

MODEL OF HUMAN RESOURCE MANAGEMENT IN MANUFACTURING COMPANIES USING KEY PERFORMANCE INDICATORS (KPIS)

DOI: 10.2478/czoto-2024-0009

Received: 26/10/2024

Accepted: 27/11/2024

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Abstract: Measuring the performance of manufacturing enterprises is now a key component of developmental organizational management. Key performance indicators make it possible to determine the effectiveness of implemented changes, set new goals and confirm the reasonableness of incurred expenditures. However, a key difficulty is the selection of adequate metrics, which should correspond to strategic objectives and be tailored to the specifics of the enterprise. Therefore, the purpose of the study was to present a model for effective human resource management in manufacturing enterprises based on key performance indicators. The developed model makes it possible to justify the necessity and examine the relevance of decisions made and investments incurred. The originality of the study is due to the methodological nature and concerns the model used, which is the author's tool for supervising the development strategy of the organization taking into account the well-being of employees. The presented model can provide important support for managers shaping the personnel policy of the enterprise and carrying out tasks in the field of employer branding.

Keywords: key performance indicators, key performance measures, management and quality, strategic management, human capital

1. INTRODUCTION

The increasing globalization of trade, the dynamic development of technology, the increasing intensity of competition require businesses to develop and implement innovative management methods (Ulewicz, et al. 2023). Orienting the management method of a manufacturing enterprise towards increased efficiency and innovation becomes possible by achieving and strengthening competitive advantage (Klimecka-Tatar, et al. 2021, Pacana, and Czerwińska, 2020, Ramirez-Zuñiga et al. 2024; Jemela 2024).

One of the competitive advantages is human capital. There is an increasing emphasis on the importance of its analysis (Tootel et al., 2009). HR analytics is the systematic



identification and quantification of the human factors that affect a company's business performance (Gajdzik, 2015). HR analytics is most often concerned with examining an organization's HR and data processing problems and drawing lessons for the future, i.e. turning data into information and information into forward-looking analyses (Gajdzik and Wolniak, 2022). Measurements within human resources (HR) should be impact-oriented and future-oriented (Blaskova, et al., 2017; Stacho et al. 2024). Measurements should be focused on the HR area as a whole, not monitoring only individual practices. The most common obstacles to measuring human resources are lack of or low levels of experience and precision, and difficulties in the measurement itself (Toulson and Dawe, 2004; Wolniak, 2024).

Key performance indicators (KPIs) at HR level have become a significant benchmark in the business sector. KPIs are a helpful measurement tool, providing HR professionals with useful information while illustrating the company's performance in key areas. KPIs are relevant and effective when used consistently and comprehensively. These metrics are often referred to as critical management tools, which allow for ongoing control and for increasing the efficiency and operability of an industrial entity (Pacana et al, 2016; Kocylowska and Pietraszek, 2010). Financial performance in an effectively managed company must be seen as a critical measure of success. With financial KPIs being linked to a set of operational metrics, also at the HR level (Bean and Gerathy, 2003). A useful set of KPIs should be identified, defined, formalized (Bauer, 2005, Siwiec and Pacana 2022) and based on non-manipulative formulas (Czerwinska et al., 2023). All KPIs used in a manufacturing company should have an impact on the development decision in a specific perspective and time scale, depending on the possibilities and time availability. A useful set of indicators should show a direct link between KPIs and company objectives, then between objectives and tasks and finally between objectives and development strategies (Ingaldi and Dziuba, 2020).

The problem, however, is the adequate selection of KPIs, which must meet a number of characteristics - they should be matched not only to the marketing plan, the overall strategy of the entity, the specified specific objectives, but also to the nature of the business (Czerwińska et al., 2020). Due to the presented identification and implementation difficulties, the aim of the study was to create and verify a model for the selection of key performance indicators in the HR area in manufacturing companies in accordance with their vision and strategic objectives. The developed model may serve as a model for entities wishing to improve internal processes and for management staff shaping the company's HR policy and implementing employer branding tasks.

Sustainable industry, managed by selecting appropriate metrics, requires the use of appropriate optimization techniques for implemented production processes, including design of experiments (Dwornicka & Pietraszek, 2018; Jasiewicz et al., 2021) and fuzzy approach (Pietraszek, 2013) due to the impact of a human factor. This allows for the implementation of highly specialized techniques for refining working surfaces (Radek et al., 2020), significant reduction of fatigue effects (Ulewicz et al., 2014; Markovic et al., 2021) as well as the implementation of appropriate production (Knop, 2019) and environmental (maritime) supervision methods, including the capture of emitted toxic pollutants in appropriate purification processes (Radzymińska & Ulewicz, 2015; Kalak et al., 2021).

2. CHARACTERISTICS OF KPI - ADEQUATE SELECTION AND EFFECTIVE ACTION

In the implementation of KPIs in manufacturing companies, one of the key issues is the ability to distinguish more relevant indicators relating to strategy from mere metrics. The implication of inappropriate metrics can frustrate performance management initiatives and demotivate employees (Czerwinska and Pacana, 2022). To be useful and effective, the KPIs used by companies should have the set of characteristics shown in Table 1.

Table 1
Key features of KPIs

Author	Feature	Description
Eckerson, 2006; Eckerson, 2009	Aligned	KPIs aligned with the company's strategy and goals
	Owned	There must be a defined person or group who 'owns' each KPI on the business side and is responsible for its outcome.
	Predictive	KPIs are the key performance indicators expected by the company
	Actionable	KPI values are delivered in a timely manner so that owners can intervene to improve
	Few in number	KPIs should be focused on a few high-value, relevant and targeted tasks
	Easy to understand	KPIs should be simple and not refer to complex indexes that users do not know how to interact with directly
	Balanced and linked	KPIs should balance and reinforce each other, not undermine each other and sub-optimize processes
	Trigger changes	KPIs should trigger positive behaviour and create a chain reaction of changes in the company leading to improved performance
	Standardized	KPIs should be based on standard definitions, rules and calculations so that they can be understood within the company
	Context driven	KPI contextualise performance, including targets and thresholds to performance, to ensure that progress can be assessed over time
	Reinforced with incentives	Organizations can amplify the impact by attaching compensation or incentives to well understood and stable KPIs
Hursman 2010; Cervi et al., 2017	Relevant	KPIs need to be reviewed and refreshed periodically as they gradually lose their impact and validity over time
	Specific	The description of the KPIs must contain enough information for the target to be well understood by stakeholders
	Measureable,	KPI refers to success that can be quantified and assessed against a specific target measurement or within a target range
	Attainable	The KPI should refer to a target that is achievable with the resources and time allocated
	Relevant	KPIs measure criteria that are relevant to the business objective
	Time-based	A KPI has a clearly defined time period or point in time at which it will be measured

Source: (Eckerson, 2006; Eckerson, 2009; Hursman 2010; Cervi et al., 2017).

Despite the considerable number of characteristics that KPIs should fulfil, many authors take a clear view and believe that KPIs should be primarily aligned with the strategic business goals and objectives of the company, rather than individual business processes and activities, in order to optimize performance and drive productive behavior towards a common goal (Bauer, 2004, 2004a; Eckerson, 2006; Hursman, 2010; Cronin, 2007).

3. METHODOLOGY OF RESEARCH

It is crucial to prepare HR staff to use the management information provided by HR controlling (Pacana et al., 2018). The first step should be to select the most relevant metrics for each soft HR area.

The initial identification of the HR KPIs in the case under consideration was based on a literature analysis, resulting in the specification of a list of metrics for further analysis. The final selection was based on an elaborated model that took into account the previously identified key success factors in the HR area:

- KCS1: Ensuring that the enterprise has access to the human resources it needs,
- KCS2: Development of competence and knowledge,
- KCS3: Motivating employees,
- KCS4: Ensuring a friendly working environment.

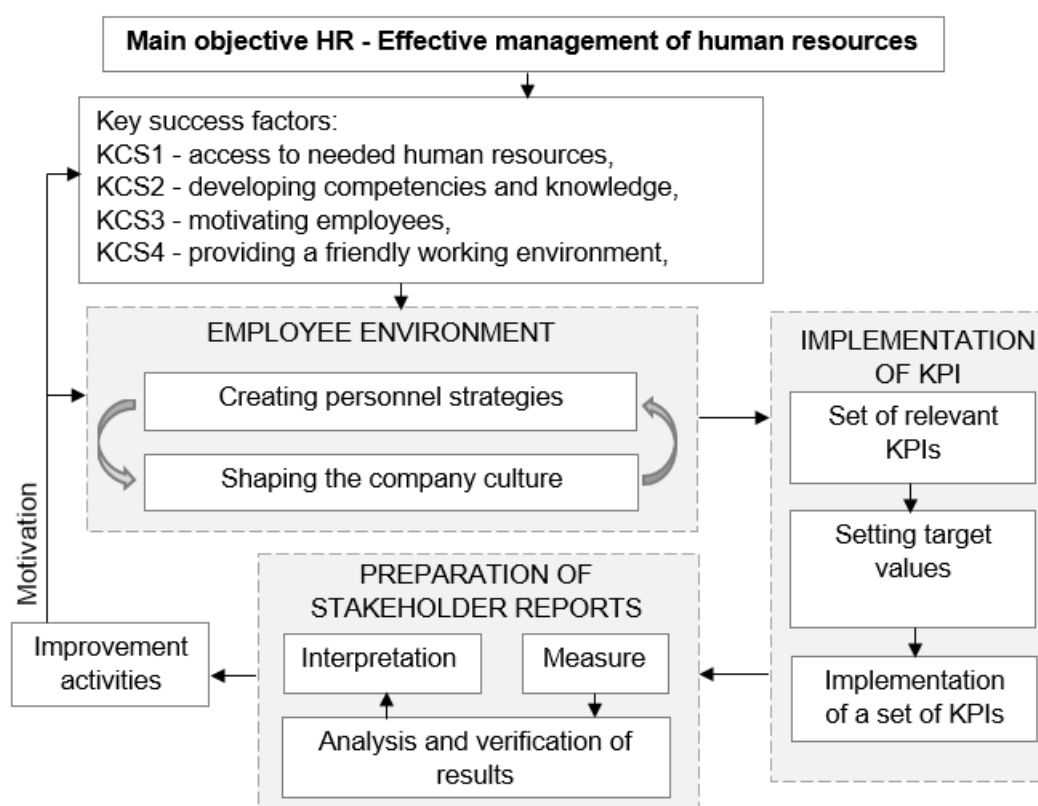


Fig. 1. Human Resources (HR) KPI selection model for manufacturing companies

It was assumed that the process of selecting key performance indicators for HRM activities could be systematized and streamlined through the development and application of an appropriate model. A general framework for the selection of indicators can serve as a guideline for internal analysis and supervision (Ogunlana, 2010). The development of an effective set of KPIs involves the fulfilment of four conditions (Popa, 2015):

- ensuring that metrics are in line with targets,
- correct collection of the necessary information,
- controlling the measurement process,
- correct preparation of reports (results) for stakeholders.

Each manufacturing company may have different needs and consider different objectives as key, and therefore the set of KPIs adopted should be relevant to the company's current and individual situation. Based on the rationale presented and recommendations from the literature, an HR KPI selection model for manufacturing companies was developed. The model is presented in Figure 1.

A properly selected set of key performance indicators for HR processes should be helpful and result in HR management departments starting to identify and collect adequate data and information, which will become the basis for the implementation of analyses, synthesis and conclusions, as well as the selection of an appropriate development strategy.

The developed model for the selection of an optimum set of KPIs is in line with the idea of continuous improvement, i.e. improving every aspect of the functioning of HR areas and every process taking place in them, but in a continuous, systematic manner.

4. RESULTS AND VERIFICATION

The model was verified through its implication in a manufacturing company located in the south-eastern part of Poland. The company has been in business for 20 years, offering products made from light alloys to sectors such as medicine, robotics, energy, railways, mechanical engineering, engine technology, aviation and defense. The company employs around 1,400 people. The research was implemented in the first quarter of 2024.

The implementation of the developed HR KPI selection model for manufacturing companies was a major undertaking. It involved the establishment of a formal project characterized by the following features:

- staggered,
- distribution across departments/divisions, teams, resources involving different people and their competencies,
- a structured sequence of activities,
- an objective, closely linked to the achievement of specific results (supported by specific indicators),
- implementation within a defined budget,
- going beyond the standard and described activities defined for a given employee, team, department, division.

Ensuring that the model's implementation processes meets the specified characteristics significantly increased the probability of success of this endeavor.

On the basis of the developed procedure model, the selection of KPIs in the area of human resources management for the manufacturing enterprise was based on a logical relationship between the degree of relevance and the specified key success factors. The developed model made it possible to extract the following set of KPIs for the human resources management area (Table 2).

The FTE (Full-Time Equivalent) metric used is defined as: full-time equivalent, full-time equivalent or full-time substitute.

The metrics were subject to verification and final formulation based on the SMART (Specific, Measurable, Achievable, Relevant, Time-bound) method. In line with best practice in the effective identification and adequate selection of KPIs, financial and non-financial indicators (with a numerical predominance of the latter) were included in the compilation. Information useful for measuring the effectiveness of activities carried out by HR was collected from employee records (employee personnel files and other

documentation on matters related to the employment relationship), training, surveys and interviews with customers, the company's development strategy.

Table 2

Set of KPIs for the HR area of a manufacturing company

A key success factor	KPI	Method of calculation
Ensuring access to the human resources it needs	Average cost of external recruitment	Cost per employee by source of recruitment
	External recruitment rate	Number of employees from outside the company ÷ Current number of employees
	Quality of newly recruited staff	Post probationary hires by recruitment source
	Profitability of human resources	Revenue from sales of products ÷ number of employees
Development of competence and knowledge	Cost of training as a total wage bill	(Total training costs ÷ total wage costs) - 100
	Return on investment for training and development of employees	Total investment benefits ÷ total investment costs
	Number of days/hours of training per full-time position	Number of days/hours of training for a position or group of positions ÷ FTE (e.g. by position)
	Employees included in the competence assessment system	Number of employees for completed competency ocean for a given period ÷ Number of employees covered by a given appraisal system - 100
Motivating employees	Employees included in the performance appraisal system	Number of employees with realised performance ocean for a given period ÷ Number of employees covered by a given appraisal system - 100
	Share of bonuses, commissions and financial rewards in salaries	Cost of bonuses, commissions and financial rewards ÷ Cost of financial salaries excluding non-scheduled benefits
	Payroll profitability (amount of profit per PLN 1 of salary fund)	Gross financial result ÷ Salary fund
Ensuring a friendly working environment	Engaging employer brand	Employees rating the company's image as an employer well and very well against the current labour market offer
	Leaving rate	Number of departures ÷ FTE
	Average length of service in months	Length of service of all employees employed in the company in the given year [in months] ÷ Number of all employees employed in the given year
	Average cost of employee resignation	Sum of resignation and replacement costs ÷ Number of resignations

Source: own development

It should be borne in mind that the value of the measure alone does not provide complete information about the enterprise. Some kind of benchmark should be adopted. The foundation for comparison can be:

- past results - their limitation is the need to maintain the same survey conditions, which leads to not taking into account the impact of random factors on the result (e.g. economic or technological changes),
- planned figures and norms - as long as the plan is realistic from a company interest perspective,
- other companies - so-called spatial comparisons retain their relevance if potential differences in the specifics of the businesses being compared are taken into account,
- average sizes - this type of comparison is important because of the social function of wages.

KPIs should take into account important regularities, distinguish and present meaningful processes in a changing management reality. It should be noted that a set of indicators is never something permanently valid (indicator life cycle). The chosen set of KPIs should be evaluated and revised periodically, in accordance with the changing internal and external situation of the company. KPIs are also not universal measures; they depend on the specific characteristics of the entity and what information is needed at a given stage of the company's development.

The model provided important support for the implementation of human resources management processes, decision-making and the identification of developments and improvements in the company's human resources policy. The set of selected KPIs should also be used to propose improvements in human resources management, which will have a significant impact directly on employee satisfaction and indirectly on the satisfaction of external customers.

5. CONCLUSION

One area where KPIs are used is human resource management. The use of KPIs enables organizations to monitor, define strategies and appropriate methods of managing human capital. The purpose of this study was to create and validate a model for the selection of HR KPIs in manufacturing companies according to their vision and strategic objectives.

According to the developed HR KPI selection model for manufacturing companies, the basis for the selection of indicators were the key success factors of the analyzed area defined for the organization. The key step was to match them with adequate HR performance measures. Practical verification of the developed model confirmed its usefulness and the correctness of its design and adopted assumptions. Implementation of the model made it possible to develop an adequate set of indicators, which was helpful in monitoring the effects of HR area activities and made it possible to justify the necessity and diagnose the accuracy of undertaken undertakings and development strategies.

The developed model can be successfully implemented and used as part of research on sound human resource management in manufacturing companies. Future research directions will focus on completing the collected set of performance measures and examining the correlations between them. Further research will also be carried out in the validation of digital data collection and information analysis methods using KPIs for diagnosing human capital management strategies and methods.

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