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EMPLOYEE PERFORMANCE MEASUREMENT AND IMPROVEMENT SYSTEM

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ABSTRACT: *Efficient logistics represents a crucial differentiating factor in the market. The distribution centre employee occupies a special role for reaching the goal of more efficient logistics. One approach is to increase the logistics performance by improving labour productivity due to increasing work motivation. The developed employee performance measurement and improvement system is a combination of a performance measurement, feedback and remuneration system. This system is based on the Productivity Measurement and Enhancement System but has more functionalities. The developed system provides a tailored solution to increase productivity. The modules of the system meet different must-have and nice-to-have requirements. The system is characterized by high flexibility, transparency, and comparability. At the same time, the acceptance by the employees is given by the participation approach. The benefit is a significant potential to increase work motivation*.

KEYWORDS: logistics, labour productivity, performance measurement

INTRODUCTION

The central challenges for the manufacturing industry in the upcoming years will be complexity, innovation, and flexibility (Spath et al., 2013). The increasing complexity refers to both the products and the production processes. Reasons for this complexity are the spread of new technologies, the internationalization of markets, growing customer demands, and quickly changing conditions (Cao & Zhang, 2008). Similarly, shorter innovation cycles demand manufacturing companies to steadily invest in improving innovation abilities (Sohlenius et al., 2006). Furthermore, short-term changes, increasing market volatility, and customer demands for rapid reaction capabilities require more flexible production and logistics. If companies want to meet these challenges, they have to focus on all organizational fields – technology, logistics, and organization (especially personnel) (Meyer et al. 2015; Nyhuis et al., 2010; Kuzgunkaya & ElMaraghy, 2006). In this context, the employee represents a key factor because he, through flexible performance, especially influences the competitiveness of companies (Eicker et al., 2008; Spath et al., 2013; Drejer, 2001). It is necessary to combine organizational field logistics better with personnel. The employees play an important role in companies, which especially distinguish them from competitors through their logistics performance.

Logistics has become increasingly important (Pfohl, 2001). Employees increasingly influence the logistics performance and significantly contribute to the company's success (Meyer et al. 2015). On the one hand, the challenge of logistics is to reduce costs, but on the other, the challenge is to enhance the logistical quality. In this context, the distribution centre takes up a special position. However, studies show that logistics and especially intralogistics costs can be reduced with improved process management (Christopher, 2004)

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One approach to enhance the logistics performance is to improve labour productivity by increasing employees' motivation. Companies must develop innovative concepts which motivate employees with incentives to improve their performance. To achieve this goal companies often consider implementing performance-oriented remuneration systems (Gertz, 2010). In literature, it is controversial whether solely through the payment of a bonus, the motivation can be sustainably increased (Markham, 1988). Companies should rather focus on a combination of motivational elements to improve employee morale. This involves a range of an increase of extrinsic motivation through incentive payments to an increase of intrinsic motivation through employee promotion in the form of participation. This results in the requirement of a design of a performance-oriented remuneration systems that take intrinsic factors, such as the idea of participation, sufficiently into account (Friesike & Gassmann, 2010; Gertz, 2007; Frey, 2010).

This paper takes the same approach and describes a developed employee performance measurement and improvement system combined with a performance-oriented remuneration system, which helps companies increase the motivation of logistics employees and improve the productivity in distribution centres.

THEORETICAL FUNDAMENTALS

DISTRIBUTION CENTRE

Kerber and Dreckshage (2011, p. 1) define supply chain management as "the planning and management of all activities involved in sourcing and procurement, conversation (make), and logistics management activities. The steps generally included in the discipline are (1) plan, (2) source, (3) make, (4) deliver, and (5) return". In this context, logistics plays an important role, especially the distribution centre. The distribution centre focuses on dispositive activities. The functions of a distribution centre are receiving, processing, storing, picking, packing, shipping and waste disposal. On the one hand, the supplier delivers the goods to the distribution centre, and on the other hand, it also carries out goods to the customer and manages the return of goods or packaging from customer to supplier (Gudehus, 2000). Therefore, the distribution centre has a special role within the supply chain and represents a primary target for process optimization. Today, the work in distribution centres is characterized by various trends, such as very high quality requirements, increasing cost pressures, low inventory, short lead times and on-time production. Additionally, diverse customer requirements and strong demand fluctuations, delivery time reduction, increasing complexity, and an increase of order lines are required (Jünemann & Beyer, 1998; Esser & Hoffbauer, 2009; Herrmann, 2008).

WORK MOTIVATION

Companies strive to increase productivity to be more competitive (Kleinbeck & Kleinbeck, 2009). In general, the quality and quantity of work results in the performance capability, characterized by the skills and abilities of a person, as well as the work motivation, which is characterized by working motivation (Kiener et al., 2006; Zäpfel, 2000). Pinder (2008, p. 11) defines work motivation as "a set of energetic forces that originate both within as well as beyond an individual's being, to initiate work-related behaviour and to determine its form, direction, intensity and duration." Results of increased work motivation are high labour productivity, high job satisfaction and high well-being of the employees (Kleinbeck & Kleinbeck, 2009). Locke (1976, p. 1304) describes job satisfaction as "… a pleasurable or positive emotional state resulting from the appraisal of one's job or job experience".

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Many authors differentiate between intrinsic and extrinsic motivation (Cameron & Pierce, 2002). According to Herzbergs, Mausners and Snydermans theory, intrinsic motivation reflects on several motivational factors (Miner, 2007). "Intrinsic motivation is defined as the doing of an activity for its inherent satisfactions rather than for some separable consequence. When intrinsically motivated, a person is moved to act for the fun or challenge entailed rather than because of external prods, pressures, or rewards." (Ryan & Deci, 2000, p. 56). The motivation thus occurs from the inside (Grant, 2008). In particular the intrinsic job-attitude factors are achievement, recognition, possibility for growth, responsibility, work itself and advancement (Herzberg et al., 2010). "Extrinsic motivation is a construct that pertains whenever an activity is done in order to attain some separable outcome. Extrinsic motivation thus contrasts with intrinsic motivation, which refers to doing an activity simply for the enjoyment of the activity itself, rather than its instrumental value." (Ryan & Deci, 2000: 60).

The consequence is that companies should, on the one hand, focus on stimulating the extrinsic motivation through monetary incentives, and on the other hand simultaneously promote the development of intrinsic motivation to increase labour productivity (Frey, 2010; Lim & Sng, 2006; Grant, 2008).

PRODUCTIVITY MEASUREMENT AND ENHANCEMENT SYSTEM

If companies want to improve labour productivity, they first must be able to measure the performance (Marcus & Schuler, 2001). In this context, key performance indicators (KPI) allow companies to measure the logistics performance of the relevant system and thus provide a basis for the improvement process. The aim of using KPI is to assist the management in making decisions (Arnold et al., 2008). Because the validity of a single KPI is relatively limited in a complex and only partly transparent economic process, the coexistence of several KPI is necessary. A performance measurement system combines several KPI (Küpper, 2005; Weber, 1995). By implementing a performance measurement system in logistics, the following objectives are pursued among other things (Grochla et al., 1983):
Performance-based assessment of areas and employees

- Clear specification of logistical objectives
- Early detection of deviations, opportunities and threats
- Supporting the development of rationalization potentials

In practice, different measurement systems were used for the performance analysis. Scientific studies have been argued that using the instrument of a 'Productivity Measurement and Enhancement System' (ProMES) helps to develop tailored performance measurement systems. The performance evaluation of this system leads to productivity improvements and can also be a basis for a performance-based remuneration system (Sodenkamp et al., 2002; Fuhrmann et al., 1999). In Germany, ProMES is called 'Partizipatives Produktivitätsmanagement' (PPM). In addition, it supports the increase of work motivation, but has many more functionalities outside of measuring labour productivity (Przygodda, 1994). PPM is based on the rationale that clear and achievable goals are necessary to improve productivity. These goals should be directly influenced and accepted by the employees and their achievement is reported directly and regularly. PPM allows groups to activate the self-management of work processes (Hoschke, 2001). The employees play an important role because they actively participate in the development and design of the productivity measurement system and its influencing factors as well as in the analysis, the feedback and the development of improvement proposals and their

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implementation (Kleinbeck & Kleinbeck, 2009; Sanders & Bock, 2009; Wilkesmann, 1999; Voß & Wilke, 2003).

Scientific studies have shown that an increase of behavioural productivity can be generated by improving work motivation. This is where the concept of PPM comes into place. By reporting behavioural productivity data, employees receive additional information regarding how their activities can be performed more efficiently. Thus, a goal-oriented management of the employees' activities is allowed. In this manner, physical and psychological stress can be studiously avoided (Pritchard et al., 1993; Werthebach et al., 1998).

An important characteristic of PPM is the determination of a total index of the productivity and KPI of secondary importance. The advantage of the determination of a total index is that employees can easily identify positive and negative developments concerning their labour productivity. Furthermore, a total index is helpful to initiate change processes and assess them afterwards. In addition, it is ancillary for the design of individual target agreements or incentive programmes. On the one hand, PPM is a complete measuring system which exactly determines the facts; on the other hand, it is also able to represent the different weights for different productivity characteristics. Another advantage of PPM is its transparency and acceptance by the employees. If it is possible to achieve the necessary acceptance of the employees, PPM offers the chance to exploit work motivation (Pritchard et al., 1993; Przygodda, 1994; Heckhausen & Heckhausen, 2006). PPM is directly connected to the principle of group work, because it implicates structural homogeneity and autonomy, as well as regular meetings of its members (Sodenkamp et al., 2005).

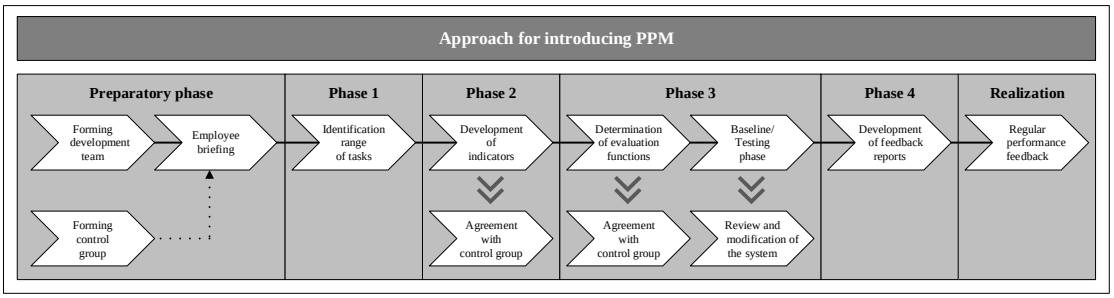

Figure 1: Approach for introducing PPM (Hoschke, 2001)

The implementation is structured into a preparatory phase, four main phases and the realization phase (see figure 1). The positive motivational impact of PPM leads to improved labour productivity and thus increased competitiveness, in particular through the development process (Przygodda, 1994). The motivational effect of PPM on labour productivity can be further supported by the payment of a performance-based remuneration (Kleinbeck, 2008).
The next chapter describes the development of PPM to an employee performance measurement and improvement system combined with a performance-oriented remuneration system.

EMPLOYEE PERFORMANCE MEASUREMENT AND IMPROVEMENT SYSTEM

CONCEPTUAL DESIGN

In general, an employee performance measurement and improvement system should have the following features: flexibility, transparency, acceptance, comparability, efficiency, and an increase in motivation & satisfaction. Companies are forced to react flexibly to changes in

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competitive conditions. This flexibility should also be reflected in the employee performance measurement and improvement system. The requirement of transparency to the model describes the importance of a fair system that is easily comprehensible for all employees and includes a sufficient consistency. This includes the reproducibility of data or the use of objective data. In addition, the system should meet a broad acceptance from employees, so that it can have a performance-enhancing effect (Pritchard et al., 1993). Comparability describes the requirement for the system to allow comparisons between areas within the logistics. The decisive requirement feature is efficiency. The intended benefit of the implementation and the practice of the system must be inevitably higher than the costs. In addition, the system should have the ability to increase the motivation and satisfaction of employees. For this reason, during the development of the system it always considers whether the respective elements have a positive effect on the employee's motivation (Przygodda, 1994).

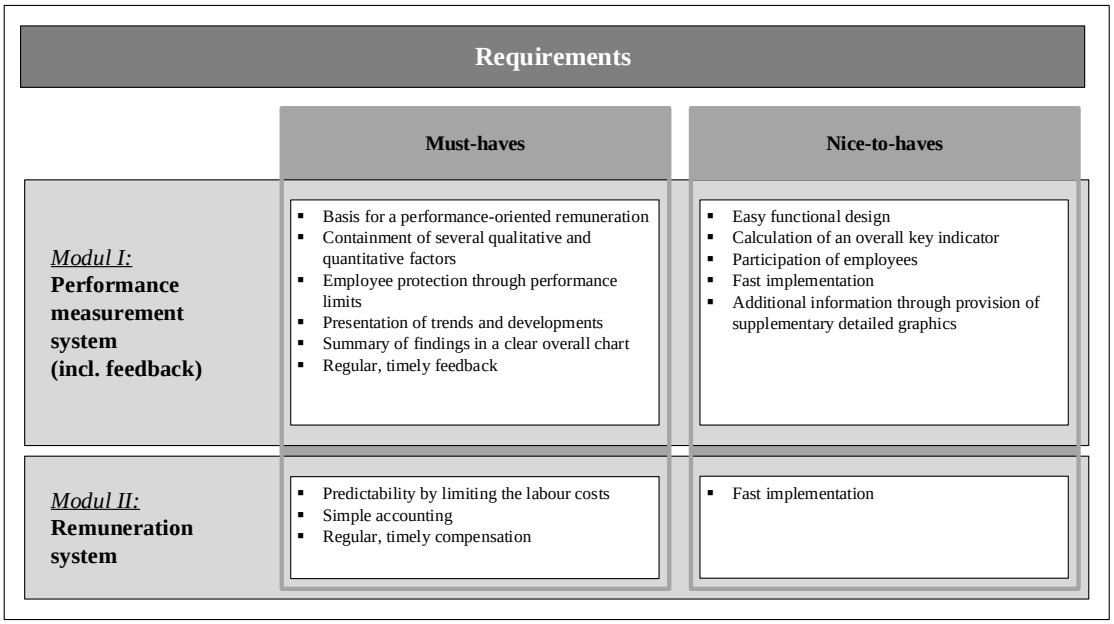

Figure 2: Requirements of the employee performance measurement and improvement system

The employee performance measurement and improvement system is divided in two modules: a performance measurement system (incl. feedback) and a remuneration system, to achieve a high degree of flexibility, transparency and acceptance. The advantages of this combination are that individual adjustments can be made quickly, there is a sufficient level of detail, and a thematic separation of the main contents of a performance-oriented compensation model is made.

Figure 2 gives an overview of the requirements for the respective module. A distinction is made between must-haves and nice-to-haves. Based on these requirements, a performance measurement system based on the concept of the PPM is particularly suitable. PPM is a useful instrument to create high acceptance of all involved stakeholders because of its participative approach. In addition, it is flexible and meets the criteria of comparability. The employee performance measurement and improvement system also consistently fulfil the other Must-Haves requirements. Furthermore, an overall key indicator is calculated from the various qualitative and quantitative indicators. The key advantage of PPM is the productivity

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improvement through increased employee motivation. The developed system based on its performance measurement system includes a feedback system and its remuneration system on PPM but also includes additional elements.

Performance Measurement System

Goal	Indicator	Department	Minimum value	Target value	Maximum value	KPI range	Actual value	LPF	
Logistics costs reduction	Costs per order line	All	10€	5€	3€	-100 to +100	3€	+100	
Performance increase	On-time delivery	Dispatch	95%	97%	100%	-60 to +85	98%	+65	
	Picks per man-hour	Picking	50	100	200	-100 to +100	100	+0	
	Processing time per return	Returns	15 min	10 min	5 min	-20 to +40	12 min	-10	
Quality enhancement	External complaints	All	10	2	0	-100 to +50	6	-50	
Work safety	Work-related accidents	All	5	0	0	-100 to +0	1	+0	

LPF total	+105
Maximum achievable LPF	+375
Minimal achievable LPF	-480
Overall key indicator	28%

(LPF = Logistics Performance Factor)

Figure 3: Example of the performance measurement system (incl. feedback)

Figure 3 shows the structure of the system with examples. The clarity and transparency becomes immediately clear. The performance measurement system includes several key performance indicators (for example work-related accidents), which enables the system to measure the performance in the relevant period. The key performance indicators are assigned to different targets. For example, the indicator for work-related accidents belongs to the goal of work safety. The clustering of the KPI results in an improved structure of the system which increases the transparency. It should be noted that the measures may relate to a specific area, e.g., the returns area. Furthermore, a target value for the respective KPI is set which should be achieved during the period. In addition, a minimum and a maximum value will be defined. These values indicate the minimum and maximum, which is received by exceeding or falling below the work power in the system. The advantage of the minimum value is that if only one value is considerably lower than the target value, the minimum value will be counted, and the overall performance will not be excessively impacted by only one KPI. On the other hand, a maximum value is helpful to limit the work power and protect employees from self-exploitation.

When calculating the performance of the respective KPI a 'Logistics Performance Factor' (LPF) is assigned. The LPF results from the evaluation function of the respective KPI. What the evaluation function exactly is will be explained later. The sum of the LPF is represented by the value 'LPF total' (see figure 3). The 'Maximum achievable LPF' is the sum of all maximum values of the LPF range. The calculation of the minimum values is analogous. The 'Overall key indicator' displays the performance of the group within the observation period in one single figure and is calculated by dividing the 'LPF total' by the 'Maximum achievable LPF' (see figure 3).

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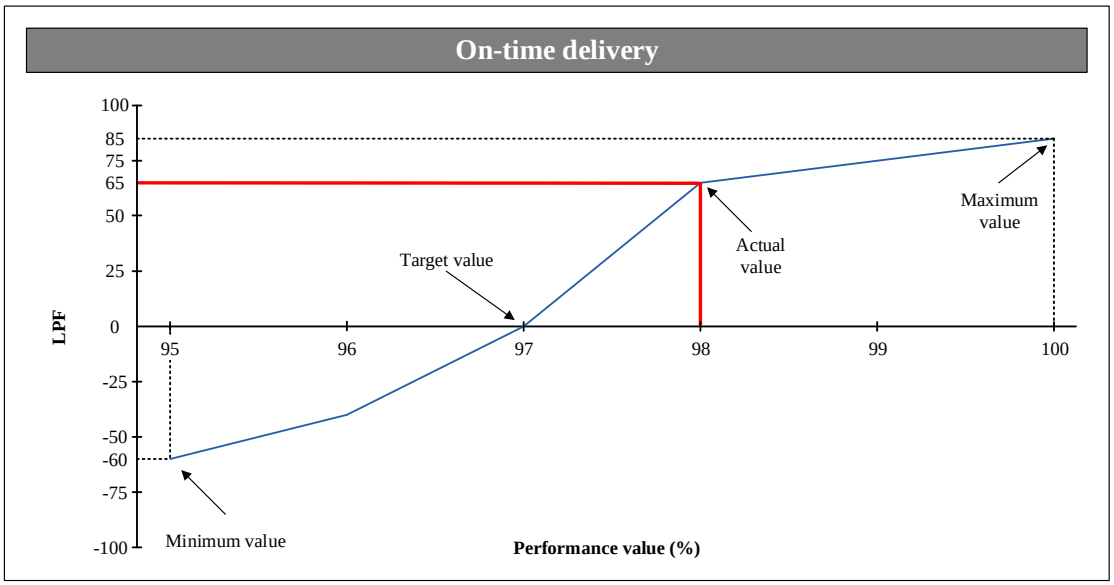

Figure 4: Evaluation function of KPI On-time delivery

Figure 4 shows an example of an evaluation function. For the KPI, "On-time delivery", a maximum (100%), a minimum (95%) and a target value (97%) are determined. The maximum value corresponds to the best expected performance which can be achieved. The minimum value represents the worst predicted performance. The performance which will be achieved by the group or single person in the normal case corresponds to the expected value (Hoschke, 2001). The target value is assigned to the abscissa of the zero point of the performance value. On the ordinate, the range of values of LPF is applied. Usually, the LPF value is from -100 to + 100 for the most important KPI. Generally, the most important KPI should be identified and the maximum performance value of +100 should be allocated. The determination of the limits of the LPF and the indicator value can be done individually. For example, the values can also range from -35 to + 45 (Kleinbeck & Kleinbeck, 2009; Pritchard & Sargent, 2005). In the example, it is assumed that the KPI 'On-time delivery' has minor importance to the overall productivity. Accordingly, the maximum LPF value of only +85 can be achieved with maximum productivity (see figure 4).

The system should be adapted to the local conditions. For example, the number of goals and indicators can vary. In the literature, this is referred to as number 3-8 goals and 12 indicators (Pritchard & Grossmann, 1999; Pritchard et al., 1993). However, this is only a suggestion. The number should be determined in each case individually by the group.The colour of the traffic lights on the performance measurement system gives the employees feedback about the performance of each indicator: green colour means 'great performance', yellow means 'performance was ok' and red means 'performance should be improved'. In this way, the employees receive a simple, quick and summary assessment of their performance (see figure 3).

Basically, companies can choose between different incentive and compensation options for the remuneration system. Distribution centres are often characterized by inaccurate piecework specifications and increased automation processes. So for the remuneration system, a premium wage is suitable because several quantitative and qualitative KPI can be considered. The premium wage enables high flexibility, transparency and acceptance.

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It also increases work motivation and enables a limitation, which prevents self-exploitation of the employees. The performance can be assessed and remunerated based on the overall key indicator. A bonus amount should be determined by taking economic aspects into account and could be paid per achieved percentage point. A sanctioning of negative performance through wage deduction is not recommended.

PROCEDURE FOR THE IMPLEMENTATION OF THE SYSTEM

Figure 5 show the procedure for the implementation of the developed employee performance measurement and improvement system. The procedure is similar to PPM, however, consists of a preparatory phase, 5 main phases and the realization phase. In comparison to PPM, there is one more phase.

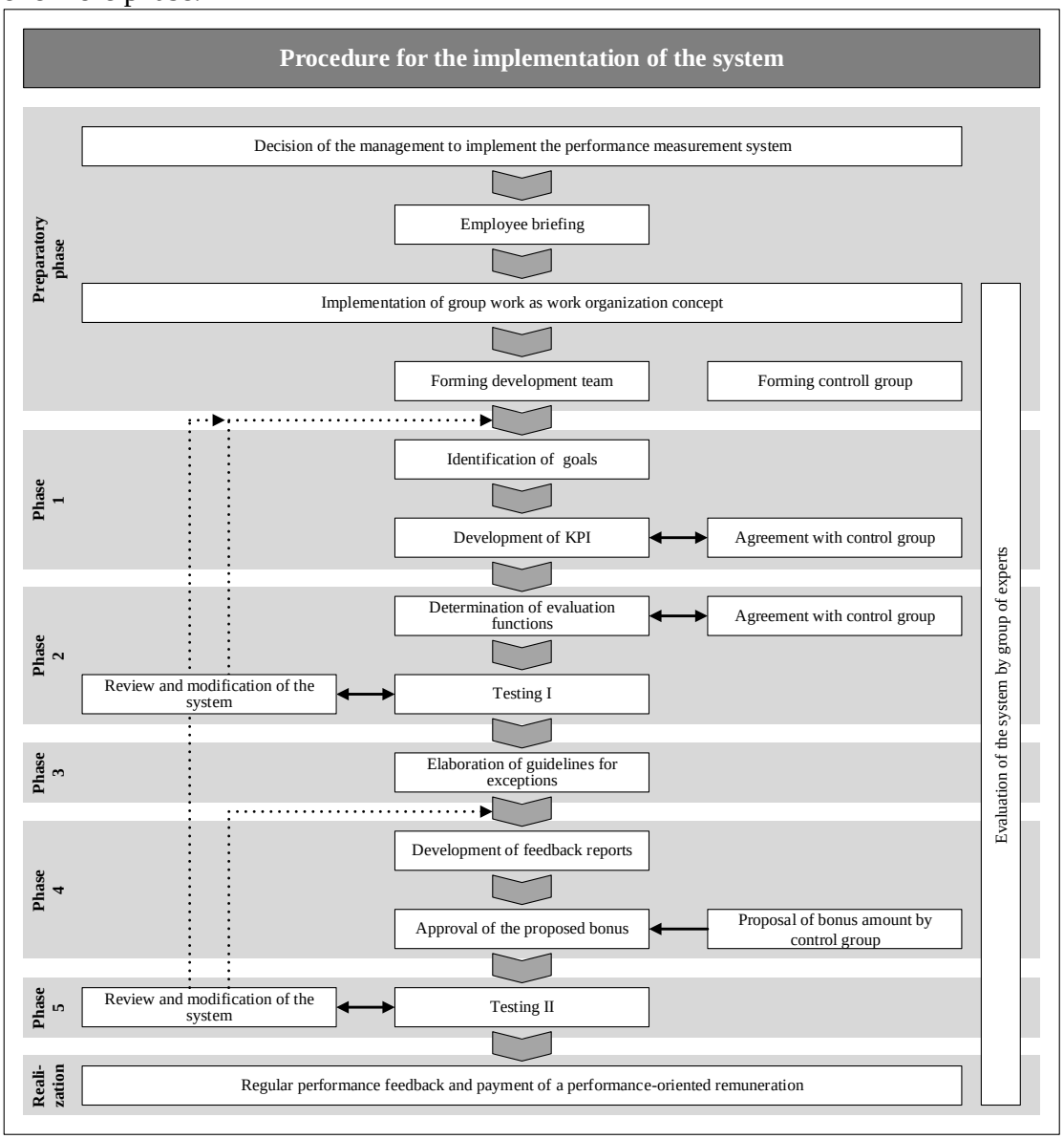

Figure 5: Procedure for the implementation of the system

In the preparatory phase, the management must make the decision to implement a performance measurement system. Usually, the work council of the company must be consulted and give approval if the implementation of a performance-oriented remuneration system is planned.

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After the decision has been made, the employees will be informed about the project in an information event. The first task of the management and the employees is to implement the work organization concept of group work if this does not already exist. Group work is an essential success factor for the implementation of the employee performance measurement and improvement system. Next, a development team has to be formed and a control group (see figure 5). The development team consists of employees from the relevant area and members of the senior management level. The control group consists of responsible higher managers and employees of the Human Resources department and other individuals. In addition, a facilitator must be appointed for the development team.

In phase 1, the development team has to identify the goals of the areas considered (e.g., performance increase). Then, KPI for these areas have to be developed that reflect the measurement of the target achievement. The developed KPI have to be settled by the control group.

In phase 2, the task of the development team is to define a proposal for the evaluation functions of the individual KPI and to convince the control group to approve them. The calculation and the measuring points of evaluation functions are defined in the group. If the control group agrees, a first testing phase follows, in which the developed performance measurement system must prove one's practicality. The testing period should be 2 to 3 months in which data are collected but not reported to the employees. Subsequently, the performance measurement system will be reviewed by the control group and modified together.

After this phase, the development team and the control group have jointly created elaborate various guidelines for various special cases (e.g., technical failures).If the performance measurement system has been successfully implemented, the development of the feedback reports will be the next task of the development team. After the implementation of the performance measurement and feedback system, the bonus amount must be defined. It is up to the control group to make a proposal for the bonus amount. The task of the company's management is to consider what level of bonus is most suitable to generate a win-win situation for the employees and the company. The object of the development team is to assess this and to agree or reject the amount of the bonus.
Subsequently, the complete system will be tested in a further pilot phase and finally reviewed and modified if necessary (see figure 5).
If the testing phase is successful, the system can be used. The realization phase will start. The performance will be measured on a regular basis and reimbursed. If the system is implemented, it has to be continuously monitored and optimized.
In addition, a group of experts has to be involved in the development and implementation steps of the model. An expert group is to be formed of independent external experts (e.g., scientists). They have to evaluate each step by taking into account particular occupational psychological, medical and ergonomic aspects. The expert group has the right to demand changes if the respective developments are not in conformity with the latest scientific findings. The development team, control group and expert group are jointly responsible for the sustainable success of the employee performance measurement and improvement system.

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CONCLUSIONS AND OUTLOOK

Efficient logistics represents a crucial differentiating factor in the market. The distribution centre employee occupies a special role for reaching the goal of a more efficient logistics. One approach is to increase the logistics performance by improving labour productivity due to an increase in work motivation. The developed employee performance measurement and improvement system is a combination of a performance measurement, feedback and remuneration system. It based on the ProMES / PPM, but has more functionalities. The developed system provides a tailored solution to increase productivity. The modules of the system meet different must-have and nice-to-have requirements. It is characterized by high flexibility, transparency, and comparability. At the same time, the acceptance by the employees is given by the participation approach. The benefit is a significant potential to increase work motivation.

The implementation of the system incurs five challenges. The management should be convinced to implement the work concept of group work, although individual work is also possible. Also it is necessary to give the employees more responsibility, to verify profitability and to create the needed database.

From a research perspective the development of the system affects 3 different research topics. First the benefit of the system should be measured. In addition, the motivational effect of the system should be proved in long-term studies. Also, it is necessary to develop an IT solution that supports SME with limited financial and human resources to implement the developed employee performance measurement and improvement system.

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