ECONOMIC ANALYSIS OF THE POSSIBILITIES FOR BUSINESS PROCESSES IMPROVEMENT IN SERBIAN DAIRY INDUSTRY

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ABSTRACT

The objective of the research is to analyze the maturity model of business process management, evaluate the importance of the factors that form the basis of the model, as well as the mutual influence of certain factors on the level of maturity of business process management. In accordance with the set objective, a survey of 13 factors critical for the successful implementation of process orientation in dairy industry companies in the Republic of Serbia was conducted. A structured questionnaire containing 85 questions divided by factors and the use of Delphi method, enabled us to single out crucial factors, i.e. factors with a higher level of maturity. Based on the level of development of the observed factors and the correlation between these factors, a model was formed that can influence the increase in maturity of factors at a lower level.

Introduction

The maturity model of business process management enables the diagnosis of the level of maturity of the company, in terms of deployment and acceptance of the process approach. The level of maturity is determined by the elements and factors critical to the successful implementation of Business Process Management (BPM). Once an organization has defined their "as-is" condition, they are the best positioned to establish their BPM roadmap. (Dharmawan et al., 2019) Balanced management of these factors and their continuous improvement means greater maturity, and hence a quantitatively and qualitatively higher level of business process results, i.e. the companies in

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which they are implemented. Modern chains must be organized in order to respond to the challenges posed by intense competition and by consumers, whose increased expectations regarding price and quality becomes of great importance, as they are able to choose from a number of products offered by competing chains. (Dasic et al., 2022)

Maturity models show the evolution of the company, through individual stages, on the way to business quality improvement, and their main purpose is to describe the stages and paths of process maturation of the company. When it comes to their application in practice, maturity models make it easier to identify the gap between the current and desired level of maturity, as well as the abilities that need to be improved to bridge this gap. Therefore, it can be said that their purpose is to diagnose and develop the skills needed to increase the quality performance. (Mihajlović et al., 2021)

Since the launch of the first maturity model, named Capability Maturity Model – CMM, whose application has been confirmed (Paulk et al., 1993), a large number of maturity models have emerged, proposed by theorists and practitioners from different research fields. (Maull et al., 2003; Fisher, 2004; Rosemann & De Bruin 2005; Hammer, 2007; Weber et al., 2008; McCormack et al. 2009; Van Looy et al., 2011). The maturity model proposed by Fisher is based on five domains, or as he calls them, "Five Levers of Change." By articulating the core characteristics of each Lever of Change in the context of each state of maturity, companies can quickly assess where they stand from a maturity perspective for each of the Levers of Change. (Fisher, 2004).

One of the best known is the model formulated by Rosemann and de Bruin (2005), which is known as Business Process Management Maturity Model. At the heart of this model there are six factors, identified based of the Delphi study, which are critical for the successful implementation of business processes, such as strategic alignment, process management, employee management, methods, information technology, and culture. (Radosavljević, 2015)

Hammer's Process and Enterprise Maturity Model – PEMM (Hammer, 2007) can measure the organization's level of process maturity by selecting specific processes and measuring the organization's level of process management maturity as a whole. (Correia et al., 2021) Within this model, the maturity of the following factors is estimated: (a) Leadership, (b) Culture, (c) Expertise, and (d) Governance. Each of these factors is subdivided as follows: Leadership contains Awareness, Alignment, Behavior, Style; Culture consists of Teamwork, Customer focus, Responsibility, Attitude Toward Change; within the Expertise factor are People, Methodology; while the maturity level of the Governance factor is established through the maturity of the Process model, Accountability.

Based on the Delphi-method-based maturity model (McCormack et al., 2007), a survey was conducted (Willaert et al., 2007) based on 68 questions related to eight different factors: (1) customer orientation; (2) process view; (3) organizational structure; (4) process performance; (5) culture, values and beliefs; (6) people management; (7) information technology; and (8) supplier orientation (Willaert et al., 2007)

Each of the mentioned models contains a defined level of maturity, however, in this paper the emphasis is on maturity factors as well as the possibility of influencing certain factors, i.e. their maturity, on other factors in order to raise the overall maturity of the organization. As many maturity models either do not have or offer only limited guidelines on how these models can be applied in improving process capabilities or refer to certain domains and situations specific to the organization, the aim of this paper is to propose the model as one of the ways of applying the maturity model.

Materials and methods

The survey was conducted on a stratified sample of 14 companies. The following criteria were used for selecting dairies from which data were requested: the importance of individual participants in the raw milk purchase market, installed production capacities and their position in regional market segments of production and processing of milk and dairy products. Also, it was necessary to ensure that the aggregated data, from dairies selected as above, form a representative sample, i.e. that they had adequate significance and weight from the aspect of their aggregate share in the aggregate data on the total quantity of purchased and processed milk in the Republic of Serbia. Strata are divided according to market share, installed capacities and number of employees, to three groups of dairies, "large" (3), "medium" (3) and "small" (8) with a total market share between 70-80%

The study covered 13 factors critical to the successful implementation of process orientation: strategy, leadership, process management, employee management, information technology, communication, customer focus, supplier relations, employee skills, reward system, continuous improvement, methods and techniques, performance measures. Based on a structured questionnaire containing 85 questions divided by factors and using Delphi methods, the following results were obtained (Table 1).

Process management	Processes within the company are defined and documented with clearly defined inputs/outputs	-	21.4	21.4	21.4	35.7	1.451	3.94
	Processes are described using flowcharts or process maps	-	21.4	14.3	7.1	57.1	1.692	
	Process performance measures are clearly defined	-	-	42.9	14.3	42.9	,923	
	Process performance is measured through quality, time and cost metrics	-	-	35.7	21.4	42.9	,841	
	Process performance is measured in terms of user satisfaction, employee satisfaction and financial contribution	-	-	42.9	28.6	28.6	,747	
	Process performance control is seen as a condition for their improvement	-	-	28.6	42.9	28.6	,615	
Management of employees	Jobs require performing a large number of multi-dimensional (complex) tasks	-	-	28.6	35.7	35.7	,687	3.97
	Employees can independently solve problems at the workplace (they have the necessary knowledge and skills)	-	-	42.9	35.7	21.4	,643	
	Employees are stimulated to suggest ideas for improving work processes based on their own observations	-	-	7.1	50.0	42.9	,401	
	Traditional control replaced by self-control (employees realize that every mistake they make has a negative impact on customer satisfaction)	-	-	35.7	42.9	21.4	,593	
	Employees are considered an important source of information	-	-	28.6	28.6	42.9	,747	
	In order to improve the process, employees are inclined to teamwork (collaboration and communication).	-	-	7.1	50.0	42.9	,401	
	Employees are involved in decision-making, their ideas are considered and, eventually, accepted	-	-	14.3	71.4	14.3	,308	
	The commitment and support of the management is intensive in removing the cultural characteristics that are a barrier to change	-	7.1	28.6	28.6	35.7	,995	
	The relationship between managers and subordinates is described as friendship at a distance (trust and mutual respect).	-	-	7.1	50.0	42.9	,401	
	The employees' attitude towards changes is "why not try something different", not "why change the existing ones"	-	28.6	28.6	28.6	14.3	1.143	
	Mistakes are acknowledged and not covered up	-	7.1	50.0	35.7	7.1	,571	
	The abilities of the employees are not ignored, but on the contrary they are used and further developed	-	-	28.6	35.7	35.7	,687	
Information technology	Information is collected, processed and visually presented	-	14.3	7.1	42.9	35.7	1.077	3.44
	Information is presented visually in all processes, in those that add value, but also in administrative processes	14.3	14.3	21.4	21.4	28.6	2.093	

	Data collection technology and IT systems make it possible to make decisions based on data and information in real time	-	42.9	14.3	14.3	28.6	1.758	
	Bar codes, sensors and RFID are used to track the entire value creation flow	35.7	14.3	-	7.1	42.9	3.610	
	The company orders electronically from its suppliers	21.4	14.3	7.1	21.4	35.7	2.709	
	The information system of the enterprise supports the management of the distribution process	-	42.9	7.1	-	50.0	2.264	
Communication	Internal communication about the methodology and achieved results is intensive	-	28.6	7.1	21.4	42.9	1.720	4.25
	There is a two-way flow of work reports between superiors and subordinates	-	-	-	57.1	42.9	,264	
	Employee communication takes place formally and informally	-	-	7.1	14.3	78.6	,374	
	Employees from different functional organizational units perform tasks while respecting the mutual alignment of goals	-	-	14.3	57.1	28.6	,440	
	Employees from different functional organizational units consult each other when necessary	-	-	21.4	42.9	35.7	,593	
	Managers of different functional organizational units meet frequently to coordinate mutual activities	-	-	21.4	28.6	50.0	,681	
Focus on customers	The company works to identify customer needs	-	-	-	21.4	78.6	,181	4.47
	Employees have a good understanding of customers' needs and keep customer expectations in mind at every operational stage	-	-	-	71.4	28.6	,220	
	Customer feedback is used to improve business processes	-	-	-	21.4	78.6	,181	
	Customer satisfaction is constantly monitored and processes are designed according to their suggestions	-	21.4	14.3	14.3	50.0	1.610	
	Products and services are developed in accordance with the needs and expectations of customers	-	-	-	50.0	50.0	,269	
	The company is successful in retaining existing and attracting new customers	-	-	7.1	50.0	42.9	,401	
	The number of customer complaints has significantly decreased compared to the previous year	-	-	7.1	21.4	71.4	,401	
Supplier relations	The company has established long-term partnership relations with suppliers	-	-	-	50.0	50.0	,269	4.04
	The company connects with suppliers at the level of business processes and closely cooperates with them	-	7.1	42.9	21.4	28.6	,989	
	The company formally informs suppliers about changes in business processes	-	35.7	21.4	14.3	28.6	1.632	

	The number of complaints from companies to suppliers has significantly decreased compared to the previous year	-	-	-	50.0	50.0	,269	
	Suppliers are open to suggestions from businesses	-	-	14.3	57.1	28.6	,440	
Knowledge and skills of employees	Employees have the necessary knowledge and skills to perform tasks	-	-	-	21.4	78.6	,181	3.39
	Employees exchange and share knowledge with each other	-	-	-	35.7	64.3	,247	
	Employees constantly improve their knowledge formally and informally	7.1	7.1	-	42.9	42.9	1.209	
	Employees attend trainings in the field of motivation (developing communication skills, techniques for overcoming stress, accepting changes)	50.0	21.4	-	21.4	7.1	2.132	
	Employees acquire new knowledge from the use of computer technologies	35.7	28.6	7.1	14.3	14.3	2.264	
	Employees acquire new knowledge from traditional external sources (seminars, conferences, trainings, publications...)	35.7	21.4	14.3	14.3	14.3	2.269	
	Employees are trained to use certain methods and techniques in order to improve business processes	-	50.0	14.3	14.3	21.4	1.610	
Reward system	Employees are rewarded with other financial compensations (eg bonuses) besides salary	-	7.1	21.4	21.4	50.0	1.055	3.61
	As a variable part of the compensation, the bonus is determined based on the achieved performance	-	-	35.7	7.1	57.1	,951	
	As a variable part of the compensation, the bonus is determined on the basis of performance improvement	-	21.4	21.4	35.7	21.4	1.187	
	In addition to fixed and variable, there are also non-financial compensations determined on the basis of the achieved performance for all employees	-	7.1	35.7	14.3	42.9	1.148	
	The compensation package also includes non-financial compensation	-	42.9	-	14.3	42.9	2.110	
	If necessary, awards are also made at the team level	35.7	14.3	14.3	14.3	21.4	2.681	
	The reward system is transparent and fair	-	42.9	21.4	14.3	21.4	1.516	
Continuous improvement	Improvements are seen as a natural way of doing business in the company	-	-	-	64.3	35.7	,247	3.95
	The company is familiar with the PDCA cycle of continuous improvement of business processes	28.6	7.1	14.3	14.3	35.7	2.951	
	The company is constantly working on reducing wastage	-	-	-	57.1	42.9	,264	
	The company is continuously working on discovering and eliminating bottlenecks	-	-	7.1	35.7	57.1	,423	
	Appropriate tools are applied in order to improve business processes	-	50.0	7.1	-	42.9	2.247	

	The company is constantly working on identifying places and opportunities to improve the process	-	14.3	28.6	14.3	42.9	1.363	
Methods and techniques	The company applies a process flow diagram (visual representation of the process).	-	21.4	21.4	7.1	50.0	1.670	2.73
	Developing the quality function - the house of quality (development or redesign of products according to customer requirements) is an integral part of the company's operations	42.9	-	-	35.7	21.4	3.148	
	The company uses Statistical Process Management (control charts, Pareto diagram...) for data presentation and analysis	21.4	-	28.6	-	50.0	2.725	
	An Ishikawa diagram (fishbone diagram) is used to investigate all possible causes of certain problems.	61.5	-	7.7	15.4	15.4	2.859	
	The company knows the Six Sigma methodology	53.8	7.7	-	15.4	23.1	3.269	
	Lean tools are applied in the company's operations	61.5	7.7	-	7.7	23.1	3.192	
	The Taguchi method was applied in the company	61.5	15.4	-	-	23.1	2.910	
Performance measures	Performance is measured at the process level	-	35.7	14.3	14.3	35.7	1.808	3.27
	The company complements traditional measures of process performance with modern measures	-	35.7	14.3	21.4	28.6	1.648	
	Some of the performance measurement indicators are used at the process level (SCOR, BSC...)	46.1	7.7	-	15.4	30.8	3.526	
	Data obtained from performance measurement is used not only for error correction and error prevention	-	38.4	7.7	23.1	30.8	1.769	
AVERAGE								3.65

Source: Authors' own calculations

Results

Starting from the selected factors critical for the successful implementation of the process orientation, as well as identification of their level of development and interdependence, it is possible to formulate a framework for improving the quality of business processes of dairy companies in the Republic of Serbia. The tables below show average values, i.e. the level of development of the observed maturity factors of process management (Table 2), and then the correlation between these factors (Table 3).

Table 2. Average values

Factors	Minimum	Maximum	Avg	Standard dev.
Strategy	2.20	5.00	3.6429	1.10155
Leadership	1.86	5.00	3.3846	1.29807
Process management	2.67	5.00	**3.9405**	.89301
Management of employees	3.00	4.92	**3.9702**	.63851
Information technology	1.50	5.00	3.4405	1.35181
Communication	3.00	5.00	**4.2500**	.68485
Focus on customers	3.57	5.00	**4.4694**	.47024
Supplier relations	3.20	5.00	**4.0429**	.68468
Staff	2.43	4.86	3.3878	.91289
Reward system	2.14	5.00	3.6122	1.07990
Continuous improvements	2.67	5.00	3.7524	.89736
Methods and techniques	1.14	5.00	2.7363	1.55056
Performance measures	1.75	5.00	3.2692	1.46295

Source: Authors' own calculations

Table 3 Process management maturity factors correlation

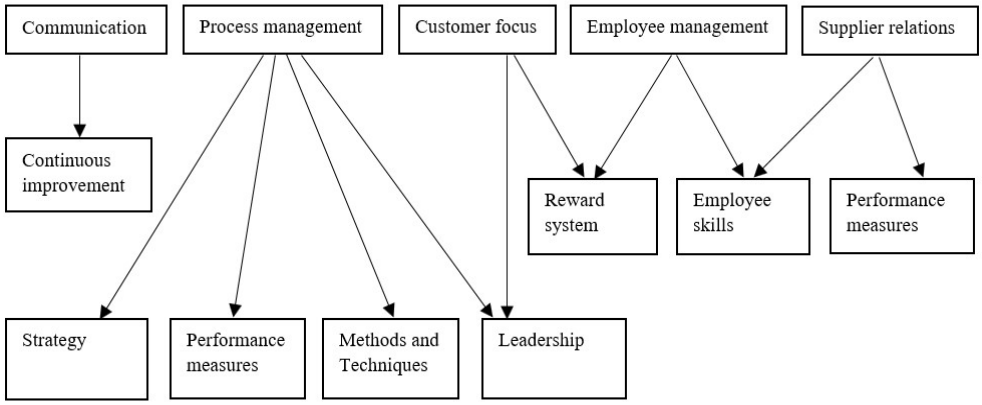
	Strategy	Management	Process management	Management of employees	Inf. Technology	Communication	Focus on customers	Supplier relations	Staff	Reward system	Cont. improvements	Methods and techniques	Performance measures
Correlation coefficient	1,000	.966**	.943**	.797**	.954**	.844**	.891**	.903**	.865**	.955**	.947**	.952**	.934**
Sig. (2-tailed)	.	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000
Strategy													
Correlation coefficient	.966**	1,000	.992**	.806**	.976**	.892**	.912**	.872**	.816**	.989**	.934**	.968**	.902**
Sig. (2-tailed)	.000	.	.000	.001	.000	.000	.000	.000	.001	.000	.000	.000	.000
Management													
Correlation coefficient	.943**	.992**	1,000	.859**	.986**	.807**	.911**	.869**	.831**	.981**	.904**	.965**	.891**
Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Process management													
Correlation coefficient	.797**	.806**	.859**	1,000	.813**	.694**	.859**	.750**	.844**	.847**	.798**	.735**	.752**
Sig. (2-tailed)	.001	.001	.000	.	.000	.006	.000	.002	.000	.000	.001	.004	.003
Management of employees													
Correlation coefficient	.954**	.976**	.986**	.813**	1,000	.762**	.875**	.906**	.848**	.968**	.892**	.972**	.932**
Sig. (2-tailed)	.000	.000	.000	.000	.	.002	.000	.000	.000	.000	.000	.000	.000
Inf. Technology													
Correlation coefficient	.844**	.892**	.807**	.694**	.762**	1,000	.790**	.615*	.581*	.799**	.925**	.843**	.762**
Sig. (2-tailed)	.000	.000	.000	.006	.002	.	.001	.019	.029	.001	.000	.000	.002
Communication													
Correlation coefficient	.891**	.912**	.911**	.859**	.875**	.790**	1,000	.804**	.847**	.911**	.856**	.887**	.768**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.001	.	.001	.000	.000	.000	.000	.002
Focus on customers													
Correlation coefficient	.903**	.872**	.869**	.750**	.906**	.615*	.804**	1,000	.938**	.899**	.830**	.879**	.977**
Sig. (2-tailed)	.000	.000	.000	.002	.000	.019	.001	.	.000	.000	.000	.000	.000
Supplier relations													
Correlation coefficient	.865**	.816**	.831**	.844**	.848**	.581*	.847**	.938**	1,000	.861**	.807**	.796**	.898**
Sig. (2-tailed)	.000	.001	.000	.000	.000	.029	.000	.000	.	.000	.000	.001	.000
Staff													
Correlation coefficient	.955**	.989**	.981**	.847**	.968**	.799**	.911**	.899**	.861**	1,000	.903**	.950**	.906**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.001	.000	.000	.000	.	.000	.000	.000
Reward system													
Correlation coefficient	.947**	.934**	.904**	.798**	.892**	.925**	.856**	.830**	.807**	.903**	1,000	.881**	.900**
Sig. (2-tailed)	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.	.000	.000
Continuous improvement													
Correlation coefficient	.952**	.968**	.965**	.735**	.972**	.843**	.887**	.879**	.796**	.950**	.881**	1,000	.900**
Sig. (2-tailed)	.000	.000	.000	.004	.000	.000	.000	.000	.001	.000	.000	.	.000
Methods and techniques													

Source: Authors' own calculations

Finally, on the basis of the data presented in Tables 2 and 3, a framework for improving the quality of business processes was formulated (Figure 1). As can be observed, the leading factors of maturity of dairy companies in the Republic of Serbia are:

communication, process management, customer focus, employee management and supplier relations.

Figure 1. Framework for improving the quality of business processes



Source: Authors' presentation

Leading maturity factors of process management were identified based on average values of factors. As these factors have the highest average values (which are also followed by the lowest standard deviations) they have been identified as leading factors. Based on the correlation coefficients of the leading and other factors, factors were identified that can be "pulled" by the leading factors in order for them to reach a higher level of maturity, which is, ultimately, a condition for improvement of the maturity of the company as a whole. It is up to companies to develop an action plan to operationalize the correlations shown in Figure 1, i.e. to identify how statistically identified correlations can be used to increase the company processes management quality and thus increase the maturity of the company as a whole.

Conclusions

Business process management maturity models contain a number of factors whose level of maturity (development, quality) should be measured, monitored and improved, in order to increase the level of maturity of process-based management. These models should be used by organizations to analyze the strengths and weaknesses of their current business processes and develop "future" models to achieve the organization's business goals. In fact, BPMM should be a guide for organizations in achieving business goals by applying the model in practice.

The paper presents a model with 13 factors critical for the successful implementation of process orientation, whose level of maturity must be planned, measured, analyzed and improved, in order to increase the level of maturity of process-based management. The special contribution of this paper is reflected in proposing a model that does not focus

only on a particular maturity factor, the contribution of a particular factor, or the level of its maturity, but considers the interplay between factors and the possibility of raising the level of maturity of factors that are at a lower level under influence of factors that are at a higher level of maturity. By operationalizing the correlations between factors at higher and those at lower maturity level, through well-prepared and implemented action plans, an increase in the maturity of factors at a lower level can be influenced, and therefore an increase in the maturity of the company as a whole.

Future research may focus on establishing a causal model that is specific to a particular organization or different business sector. In any case, the study carried out as well as the model presented should help organizations in understanding and meeting the necessity of continuous improvement and raising the quality of business processes.

Conflict of interests

The authors declare no conflict of interest.

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