issuance is to channel newly created money as targeted credit to enterprises producing import-substituting goods or output with guaranteed demand, such as essential infrastructure, public services, or strategic industrial products [72-75]. This mechanism aims to strengthen domestic production capacity while directly enhancing the purchasing power of employees through wage growth anchored in real economic activity.

The dynamics of enterprise revenue (labor productivity) over time are modeled using the following forecasting equation:

$$R_t = R_0 \times (1 + \lambda)^t \quad (4)$$

where, R_0 denotes the enterprise revenue from the sale of goods, works, and services at the initial time t = 0 (corresponding to the base scenario year 2025), in RUB; λ represents the average annual growth rate of enterprise revenue, aligned with the long-term global average growth rate of gross domestic product (GDP). And the dynamics of employee wages (i.e., the total wage fund of the labor collective) over time are modeled as:

$$W_t = W_0 \times \prod_{i=1}^{t}(1 + \varphi_i) \quad (5)$$

where, W_0 is the initial wage fund at t = 0, determined by the baseline wage share (corresponding to the base scenario year 2025), in RUB; φ_i is the target annual growth rate of wages, which is set to exceed the revenue growth rate.

Then the constraint describing Scenario 1, where wage growth outpaces revenue growth (labor productivity), can be represented as follows:

$$\varphi_t > \lambda (t = 1, 2, \dots, n). \quad (6)$$

Thus, the economic-mathematical Model 1-6 is reduced to finding the maximum value of the objective function x_t, at which constraints 2-6 are satisfied.

Let us detail the values of the variables included in Equation 2, while omitting the index t in the formulas without losing the economic meaning and logic.

As shown in Kucherenko & Anishchenko [69], contributions to the enterprise development fund are proportional to the enterprise's gross profit minus corporate profit tax, then the following formula holds:

$$Development\ Fund = \xi \times \left(R - Cost_p\right) \times (1 - CPT) \quad (7)$$

where, ξ is the share of the enterprise's gross profit allocated to the development fund, in units; $Cost_p$ – the total cost of production and sales of goods, works, and services of the enterprise, in RUB; *CPT* – corporate profit tax, units.

Tax payments and social security contributions are determined as follows:

$$Tax\ payments\ and\ deductions\ to\ off-budget\ funds = PIT \times W + VAT \times (R - C_{var} + CPT \times (R - Cost) + Ded_{obf} \times W \quad (8)$$

where, *PIT* is a personal income rate, unit rage proportion (0-1); *VAT* – a value added tax rate, unit rage proportion (0-1); C_{var} – variable costs of the enterprise in the production and sale of goods, works, services, RUB, *SSC* – a rate of enterprise social security contributions, unit rage proportion (0-1).

Substituting 7 and 8 into 2 yields the following:

$$0 \le \frac{W}{R} + \frac{\xi \times (R - Cost) \times (1 - CPT)}{R} + \frac{PIT \times W + VAT \times (R - C_{var}) + CPT \times ((R - Cost) + SSC \times W}{R} \le 1 \quad (9)$$

After reducing similar terms simplifications lead to:

$$0 \le \left(1 + PIT + Ded_{obf}\right) \cdot \frac{W}{R} + (\xi - \xi \cdot CPT + VAT + CPT) \cdot \frac{R}{R} + (\xi \cdot \mathrm{P}Tr - \xi - CPT) \cdot \frac{Cost}{R} - VAT \cdot \frac{C_{var}}{R} \le 1 \quad (10)$$

The cost price-sales proceeds ratio, often referred to in the literature as the cost-intensity ratio [76], can be expressed through the profitability of sales, considering that:

$$ROS = \frac{POS}{R} = \frac{R - Cost}{R} = 1 - \frac{Cost}{R} \quad (11)$$

where *ROS* is return on sales of goods, works, and services of an enterprise, unit rage proportion (0-1); *POS* – profit on sales, RUB. Hence it follows:

$$\frac{Cost}{R} = 1 - ROS \quad (12)$$

Note that as the share of wages in the enterprise revenue changes, so does the return on sales. In other words, considering 1, the equation takes the following form:

$$\frac{Cost}{R} = 1 - ROS(x) \quad (13)$$

Similarly, it follows that

$$\frac{C_{var}}{R} = \tau(x) \cdot \frac{Cost}{R} = \tau(x) \cdot \left(1 - ROS(x)\right) \quad (14)$$

where, $\tau(x)$ represents the share of variable costs in the total production cost of goods, works, and services of an enterprise, unit rage proportion (0-1).

As follows from Formula 14, in general, the share of variable costs in the cost structure, and the return on sales of goods, works, and services of an enterprise, depends on the share of wages in the enterprise revenue *x*. Substitution of 1, 13 and 14 into 10 yields:

$$0 \le (1 + PIT + SSC \times x + (\xi \times CPT - \xi - CPT) \times (1 - ROS\ (x)) - VAT \times \tau(x) \times (1 - ROS\ (x)) + \xi - \xi \times CPT + VAT + CPT \le 1 \quad (15)$$

After transformations, Formula 15 takes the following form:

$$0 \le VAT \times \tau(x) \times ROS\ (x) - VAT \times \tau(x) + (\xi + CPT - \xi \times CPT) \times ROS\ (x) + (1 + PIT + SSC) \times x + VAT \le 1 \quad (16)$$

The objective function of the economic-mathematical model for socially oriented enterprise financing, integrating a progressive labor incentive system and maximizing the wage fund of the labor collective in alignment with revenue growth, can be written as [66]:

$$W = R \times \theta_0 + \gamma \times (POS - POS_0) \quad (17)$$

where, θ_0 represents the share of wages in revenue at the initial moment of time $t = 0$ (corresponding to the base scenario year 2025), unit rage proportion (0-1); γ is the coefficient of redistribution of the enhanced financial performance between employees and enterprise owners, unit rage proportion (0-1); POS_0 – profit on sales at the initial moment of time $t = 0$ (corresponding to the base scenario year 2025), RUB.

In this case, profit on sales is defined as the difference between the enterprise revenue from the sale of goods, works, and services and the aggregate costs for them:

$$POS = R - Cost = R - C_{var} - C_{fix} \quad (18)$$

Dividing the left and right sides of Equation 17 by revenue leads to:

$$\frac{W}{R} = \theta_0 + \gamma \times \left(\frac{POS}{R} - \frac{POS_0}{R}\right) \quad (19)$$

Then considering 11 the following is obtained:

$$ROS\ (x) = \frac{1}{\gamma} \cdot (x - \theta_0) + ROS_0 \quad (20)$$

where, ROS_0 is the return on sales of goods, works, and services of an enterprise at the initial moment of time $t = 0$ (corresponding to the base scenario year 2025), unit rage proportion (0-1).

Following an analogous procedure, one can derive the functional dependence of the share of variable costs in total production cost on the wage-to-revenue ratio, denoted as τ(x). Substituting Equation 18 into Equation 17 yields:

$$W = R \times \theta_0 + \gamma \times (R - C_{var} - C_{fix} - \gamma \times POS_0 \quad (21)$$

Dividing the left and right sides of Equation 21 by revenue results in:

$$\frac{W}{R} = \theta_0 - \gamma \times ROS_0 + \gamma - \gamma \times \frac{C_{var}}{R} - \gamma \times \frac{C_{fix}}{R} \quad (22)$$

Let us denote the share of wages in fixed costs as μ. Then, considering for Equation 14, which expresses the dependence of the variable cost share on the wage-to-revenue ratio, Equation 22 can be rewritten as follows:

$$x = \theta_0 - \gamma \cdot ROS_0 + \gamma - \gamma \cdot \tau(x) \cdot \big(1 - ROS(x)\big) - \frac{\gamma}{\mu} \cdot x \quad (23)$$

Hence it follows:

$$\tau(x) = \frac{\theta_0 - \gamma \cdot ROS_0 + \gamma - \left(\frac{\gamma}{\mu} + 1\right) \cdot x}{1 - ROS(x)} \quad (24)$$

where, ROS(x) is determined by Equation 20.

3-2- Research Model

The economic-mathematical model for maximizing the wage share in enterprise revenue, while simultaneously considering the financial objectives of enterprise owners and the state, is formulated as follows:

Objective function:

$$\frac{W_t}{R_t} = x_t \to \max\ (t = 1,2, \dots, n) \quad (25)$$

Constraints:

$$0 \le Vat_t \times \tau_t(x_t) \times ROS_t(x_t) - Vat_t \times \tau_t(x_t) + (\xi_t + CPT_t - \xi_t \times CPT_t) \times ROS_t(x_t) + (1 + PIT_t + SSC_t) \times x_t + Vat_t \le 1 \quad (26)$$

$$\tau_t(x_t) = \frac{\theta_0 - \gamma \cdot ROS_0 + \gamma - \left(\frac{\gamma}{\mu} + 1\right) \cdot x_t}{1 - ROS_t(x_t)} \quad (27)$$

$$ROS_t(x_t) = \frac{1}{\gamma} \cdot (x_t - \theta_0) + ROS_0 \quad (28)$$

$$x_t \geq 0, \quad (29)$$

$$R_t = R_0 \times (1 + \lambda)^t \quad (30)$$

$$W_t = W_0 \cdot \prod_{i=1}^{t} (1 + \varphi_i) \quad (31)$$

$$\varphi_t > \lambda (t = 1, 2, \ldots, n) \quad (32)$$

Designations and brief descriptions of the parameters and variables used in the economic-mathematical Model 25-32 are presented in Table 2.

Table 2. Designations used in the economic and mathematical Model 25-32 with brief descriptions

Variable №	Designation of a Parameter or Variable	A brief description of the parameter or variable	Units of measurement of a parameter or variable
1	W_t	The amount of the collective laborer's salary at time t	RUB
2	R_t	The company's revenue from the sale of goods, works, and services at time t (labor productivity)	RUB
3	x_t	Share of wages in revenue (labor productivity) at time t	Unit percentage
4	t	The number of simulation periods (ordinal number of years)	
5	n	Planning horizon (number of forecast period years)	
6	Vat	Value-added tax rate at time t	Unit percentage
7	τ_t	The share of variable costs in an enterprise's total production cost of goods, works, and services at time t	Unit percentage
8	ROS_t	Return on sales of goods, works, and services of an enterprise at time t	Unit percentage
9	ξ_t	Share of the enterprise's gross profit allocated to the development fund at time t	Unit percentage
10	CPT_t	Corporate profit tax at time t	Unit percentage
11	PIT_t	Personal income at time t	Unit percentage
12	SSC_t	Rate of enterprise social security contributions at time t	Unit percentage
13	θ_0	The share of wages in revenue at the initial moment of time t = 0 (corresponding to the base scenario year 2025)	Unit percentage
14	γ	Coefficient of redistribution of enhanced financial performance between employees and enterprise owners	Unit percentage
15	μ	Share of wages in fixed costs	Unit percentage
16	ROS_0	Return on sales of goods, works, and services of an enterprise at the initial moment of time t = 0 (corresponding to the base scenario year 2025)	Unit percentage
17	R_0	Enterprise revenue from the sale of goods, works, and services at the initial time t = 0 (corresponding to the base scenario year 2025)	RUB
18	λ	The average annual growth rate of enterprise revenue, aligned with the long-term global average growth rate of GDP	Unit percentage
19	W_0	The initial wage fund at t = 0 is determined by the baseline wage share (corresponding to the base scenario year 2025).	Unit percentage
20	φ_t	The wage's target annual growth rate, which is set to exceed the revenue growth rate at time t	Unit percentage

The practical significance of the economic-mathematical model defined by Equations 25-32 lies in its capacity to quantitatively assess the impact of key enterprise-level and macro-fiscal parameters on wage dynamics. The model enables policymakers and enterprise managers to evaluate how changes in the following factors influence the sustainable growth of employee compensation: tax rates, including value-added tax (VAT), corporate profit tax (CPT), and personal income tax (PIT); the cost structure, particularly the relative shares of fixed and variable costs production cost; the enterprise sales profitability; reinvestment intensity, that is, the proportion of revenue allocated to the enterprise development fund; payroll deduction rates to off-budget social funds (e.g., pension, medical, and social insurance).

The model provides a rigorous, evidence-based decision-support tool by simulating the interplay among these variables within a unified optimization framework. It supports the design of coordinated fiscal, corporate, and wage policies that simultaneously: enhance household income and living standards for working citizens; strengthen enterprise financial resilience and investment capacity, and ensure stable and predictable revenue flows to federal, regional, and local budgets.

Thus, the model serves not only as an analytical instrument for microeconomic planning but also as a strategic mechanism for providing inclusive economic growth, aligning the financial outcomes of labor, capital, and the state in a mutually reinforcing manner.

4- Results

4-1- Literature Survey Analysis

The literature review covers 101 peer-reviewed publications by scholars from Russia and abroad, structured along three thematic dimensions: labor incentive models (21 articles), optimization methodologies (46 articles), and stakeholder-oriented financial frameworks (43 articles). The total number of articles reviewed exceeds the overall number because several works cover multiple categories, reflecting their interdisciplinary nature.

For instance, an economic-mathematical model simultaneously maximizes financial performance in dental healthcare organizations through improved quality of paid services, increases in dentists' wages, returns for business owners, and enhanced tax revenues and social security contributions [23]. Given its integrated focus on incentive structures, optimization techniques, and systemic financial alignment, this publication resists classification within a single category and belongs to all three. Similar overlaps are evident in other studies included in multiple groups, underlining the interconnectedness of these dimensions in real-world applications. Figure 3 shows the relative distribution of articles across these categories.

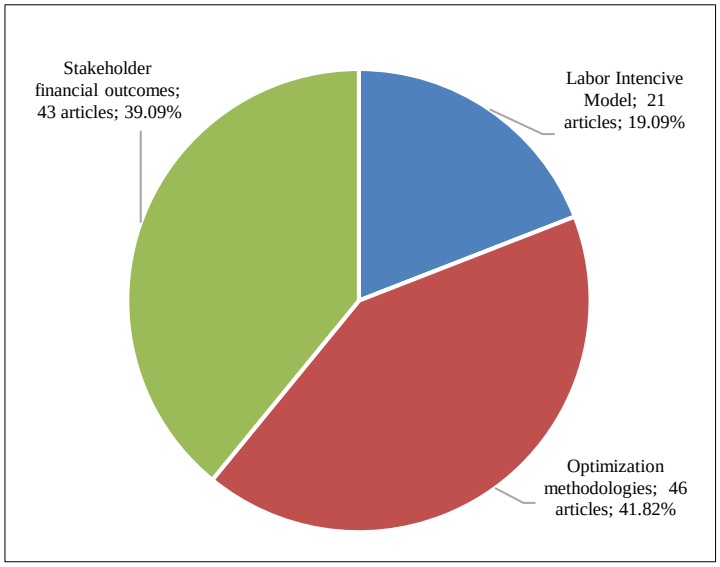

Figure 3. Article distribution by research area

The data presented in Figure 3 indicate that the largest share of reviewed articles falls within the optimization methodologies category (46 articles, or 41.82% of the total), followed closely by research investigating SFOs (43 articles, or 39.09%). The smallest cluster comprises studies focused specifically on Models of Labor Incentive (21 articles, or 19.09% of the total).

This distribution highlights a strong emphasis in the existing literature on technical and computational methods for solving economic problems and growing attention to financial coordination among stakeholders. However, few studies have explicitly developed structured labor incentive models that link employee compensation to broader organizational and societal outcomes, revealing a relative gap in integrated, participatory approaches to enterprise performance.

Thus, the literature review reveals the following critical research gaps. First of all, it is absence of integrated models, since there is a notable lack of scholarly research devoted to the development and practical implementation of economic-mathematical models capable of harmonizing the financial outcomes of employees, enterprise owners, and the state within a unified analytical framework. Next, it is limited use of nonlinear programming methods, particularly quadratic programming, which remain scarcely employed in the economic-mathematical modeling of core enterprise financial indicators (e.g., revenue, profit, cost of production, and sales) and in the rigorous, model-based formulation and subsequent evaluation of managerial decisions. The next gap is lack of progressive incentive systems and proper efforts to design, refine, or implement progressive wage incentive mechanisms that explicitly align employee compensation with the broader financial objectives of enterprise owners, employers, and the state is demonstrated in the scientific literature. Furthermore, insufficient modeling of wage maximization is under constraints, since only few studies address the economic-mathematical problem of maximizing employee wages while considering the existing and prospective resource constraints. Moreover, there is a clear deficit in the methodological and instrumental approaches that enable the coordination of wage growth with the financial objectives of business owners and public fiscal outcomes. Finally, there is limited holistic coordination due to a scarcity of research proposing coherent and interdependent comprehensive, balanced mechanisms for simultaneously managing wages (labor objectives), social security contributions and tax payments (state objectives), reinvestment allocations, and return on sales (owner objectives).

The identified research gaps are not only thematical limitations but also methodological. These gaps collectively underscore the need for a novel, integrative approach that closes the gaps in incentive design, optimization methodology, and multi-stakeholder financial alignment to advance both theoretical understanding and practical policy solutions in enterprise governance and national economic development.

4-2- Simulation Results

The simulation results obtained using the economic-mathematical Model 25-32 in MS Excel for a representative Russian enterprise with average profitability and wage levels are presented in Table 2. The first simulation scenario, which corresponds to the first row of Table 2, represents the baseline case (2025), which includes the initial values of all modeled parameters.

As an example of the practical implementation of the economic and mathematical Model 25-32 developed in the scientific article, a representative Russian enterprise with average sales profitability, wage levels, and labor productivity growth rates is used, which correspond to global trends according to the Federal State Statistics Service of Russia [75].

Column 1 lists the number of simulation cases, while Column 2 specifies the respective years. In Row 1, Column 11, Table 2 gives official data from the Federal State Statistics Service (Rosstat) [75] on the average monthly nominal accrued wages for employees in organizations across the Russian Federation as of July 2025, amounting to 99,305 RUB. According to Rosstat, the share of employee compensation (including social deductions) in Russia's gross domestic product (GDP) structure is 44.9%, while the average sales profitability of goods, products, works, and services stands at 9.9%.

Figure 4 illustrates the cost structure of Russia's GDP in 2025. According to this breakdown, conditionally fixed costs account for 60% of total costs, whereas conditionally variable costs, which vary proportionally with revenue, constitute 40%. This ratio is a general characteristic of the structure of the Russian economy, since part of the costs is conditionally constant, and the other part, which varies in proportion to revenue, is conditionally variable costs (Table 3).

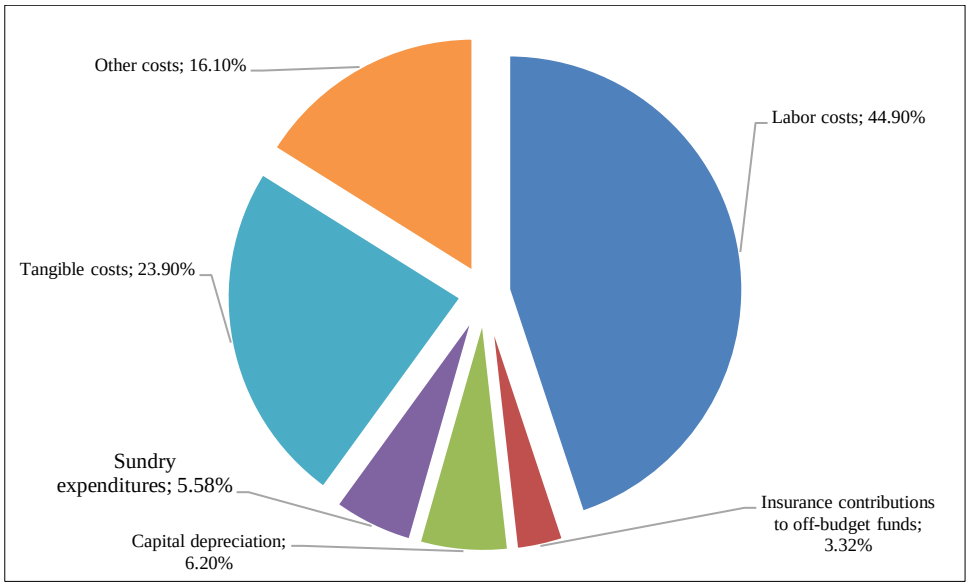

Figure 4. The cost structure of Russia's GDP in 2025

Table 3. Cost structure of Russia's GDP in 2025. Conditionally fixed and variable costs

Cost price	**Conditional fixed costs**	60%	Labor costs	44.90%
			Insurance contributions to extra-budgetary funds	3.32%
			Fixed asset depreciation	6.20%
			Other expenses	5.58%
	Conditional Variable Costs	40%	Material costs	23.90%
			Other expenses	16.10%

Table 3 and Figure 4 show that the share of conditional fixed costs, including labor costs, insurance premiums to extra-budgetary funds, depreciation of fixed assets, and other costs, is 60% of the cost price, and the share of conditional variable costs, which comprises material and other costs, is estimated as 40% of the cost price. The established ratio of

conditionally fixed and conditionally variable costs, namely: 60% – conditionally fixed costs, and 40% – conditionally variable costs, according the Federal State Statistics Service of Russia (Rosstat) [75], which characterizes the structure of the Russian economy as a whole. In other words, this ratio becomes a universal assumption of the economic and mathematical Model 25-32 developed by us, which does not affect its stability. Moreover, as will be shown below in the text, an increase in the share of variable costs in the basic modeling option from 40% to 50% (i.e., with a cost structure of 50% – conditionally fixed costs and 50% – conditionally variable costs) increases the maximum share of wages in the company's revenue per employee (labor productivity) from 54.73% to 55.65%. Conversely, a decrease in the share of variable costs in the basic modeling option from 40% to 30% (i.e., under the cost structure of 70% conditional fixed costs and 30% conditional variable costs) reduces the maximum share of wages in labor productivity from 54.73% to 53.83%. A more detailed analysis of the sustainability of the company's key performance indicators in 2034, depending on the cost structure, proving the resilience of the economic and mathematical Model 25-32 to changes in input parameters will be shown in Table 4.

Table 4. Model simulation outcomes: stakeholder-oriented revenue distribution in enterprise finance

Simulation scenario	Year	Baseline monthly revenue per employee (RUB) (wage share = 44.9%).	Revenue growth rate	Simulated COGS per employee, baseline (RUB) (9.9% profit margin)*	Share of fixed costs in total COGS**	Share of variable costs in total COGS	Fixed costs (RUB)	Variable costs (RUB)	Cost reduction impact (RUB)	Simulated monthly wage (RUB) (adjusted to revenue growth)***	Share of incremental profit allocated to wage growth (%)	Wage growth allocation (RUB)
1	2	3	4	5	6	7	8	9	10	11	12	13
1	2025	221,169.27	1.00	199,273.51	60.00%	40.00%	119,564.10	79,709.40	0.00	99,305.00	44.90%	0.00
2	2026	227,804.34	1.03	201,664.79	59.29%	40.71%	119,564.10	82,100.69	3,586.92	102,284.15	45.40%	2,869.54
3	2027	234,638.47	1.06	204,127.81	58.57%	41.43%	119,564.10	84,563.71	7,281.45	105,352.67	45.90%	5.825.16
4	2028	241,677.63	1.09	206,664.72	57.85%	42.15%	119,564.10	87,100.62	11,086.82	108,513.25	46.40%	8,869.46
5	2029	248,927.96	1.13	209,277.74	57.13%	42.87%	119,564.10	89,713.64	15,006.35	111,768.65	46.90%	12,005.08
6	2030	2595.79	1.16	211,969.15	56.41%	43.59%	119,564.10	92,405.04	19,043.46	115,121.71	47.40%	15,234.77
7	2031	264,087.67	1.19	214,741.30	55.68%	44.32%	119,564.10	95,177.20	23,201.69	118,575.36	47.90%	18,561.35
8	2032	272,010.30	1.23	217,596.62	54.95%	45.05%	119,564.10	98,032.51	27,484.66	122,132.62	48.40%	21,987.73
9	2033	280,170.61	1.27	220,537.59	54.21%	45.79%	119,564.10	100,973.49	31,896.13	125,796.60	48.90%	25,516.90
10	2034	288,575.73	1.30	223,566.80	53.48%	46.52%	119,564.10	104,002.69	36,439.93	129,570.50	49.40%	29,151.95

Notes: *COGS = cost of goods sold. All values correspond to the scenario of the baseline simulation (2025).

**Costs are expressed as the shares of total COGS in the baseline scenario.

***Based on the assumption of 3% annual revenue growth per employee, wages are simulated.

****percentage of incremental profit allocated to wage growth and enterprise development.

***** Monetary amounts allocated from incremental profit to wage increases and ED.

For baseline scenario 1, the average monthly revenue (labor productivity per employee) is derived by dividing the average monthly wage by the wage share in GDP: 99,305 RUB: 0.449 (44.9%) = 221,169.27 RUB.

This value is entered in Column 3, Row 1 of Table 4. It serves as the starting point for projecting future revenue under the assumed growth rate λ aligned with global GDP trends. All subsequent simulations (Cases 2–n) build upon this benchmark, adjusting key variables, such as tax rates, reinvestment shares, cost structures, and wage dynamics, to evaluate their impact on financial sustainability and stakeholder outcomes. These results provide a realistic foundation for assessing the feasibility of progressive wage policies within existing macroeconomic constraints and support evidence-based decision-making at both enterprise and policy levels.

The average monthly cost of goods sold (COGS), including all expenses related to the production and sale of goods, works, and services, is calculated as the average monthly revenue of the enterprise minus the profit on sales. The latter is derived by multiplying the average monthly revenue at the sales profitability rate as follows:

Monthly profit = 221,169.27×0.099=21,895.76 RUB.

The average monthly COGS for a representative Russian enterprise is:

COGS=221,169.27−21,895.76=199,273.51 RUB, as shown in Column 5, Row 1 of Table 4.

In subsequent simulation periods, the average monthly enterprise revenue is projected forward using Equation (30), with an annual growth rate of λ=3.0%, consistent with the long-term average global GDP growth rate.

Conditionally fixed costs account for 60% of the total cost of goods sold (COGS) in the baseline (first) simulation scenario, while conditionally variable costs constitute 40% (Table 4, Row 1, Columns 6-7). These cost components are derived by multiplying the baseline monthly COGS per employee by RUB 199,273.51 at a 9.9% profitability rate (Table 4, Row 1, Column 5) by their respective cost shares, specifically, conditionally fixed costs (Table 4, Row 1, Column 8) are calculated as 199,273.51×0.60=119,564.10 RUB; and conditionally variable costs (Table 4, Row 1, Column 9) are calculated as 199,273.51×0.40=79,709.40 RUB.

This allocation ensures that the cost structure is consistent with standard accounting practices and supports the internal consistency of the model. In the simulation, a gradual increase in the average monthly enterprise revenue is assumed at an annual rate of 3.0%, which is consistent with the global average GDP growth rate.

As enterprise revenue (i.e., labor productivity per employee) increases, unit cost automatically declines because of the reducing share of fixed costs per unit of output. This cost reduction enables the implementation of a progressive wage system, wherein the wage share in revenue rises from 44.90% to 49.40% and is funded by the growing profit margin, as reflected in Column 12.

The share of variable costs in the total cost of goods sold (COGS), denoted as $\tau(x)$, is defined by Equation 27. Consequently, the share of fixed costs equals $1 - \tau(x)$. By definition, variable costs are proportional to the volume of goods, works, and services produced and sold.

Column 11 of Table 4 presents the simulated nominal monthly wage, defined as a fixed proportion of enterprise revenue per employee (i.e., labor productivity). This operationalizes the objective function (25) as follows:

$$\frac{W_t}{R_t} = x_t \to \max\ (t = 1,2, \dots, n),$$

Thus, in the baseline scenario (2025), the wage share is set at 44.9% (Table 4, Row 1, Column 12). Accordingly, the wage in 2026, calculated solely from revenue growth without cost-reduction effects, is as follows:

227,804.34×0.449 = 102,284.14 RUB, which corresponds to Row 2 and Column 11. The same logic applies consistently across all subsequent years in Column 11.

This empirically grounded cost allocation ensures that the simulation reflects the actual operational structure of Russian enterprises, enhancing the model outcomes' realism and policy relevance. The framework provides a reliable basis for evaluating the trade-offs and synergies inherent in wage-led growth strategies by anchoring the simulation in observed macroeconomic and sectoral data.

Figure 5 presents the outcomes of implementing the progressive wage system at the reference enterprise. For 2026, the simulated monthly wage is RUB 105,153.69, calculated as follows:

102,284.15 (revenue-linked base wage) + 2,869.54 (additional allocation from profit growth) (Table 4, Row 2, Column 13).

This additive mechanism, in which the base wage (from revenue growth) is augmented by profit-sharing, is applied consistently across the entire projection period (2025-2034).

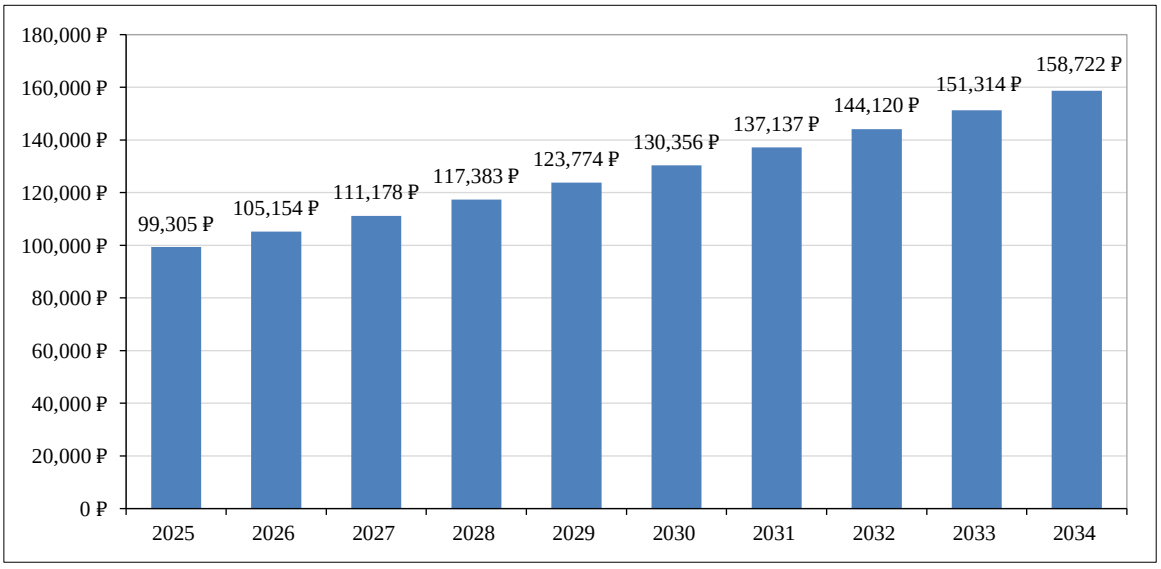

Figure 5. Simulated monthly wage per employee under the progressive incentive system, reflecting revenue-linked allocation and profit-sharing mechanisms (2025-2034)

As shown by comparing the data in Figure 5 and Column 11 of Table 4, the implementation of the progressive labor incentive system, described by Equation 25 and serving as the objective function of the economic-mathematical Model 25-32, leads to a significantly faster growth in average monthly wages compared to the baseline scenario. Specifically, wages increase by 59.83% relative to the baseline case under an annual growth rate of 3.0% in the volume of produced and sold goods, works, and services. The wage growth (from 99,305.00 RUB to 158,722.45 RUB, a 59.83% increase) nearly doubles the rate of revenue growth, fully aligning with the financial objectives of employees and confirming H1 of this study.

Figures 6 and 7 present the simulation results for the financial outcomes of enterprise owners: Figure 6 shows the average monthly contributions to the enterprise development fund and the financial performance, defined as the difference between average monthly revenue per employee and average monthly cost of goods sold per employee. Figure 7 shows sales profitability over time.

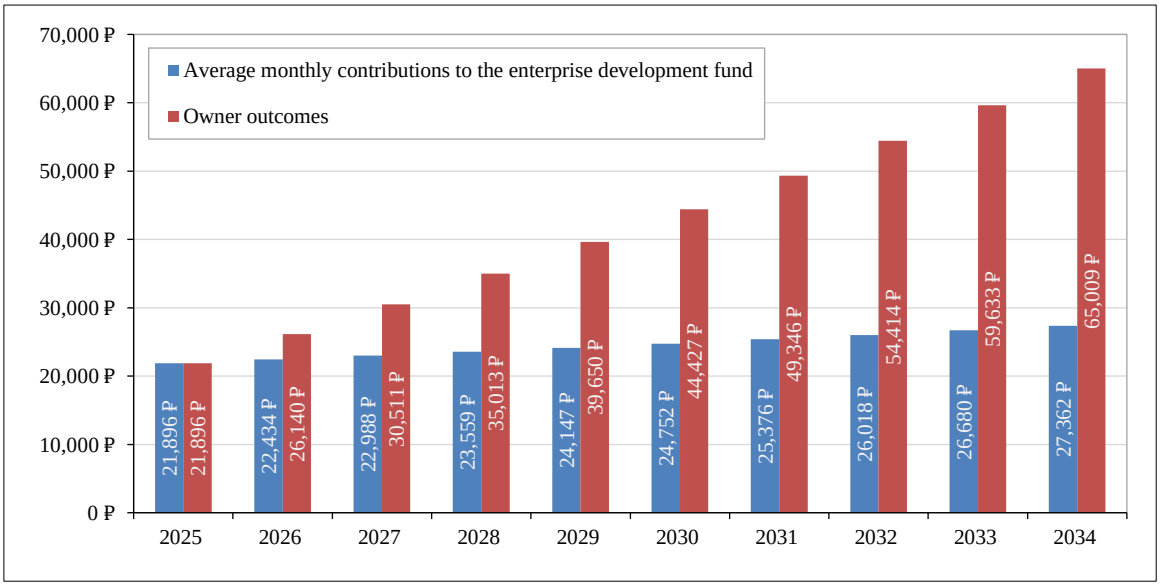

Figure 6. Monthly development fund contributions and net profit per employee under the stakeholder-balanced model (2025-2034)

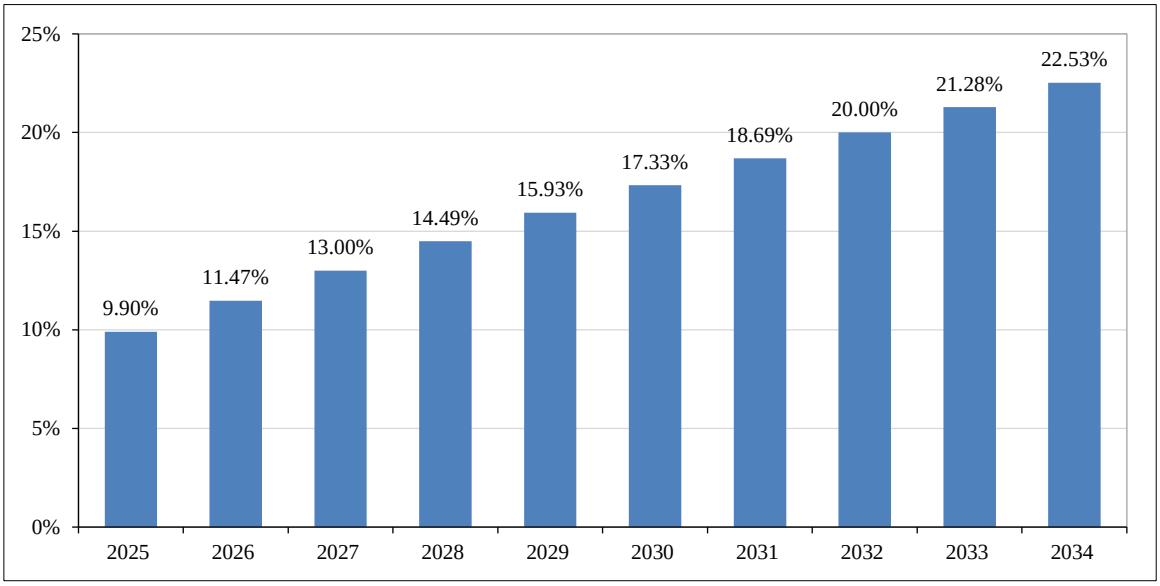

Figure 7. Financial outcomes for enterprise owners: sales profitability

To illustrate the calculation algorithm for wage-increase allocations and contributions to the EDF, the 2026 computations are presented. Enterprise profit per employee in 2026 is derived as the difference between average monthly revenue per employee (RUB 227,804.34) and average monthly cost of goods sold (RUB 201,664.79), yielding a net operating profit of RUB 26,140.00 (see Figure 6; Table 4, Row 2, Column 3).

This represents an increase of RUB 4,244.00 compared to the 2025 baseline scenario (RUB 26,140.00-RUB 21,896.00). Of this incremental profit, the contribution to the development fund amounts to RUB 4,244 (incremental financial performance increase relative to the base value) × 0.2 (the share of gross profit allocated to the development fund, as defined in Equation 7) × 0.75 (an adjustment reflecting the 25% corporate profit tax rate) = RUB 538.

Allocations toward wage increases (see Column 13 of Table 4) equal 4,244 Rubles (incremental financial performance relative to the base value) × (1 – 0.2) (the share of gross profit allocated to the development fund, as defined in Equation (7)) = RUB 2,869.54.

This allocation logic is applied consistently across all subsequent years of the 10-year simulation period (2027-2034). Notably, by 2034, the average monthly contribution to the development fund will reach RUB 27,362 per employee (Figure 6), which is 24.96% higher than the level of the baseline development fund in 2025:

(RUB 27,362 ÷ RUB 21,896) × 100% = 124.96%.

Figure 8 presents the state revenue, defined as total receipts from corporate profit tax (CPT), value-added tax (VAT), personal income tax (PIT), and social security contribution (SSC).

For the baseline year 2025, the total state revenue is calculated as follows:

RUB 21,896 (financial performance, see Figure 6) × 25% (CPT rate) + (RUB 221,169.27 (average monthly revenue, see Row 1, Column 3) RUB 79,709.40 (conditionally variable costs, see Row 1, Column 9)) × 20% (VAT rate) + RUB 99,305 (wage in the 2025 baseline, see Figure 5) × 13% (PIT rate) + RUB 99,305 × 30% (SSC) = RUB 76,467.06

The same calculation method is applied consistently for each of the remaining eight years (2027-2034) across the 10-year simulation period (2025-2034).

Using the computational environment of MathCad and applying the economic-mathematical model (25)-(32), the maximum share of employee wages in enterprise revenue can be determined while ensuring that the financial outcomes of enterprise owners and the state are fully preserved. This is achieved by identifying the highest value of the objective function $x = \frac{W}{R} \rightarrow \max$ that satisfies Constraint (26) or, equivalently, the following condition:

$$VAT \times \tau(x) \times ROS(x) - VAT \times \tau(x) + (\xi + CPT - \xi \times CPT) \times ROS(x) + (1 + PIT + SSC) \times x + VAT - 1 = 0 \quad (33)$$

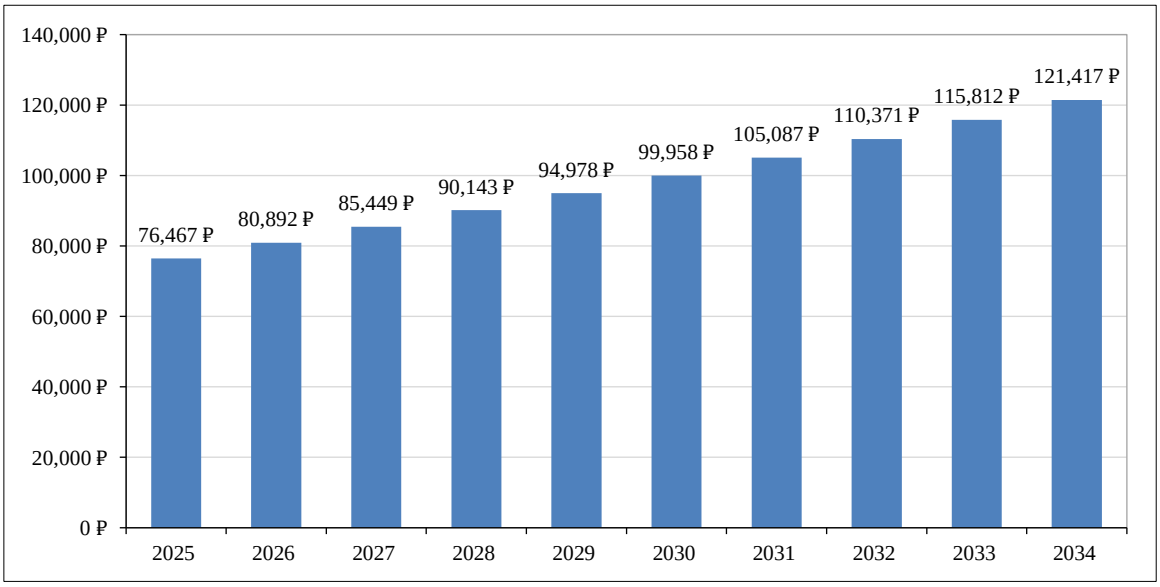

Figure 8. State Revenue comprising CPT, VAT, PIT, and SSC

Substituting the baseline parameters: $\theta_0 = 0.449$; $\gamma = 0.8$; $ROS_0 = 0.099$; $\mu = 0.83$, into Equations 27 and 28, yields:

$$\tau(x) = 0.65 \times x + 0.11; \quad (34)$$

$$ROS(x) = 1.25 \times x - 0.46. \quad (35)$$

Table 5 presents an analysis of the results of the practical implementation of the economic-mathematical model for managing the financial outcomes of employees, enterprise owners, and the state, exemplified by a representative Russian enterprise with average profitability and wage levels.

Column 4 of Table 5 shows the current values of the factors influencing the objective Function 17 under the baseline simulation scenarios. These baseline values are highlighted in gray and reflect the Russian Federation's current tax legislation [76], average national indicators, and established business practices. The table also includes adjusted scenarios in which each factor is increased or decreased by 10 percentage points (pp).

Column 5 of Table 5 provides the resulting quadratic equations obtained after substituting the corresponding Equations 34 and 35, along with the specified values of influencing factors, into Equation 33 and simplifying the expression using PTC MathCad Prime 3.1. For instance, under current conditions, the representative enterprise with average sales profitability and wage levels operates with the following tax and contribution rates: VAT = 0.20, CPT = 0.25, PIT = 0.13, and SSC = 0.30. Moreover, by agreement with the employees, the share of gross profit allocated to the enterprise development fund is set at $\xi = 0.20$. Under these assumptions, and after performing the necessary algebraic transformations in PTC MathCad Prime 3.1 using the software code, the following quadratic function (parabola) is obtained:

$$0.1625 \times x^2 + 1.7677 \times x - 1.0161, \quad (36)$$

Table 5. Sensitivity of the maximum wage share to key model parameters

Factor	Designation	Factor value		Parabola equation	Maximum sustainable wage share in enterprise revenue (x_{max})
2	3	4		5	6
Valur Added Tax Rate	VAT	Current	0.2	$0.1625 \times x^2 + 1.7677 \cdot \times x - 1.0161$	54.73%
		Increased	0.3	$0.2438 \times x^2 + 1.6866 \times x - 0.9322$	51.45%
		Decreased	0.1	$0.0812 \times x^2 + 1.8488 \times x - 1.1001$	58.02%
Corporate Profit Tax Rate	CPT	Current	0.25	$0.1625 \times x^2 + 1.7677 \times x - 1.0161$	54.73%
		Increased	0.35	$0.1625 \times x^2 + 1.8677 \times x - 1.0529$	53.85%
		Decreased	0.15	$0.1625 \times x^2 + 1.6677 \times x - 0.9793$	55.70%
Personal Income Tax Rate	PIT	Current	0.13	$0.1625 \times x^2 + 1.7677 \times x - 1.0161$	54.73%
		Increased	0.23	$0.1625 \times x^2 + 1.8677 \times x - 1.0161$	52.05%
		Decreased	0.03	$0.1625 \times x^2 + 1.6677 \times x - 1.0161$	57.69%
Social Security Contribution Rate	SSC	Current	0.3	$0.1625 \times x^2 + 1.7677 \times x - 1.0161$	54.73%
		Increased	0.4	$0.1625 \times x^2 + 1.8677 \times x - 1.0161$	52.05%
		Decreased	0.2	$0.1625 \times x^2 + 1.6677 \times x - 1.0161$	57.69%
Share of Gross Profit Allocated to Enterprise Development	ξ	Current	0.2	$0.1625 \times x^2 + 1.7677 \times x - 1.0161$	54.73%
		Increased	0.3	$0.1625 \times x^2 + 1.8614 \times x - 1.0506$	53.90%
		Decreased	0.1	$0.1625 \times x^2 + 1.6740 \times x - 0.9816$	55.64%
Baseline Share of Variable Costs in COGS	$\tau(x)$	Current	0.4	$0.1625 \times x^2 + 1.7677 \times x - 1.0161$	54.73%
		Increased	0.5	$0.1975 \times x^2 + 1.7368 \times x - 1.0278$	55.65%
		Decreased	0.3	$0.1250 \times x^2 + 1.8040 \times x - 1.0074$	53.83%
Return on sales	ROS(x)	Current	0.099	$0.1625 \times x^2 + 1.7677 \times x - 1.0161$	54.73%
		Increased	0.199	$0.1825 \times x^2 + 1.7489 \times x - 0.9630$	52.22%
		Decreased	-0.001	$0.1450 \times x^2 + 1.7840 \times x - 1.0677$	57.19%

The quadratic equation yields two mathematical solutions: $x_1 = 11.4254$ and $x_2 = 0.5473$. However, the negative root (x_1) is economically infeasible because it violates the non-negativity constraints of the objective Function 25 and the wage share boundary condition 29. Consequently, the economically valid solution is $x_2 = 0.5473$, which corresponds to a maximum sustainable wage-to-revenue ratio of 54.73%. This value reflects the optimal balance among the financial outcomes of employees, enterprise owners, and the state, as derived from the model and presented in Table 5's final column. Table 6 illustrates the analysis of the sensitivity of modeling results for 2034 using the economic and mathematical model (25)-(32) to changes in the cost structure.

Table 6. Analysis of the sensitivity of modeling results for 2034 using the economic and mathematical model (25)-(32) to changes in the cost structure

№	Cost structure		The average monthly salary, considering the progressive labor incentive system, RUB	Average monthly contributions to the development fund (RUB)	Financial result (RUB)	Return on sales, %	State financial interest (CPT, VAT, PIT, and SSC) RUB.	Maximum share of wages in revenue, %
	Conditional fixed costs (%)	Conditional variable costs (%)						
1	40	60	149,005	25,540	52,862	18.32	103,802	56.56
2	50	50	153,864	26,451	58,936	20.42	112,610	55.65
3	60	40	158,722	27,362	65,009	22.53	121,417	54.73
4	70	30	163,581	28,273	71,082	24.63	130,225	53.83

The analysis presented in Table 6 proves the stability of the economic and mathematical Model 25-32 to changes in input parameters, particularly the cost structure. At the same time, we see that an increase in the share of fixed costs in the cost structure by 10% increases the average monthly salary by an average of 4,859 rubles in 2034, average monthly contributions to the development fund by 911 rubles, financial result by 6,074 rubles, and return on sales by 2.1%, the financial interest of the state by 8,808 rubles, and reduces the maximum share of wages in revenue by an average of 0.9%.

5- Discussion

5-1- Implications of the Model

This study develops an economic-mathematical model to maximize employee compensation while aligning it with enterprise revenue growth and reinvestment, addressing the financial outcomes of employees, owners, and the state.

Unlike conventional incentive models that focus on isolated performance metrics or static bonus structures [23-25, 43, 44-47], our model integrates wage policy into a dynamic system where compensation is a strategic lever for productivity and sustainability rather than a cost. This model demonstrates that wages can rise by 59.83% over ten years under a conservative annual labor productivity growth rate of 3%, which is consistent with global GDP trends (Figure 5), outpacing revenue growth and supporting Hypotheses H1, H2, and H8. This outcome reflects a progressive redistribution of labor value, enabled by productivity gains and structured reinvestment.

Wage levels increase at an annual rate of $\varphi = 5.98\%$, surpassing revenue (labor productivity) growth $a(\lambda)$, thereby supporting H1, H2, and H8. As illustrated in Figures 6 and 7, the model also ensures balanced outcomes for enterprise owners: development fund contributions rise by 24.96% over 10 years, net profit grows 2.97-fold, and sales profitability increases by a factor of 2.28, collectively validating Hypotheses H6 and H7. Furthermore, public revenue, comprising tax payments and social security contributions, increased by 58.78% over the same period (Figure 8), confirming H3-H5.

This challenges the prevailing zero-sum assumption in wage policy debates and provides a replicable framework for designing balanced financial systems in emerging economies.

5-2- Model Contribution and Sensitivity Analysis

This study proposes a novel economic-mathematical model that integrates the financial objectives of employees, enterprises, and the state through a unified system of wage policy, taxation, and reinvestment. In contrast to existing optimization approaches, which often treat these stakeholders in isolation [23, 43, 48-57], the present study This model combines nonlinear programming with simulation modeling to dynamically link labor compensation, sales profitability, tax revenues, and social contributions to enterprise revenue.

Applying the model to a representative Russian enterprise (with average profitability and wage levels), the model shows that under current fiscal and cost conditions (VAT = 20%, CPT = 25%, PIT = 13%, SSC = 30%, reinvestment share $\xi = 0.2$, variable cost share $\tau = 44.9\%$, and baseline profitability = 9.9%), the maximum sustainable wage share in enterprise revenue ($x_{\max}$) is 54.73%. This represents a 9.83-percentage-point increase over the baseline scenario (44.9%) (Table 4).

Sensitivity analysis reveals key policy insights:

An increase in any of the aforementioned fiscal or cost parameters, except the variable cost share $\tau(x)$, reduces the maximum sustainable wage share (x_{max}). The variable cost share $\tau(x)$ exhibits an inverse relationship: a 10-percentage-point (pp) increase in $\tau(x)$ raises x_{max} by 0.92 pp, while a 10-pp decrease lowers x_{max} by 0.90 pp (Table 5, Row 5, final column). The value-added tax (VAT) rate exerts the strongest influence on the maximum wage share (x_{max}). A 10-pp reduction in VAT increases x_{max} by 3.29 pp, while a 10-pp increase reduces it by the same magnitude, from 54.73% to 51.45%. Next in sensitivity are the PIT and SSC rates. A 10-pp reduction in either parameter raises x_{max} by 2.96 pp, whereas a 10-pp increase lowers it by 2.68 pp. This symmetric effect arises because both taxes are levied on the same base (employee compensation) and thus jointly shape the wage income's net fiscal burden.

5-3- A Practical Decision-Support System

This study proposes an integrated decision-support system that combines a progressive labor incentive scheme with an economic-mathematical model to balance the financial outcomes of employees, enterprise owners, and the state. The system enables enterprises to enhance core performance indicators, including revenue, net profit, wage levels, sales profitability, tax contributions, and product output, while maintaining price stability and output diversity. The model ensures that wage growth enhances, rather than competes with, enterprise competitiveness and fiscal sustainability by anchoring compensation to productivity gains and fiscal parameters.

The framework is designed for practical adoption: it can be operationalized as a standardized module within existing enterprise information and analytical systems (IAS). This scalability supports the development of sector-specific templates for wage policy design, which aligns micro-level decisions with national development goals. These features validate Hypothesis 9: the model balances stakeholder objectives and generates a replicable blueprint for "high-performance enterprises" whose success contributes to macroeconomic stability and inclusive growth.

5-4- Comparison with the Results of Previous Studies and Scientific Accumulation of Knowledge

The innovative model of labor productivity improvement and wage management proposed in this study differs from other well-known models in that, unlike, for example, the existing work of specialists in the field of labor productivity growth [17-19] and wage increases [14, 20-22, 25], this study offers a comprehensive support system management decision-making, which includes an economic and mathematical model for maximizing the share of wages in the company's revenue., consistent with the financial interests of the owners of the enterprise in the form of contributions to the enterprise development fund and the state through tax payments and contributions to off-budget funds, the sensitivity analysis of the maximum share of wages to the key parameters of the model is presented in Table. 4, software

based on MS Excel and PTC Mathcad Prime 3.1, which together provide the basis for creating a scientifically sound, complete, consistent and consistent decision-making system for business leaders and the government in developing support mechanisms for small, medium, and large businesses in micro, meso, and macro levels of the economy. The economic and mathematical Model 25-32 developed in the scientific article are innovative because they have specific methodological and theoretical features that distinguish them from similar models [23]. Thus, the model's theoretical feature is a clear definition of its structural role within the broader financial system. The model implements the interdependence of wage growth, profitability, taxation, and reinvestment. The methodological feature of the model is its practical application in various industries, which makes it possible to develop standardized decision support systems that can be integrated into existing enterprise-level information and analytical platforms, thus ensuring scalable data-driven management in accordance with national economic priorities.

As a result, this article develops the methodological and practical foundations of public financial technologies for the development of enterprises and countries with emerging economies. The main goal that combines the financial instruments used in this work: a progressive labor incentive system and state public motivation for the development of enterprises is to increase the incomes of working citizens and their families, which is beneficial for both the owners of enterprises and the state.

6- Conclusion

This study develops an economic-mathematical model that maximizes the wage share in enterprise revenue while balancing the financial outcomes of employees, owners, and the state within Russia's fiscal system. By integrating a progressive labor incentive mechanism, the model demonstrates that constraints 26-32 can be simultaneously satisfied when the objective Function 25 is maximized, as validated by the results in Table 4 (Column 12). However, sensitivity analysis (Table 5) reveals that higher VAT rates, social contribution levels, sales profitability targets, and fixed cost shares exert downward pressure on the maximum sustainable wage share (xmax). These findings emphasize the need for coordinated policy design at both macro and micro levels to ensure that wage growth remains compatible with fiscal sustainability and business viability. Future research should refine the ERA system to better capture the full spectrum of financial flows affecting the wage share. Additionally, the model's robustness and scalability should be tested through real-world implementation across diverse sectors, evaluating its performance under varying institutional, technological, and market conditions. This study contributes a replicable, evidence-based approach to wage policy that moves beyond zero-sum bargaining toward a system where productivity gains are equitably shared, enterprise resilience is strengthened, and public finance is sustained. In addition, this study is expected to be useful for the owners of enterprises, as it makes it possible to understand at what salary level employees work effectively, and they are motivated and have money left for the development of the enterprise and for equipping their workplaces with high-tech equipment, which in the future will further increase the productivity of employees.

7- Declarations

7-1- Author Contributions

Conceptualization, E.V.K. and L.M.P.; methodology, E.V.K. and L.M.P.; software, E.V.K. and L.M.P.; validation, L.M.P. and D.K.; formal analysis, L.M.P.; investigation, L.M.P. and D.K.; resources, E.V.K.; data curation, L.M.P. and D.K.; writing—original draft preparation, E.V.K.; writing—review and editing, E.V.K. and L.M.P.; visualization, E.V.K.; supervision, E.V.K.; project administration, E.V.K. All authors have read and agreed to the published version of the manuscript.

7-2- Data Availability Statement

The data presented in this study are available in the article.

7-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7-4- Institutional Review Board Statement

Not applicable.

7-5- Informed Consent Statement

Not applicable.

7-6- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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