ANALYZING THE VOICE OF EMPLOYEE'S IN TIME RECORDING SOFTWARE FOR EFFECTIVE HUMAN RESOURCE MANAGEMENT

Andrei DRAGUT, Sabina POTRA

Abstract: *In the industry 4.0, global players as well as small and medium-sized companies embrace the digital transformation to improve their workforce scheduling process with the final scope of becoming more competitive and agile on the market. But the voice of the employee is seldom taken into consideration when designing human resource management applications. Thus, the present paper aims to determine the most important functionalities of a professional time recording and workforce management application that impact the business process by thoroughly analyzing the voice of the customer. To determine which functionalities should be integrated into the software product, the Kano Methodology and the Quality Function Deployment Tool have been used.*
Key words: *human resource management, task allocation, workforce management software, precise scheduling and personnel deployment, Kano model, Quality Function Deployment.*

1. INTRODUCTION

Workforce management represents strategy to use personnel as effectively and efficiently as possible based on capacities and needs and it implies a complex framework of analysis, planning and control of employees based on the work processes in a company. At its core, workforce management aims to improve productivity through business process optimization. From a holistic perspective workforce management is based on determining personnel demand, optimization of personnel structure, capacity planning, workforce planning, personnel management and time management.

As there are multiple platforms for managing the workforce, the software providers tend to integrate a variety of resource consuming functionalities which are more or less useful for the end users. Additional costs for not used functionalities negatively impact especially small businesses. In this regard, the present research is meant to determine which functionalities should be integrated or eliminated to provide the best possible customer experience for them.

This paperwork contains five chapters which are structured as follows: the introduction which focuses on the need of workforce management and digitalized solutions to record work time and manage employees; the workforce management software which explains how a professional workforce management application works; the method which offers an overview of the Kano and Quality Function Deployment methodologies; the results and discussion to summarize and present the results in an understandable manner and the conclusions where shotlu id described how to create a competitive software product.

As employees represent the most important resource of a company, their adequate management can lead to corporate success or failure. Therefore, it is important to deploy employees in the best possible way to work efficiently, target-oriented and long-termed. For this reason, more and more companies use modern, digital workforce management systems which significantly increase the number of advantages, such as a sustainable reduction in time and costs, increased flexibility, and improvements in terms of transparency and quality.

A redesign of workforce processes is required that puts human first without compromising cost efficiency and therefore creating a win-win situation for companies and employees.

When implementing workforce management solutions companies must take into account the importance of the digital changes thus, they have to offer to their employees a higher degree of flexibility as they help companies to increase the motivation and satisfaction of employees and enhance the employer branding. Moreover, through digitalization of the workforce management companies attract new talents and offer more transparency by making use of AI power tools to increase business efficiency [1]. By finding the right person at the right time customers can create realistic shifts planning scenarios for a better work management. Through workforce management platforms data from HR system, ERP systems, warehousing systems or production systems are linked thus a competitive advantage is created. Managers can easily find out what kind of people they need and how many are required for a specific task or project [2].

Workplace forecasting helps companies to predict their demand and then provides the possibility to schedule the workforce as an iterative process is created. By Placing personnel in the right teams, at the right workplace and time play an important role at increasing the efficiency of the business process, especially in large sized organizations. By focusing on this aspect, large organizations are also able to better plan their resources, creating transparency for business decisions and not to worry about compliance issues [3].

Such workforce management platforms should be able to cover the planning of personnel in different industries like retail, manufacturing, logistics, healthcare, construction and many more. Digitalization and flexibilization motivates companies to take the next step in terms of innovative solutions such as moving from on-premises to cloud environments. Anywhere and anytime represent a better way to organize the workforce [4].

2. WORKFORCE MANAGEMENT SOFTWARE

Organizing resources and labor represent the basis for meeting company's goals and receiving the desired results and in this context a professional software for time recording and workforce management has to offer corresponding functionalities to track working hours, plan, deploy and motivate employees, simplify the work of HR department and management board and support the accounting department to determine the correct personnel expenses [5].

Time attendance and scheduling represent important elements in managing growing staff in small or larger businesses. Employee and attendance data are collected and combined in one spot thus best possible planning and deployment scenarios are created which reduce errors, control costs and ensure a clear overview on employees work hours, unplanned absences or time off requests. Anomalies are rapidly and clearly identified and relevant data is summarized to save time and to focus the attention on critical events [6].

With analytics and embedded insights, the software helps supervisors to deploy the personnel accurately and precisely and to keep the overtime and absence goals on track. Frequent tasks like schedule creation become autonomous, faster and compliant.

An online time recording system allows its users to flexibly record their work time anytime and anywhere. All data is immediately available for further evaluations as managers can analyze work processes and, if necessary, optimize them and use employees even more efficiently [7]. As employees work in different locations or on different projects at the same time, the digital and mobile recording of presences and absences represents the first step to keep track on the evolution of projects.

By using a professional software, the legal, operational and other requirements such as maximum daily, weekly working hours, break regulations or time-dependent bonuses are managed in an easy and clear manner [8]. The software checks the entries based on default settings and draws attention to violations. The data is verified and optimally prepared for further processing, such as for legal proof and for payroll accounting.

The main advantages of a time recording system are accurate time recording, better evaluation of business process through reports of all entries, further processing of data for billing, less paperwork and administrative tasks, easy access of the application from multiple devices and operating systems, planning working time and the use of flexible scheduling models [9].

When the time recording and workforce management software is completely integrated into the business process, both employers and employees benefit from increasing transparency [10]. Finally, it takes companies one step further towards a better business process optimization [11].

3. METHOD

Based on literature, the most important functionalities of a human resource management software have been determined (Table 1).

To analyze the voice of the employee for each functionality, the Kano model has been chosen. By using the Kano methodology, a specific Kano questionnaire and an importance questionnaire have been constructed.

The Kano questionnaire implies the use of standardized questionnaire which enables respondents to offer short feedbacks that can be easily measured and quantified as there are two type of questions that are integrated in the questionnaire, functional and dysfunctional. One the one hand, functional questions are questions that ask the respondent how he/she would feel if the product or service had a specific features on the other hand dysfunctional questions are questions that ask the respondent how would he / she feel if the product or service did not have that specific feature. For each question the respondents must choose one of the following answers: "I like it", "I expect it", "I am neutral", "I can tolerate it", "I dislike it" [12].

In addition to the Kano questionnaire a third question can be added to measure the importance of a feature. This survey method will be used to find out the personal opinions of customers. The survey participants read a pre-formulated statement on a topic and use a multi-level scale with nine possible answers to indicate how important the statement is for them.

The sample size has been determined by selecting new customers from different industry domains that require the implementation of the professional software for time recording and workforce management.

Table 1

Functionalities of the time recording and workforce management software.

#	Functionalities	Required details
1	Compatibility with multiple devices	The application can run on multiple devices like PC, notebooks, mobile devices, tablets.
2	Compatibility with multiple operating systems	The application can run on multiple operating systems.
3	Application availability 24/7	The application can be used around the clock.
4	Provide suggestions for planning	The application provides suggestion for managers on how to plan employees at their workplace to avoid under and over allocations.
5	Advanced security of data	The employees of one department are not able to view relevant data like presences and absences of the colleagues of another department.
6	Automatically record the presences and absences	The working hours of employees are recorded with the help of the rhythm booking based on a predefined work program.
7	Record and track the working hours at any time and place	Especially the employees who have remote work can flexibly record their working hours from anywhere and anytime.
8	Plan and precisely schedule the staff for a workplace in a specific time	The application provides to managers the possibility to plan the employees for a workplace in a specific time interval.
9	Compatibility with time recording devices to avoid manual booking in application	When employees register their presences and absences on the stationary time recording devices by stamping with the card, the data is sent to the time recording and workforce management application.
10	Administration of employee groups	In the application, manager can restrict the employees from a group to edit their data like phone number, department name, address etc. without a permission.
11	Sending vacation requests to the manager	Employees can send vacation requests to the manager through the application.
12	Viewing how much a project or task was fulfilled	The manager can view how in percent on how much a project or a task has been fulfilled by an employee.
13	Employee appreciation for a project or a task	The managers can appreciate the employees for a project or task by providing feedbacks like "good job" in the application.

Table 2
Sample layers for questionnaire respondents.

Layer	Education degree	Respondents	Percentage
n1	High school graduate	24	23
n2	College credit / no degree	2	2
n3	Trade / technical / vocational training	7	6
n4	Bachelor's degree	37	35
n5	Master's degree	20	19
n6	Professional degree	12	11
n7	Doctorate degree	4	4

Fig. 1. The Kano evaluation methodology.

To inform them about the questionnaire we asked the internal project consultants to send the questionnaire link to the key users like HR managers, test employees and technicians. The respondents were divided into four age categories as follows: 24% are between 18 and 25 years old, 46% are between 26 and 35 years old, 20% are between 36 and 50 years old, 10% are over 50 years old. The results with the above-mentioned characteristics and those from Table 2 represent a sample size of n=106 individual valid responses. The evaluation of responses has been thoroughly done based on the Kano evaluation table.

Finally, the Kano resulted categories reveal what effect each functionality has on employee satisfaction. In this regard, a distinction is made between attractive, one-dimensional, must-be, indifferent, reverse, and questionable categories. Discussions are advised for each functionality depending on its importance rating.

After the discussion about managerial implications, the Quality Function Deployment tool is used to translate the voice of the customer into design requirements. By using the House of Quality (HoQ) methodology, a representation of how to fulfill customer desires for a product or service, desires are translated into a written plan, while the execution steps are prioritized in a realistic plan [13]. In several steps, this method derives from a single customer requirement like which product feature, which function or which feature must be designed, modified or improved to meet the customer requirements. By applying the Quality Function Deployment, the House of Quality is established as the information is gathered on one page and shows how the individual elements of the method interact. Briefly, it is represented what the most important features are in the product development and product management [14].

The decisive factor is the separation of the market view with the customer requirements on the one hand and the technical view with the product features on the other hand. The customer specifies what he wants and different technical solutions are generated. In the triangular matrix, known as "correlation matrix", which looks like a house with a roof, the interrelations are rating positive as "+", whereas negative as "-"and blank for no interrelation.

The "relationship matrix" indicates how much each engineering characteristic affects each customer attribute. The ranking system use is a set of symbols for strong, medium and weak relationships as each symbol stands for a value as follows: 9 for strong, 3 for medium and 1 for weak. By determining the technical importance, it is known where to assign the resources [15].

4. RESULTS AND DISCUSSION

In Table 3 the results for each of the proposed functionalities have been computed.

Figures 2 and 3 visually represent the HoQ for the analyzed software features.

The multiple device compatibility is categorized as a one-dimensional feature and has the highest customer satisfaction coefficient and one of the highest scores related to its importance among the quality attributes. As this quality attribute is in a linear relationship to customer satisfaction, a stronger expression of this attribute means a higher customer satisfaction.

Kano categories and Importance ratings for workforce management software functionalities.

Feat.	A	O	M	I	R/Q	Total	Kano category	Imp
1	10	52	9	33	2	106	O	6,60
2	11	45	10	38	2	106	O-I	6,95
3	9	46	14	36	1	106	O-I	7,04
4	16	38	7	43	2	106	I-O	6,61
5	21	40	4	39	2	106	O-I	6,70
6	23	29	5	45	4	106	I-O	6,14
7	16	40	6	40	4	106	O-I	6,53
8	16	45	7	37	1	106	O-I	6,52
9	17	39	6	41	3	106	O-I	6,25
10	13	41	7	42	3	106	I-O	6,29
11	30	21	7	47	1	106	I-A	6,29
12	17	26	3	59	1	106	I-O	5,95
13	16	24	10	54	2	106	I-O	5,90

A stands for attractive features which are not expected by customers but positively surprise when they are present. If they are not available, this has no negative effect on customer satisfaction.

O stands for one dimensional or performance features which are in a linear relationship to the customer satisfaction.

M stands for must-be features which are always expected by the customer and cause strong dissatisfaction if they are not there. However, increases in satisfaction cannot be achieved with the presence of the feature.

I stands for indifferent or neutral features which do not add any value to customers and do not affect their satisfaction, whether they are present or not.

R stands for reversed features which reduce customer satisfaction through their presence.
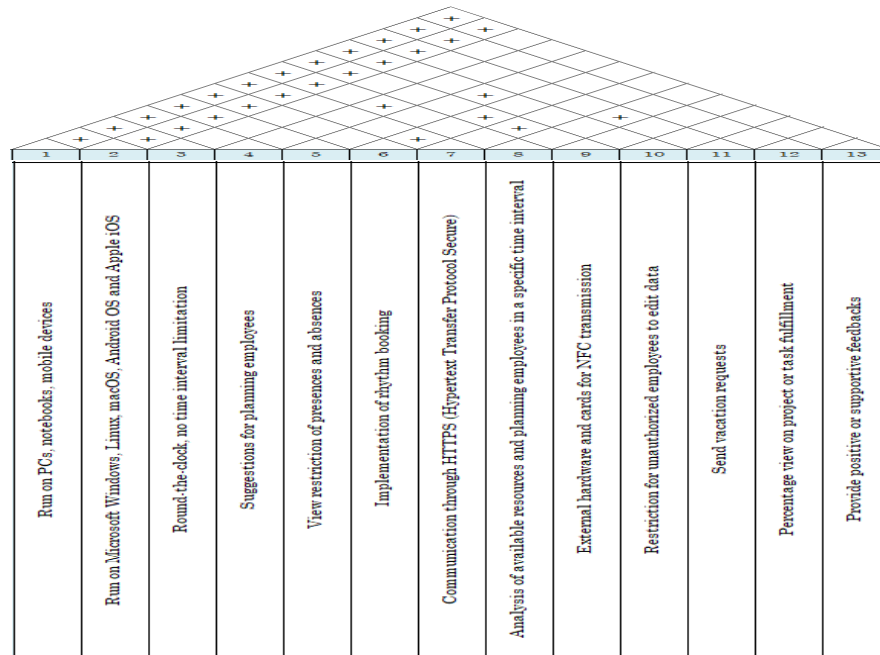

Fig. 2. The HoQ for assessing relevant functional requirements for the software product.

By looking at the correlation matrix the functional requirement related to this customer requirement has a positive effect on all the other functional requirements, reaching the highest technical importance score. In this context this functionality should be integrated into the software product.

With one of the highest customer satisfaction coefficients and scores related to the importance for the customer, the quality attribute multiple operating systems compatibility can trigger a high customer satisfaction depending on its presence. By looking to the functional requirement, we observe that it has a positive effect on all the other functional requirements and reaches the highest technical importance score. Taking this into account this functionality should be integrated into the software product.

Customer Requirements (Explicit and Implicit)	Run on PCs, notebooks, mobile devices	Run on Microsoft Windows, Linux, macOS, Android OS and Apple iOS	Round-the-clock, no time interval limitation	Suggestions for planning employees	View restriction of presences and absences	Implementation of rhythm booking	Communication through HTTPS (Hypertext Transfer Protocol Secure)	Analysis of available resources and planning employees in a specific time interval	External hardware and cards for NFC transmission	Restriction for unauthorized employees to edit data	Send vacation requests	Percentage view on project or task fulfilment	Provide positive or supportive feedbacks
Multiple device compatibility	●	●	○	○	○	○	○	○	○	○	○	○	○
Multiple operating systems compatibility	●	●	○	○	○	○	○	○	○	○	○	○	○
Application availability 24/7	○	○	●	○	○	○	○	○	○	○	○	○	○
Planning suggestions	○	○	○	●				●			▽	▽	
Advanced data security	○	○	○		●	▽							
Automatically record the presences and absences	○	○	○	▽		●	●	○		●		▽	▽
Record and track the working hours at any time and place	●	●	○			○	●			●	○	▽	
Precisely plan and schedule the staff	○	○	○	●		▽	○	●			○	▽	
Compatibility with time recording devices	○	○	○			●	●	●	●				
Administration of employee groups	○	○	○		●					●			
Sending vacation requests	○	○	○				○	▽			●		
Viewing how much a project or task was fulfilled	○	○	○	▽								●	▽
Employee appreciation for a project or a task	○	○	○									▽	●
Technical Importance Rating	443,8	443,8	350,4	229,2	213,3	246	322,9	311,4	277	141,3	203,3	175,5	144,2
Relative Weight	13%	13%	10%	7%	6%	7%	9%	9%	8%	4%	6%	5%	4%

Fig. 3. The HoQ for assessing how engineering characteristics affect each customer attribute.

A 24/7 availability of the application triggers a high customer satisfaction for most of the respondents. It has the third highest technical score. Taking these facts into account this functionality should be integrated into the software product.

Even though the quality attribute for providing suggestions for planning represents more an indifferent than a one-dimensional feature it still can be integrated into the software product due to its high importance and technical scores and the positive effects.

An advanced data security system of the professional software for securing the interdepartmental data view triggers a higher satisfaction depending on how strong its expression is. The functional requirement has a positive effect on hindering the unauthorized employees to edit data because it cannot be viewed in the first place by other departments. By looking at these aspects this functionality should be integrated into the software product even though it has low score in terms of technical importance.

The automatic recording of presences and absences represents more a one-dimensional than an indifferent feature. Due to its presence the customer satisfaction increases. Positive effects exist between this functional requirement and other engineering characteristics that imply

a fast and secured data transmission between application and hardware through HTTPS protocol and the use of external hardware and cards for NFC transmission to register the working time. The quality attribute reaches a middle score in terms of technical and customer importance. In conclusion this functionality should be integrated into the software product.

By providing the possibility for employees to record and track their working hours at any time and place the customer satisfaction increases linearly depending on the system flexibility. As employees can freely choose from where they book their work hours the traditional use of external hardware and cards for NFC transmission still extends this possibility and increases the degree of flexibility.

Precision in planning and scheduling can be categorized as a performance feature and triggers dissatisfaction if it is less present. Positive effects exist between this functional requirement and other functional requirements and it has one of the highest technical scores. Consequently, this functionality should be integrated into the software product.

The compatibility between the professional software and the time recording devices represents more an indifferent than a one-dimensional feature. For most of the customers this feature adds no value and does not affect their satisfaction, whether it's present or not. Still positive effects exist between this functional requirement and others which results in a higher degree of flexibility and precision Despite the fact that it reaches scores related to customer and technical importance this functionality should still be integrated into the software product.

Providing the possibility to send vacation requests represents an indifferent feature with a tendency to an attractive feature. For a significant part of respondents this quality attribute can positively surprise them. A positive effect exists between this functional requirement and the analysis of available resources and employee planning. Taking these aspects into account this functionality should still be integrated into the software product.

Viewing how much a project or task was fulfilled is categorized more as an indifferent feature. It has a low customer satisfaction coefficient and a low customer importance. For most of the customers this feature adds no value and does not affect their satisfaction, whether it's present or not. Going further no positive effect on other functionalities could be determined. In terms of technical importance, it reaches one of the lowest scores. Taking these aspects into consideration this functionality should not be integrated into the software product.

The last functionality referring to the employee appreciation for a project or task is categorized more as an indifferent than a one-dimensional feature. It has a low customer satisfaction coefficient and a low score related to the importance among the quality attributes. For most of the customers this feature adds no value and does not affect their satisfaction, whether it's present or not.

The functional requirement related to this customer requirement has no positive effect on other functionalities. In terms of technical importance, it reaches likewise the previous mentioned functionalities one of the lowest scores. In conclusion this functionality should not be integrated into the software product.

5. CONCLUSIONS

To keep its customers or to gain new ones the software provider should integrate into a professional time recording and workforce management software 11 from 13 functionalities. Since the Kano and importance questionnaire was distributed to clients from different industry domains, most of the functionalities are categorized as one-dimensional features.

For more accurate results further research can focus on the needs of customers that belong to a specific industry domain to determine which quality attributes represent a must. In addition, the software provider can perform a competitive assessment to determine how its competitors rank for each of the customer need. By doing so the software provider learns how to gain the advantage of its competition.

The correlation matrix and competitor research do not affect the importance ratings, but they provide useful insight to evaluate which

customer needs and design requirements matter most. As a useful tool the HoQ helps to document the Voice of the Customer and to keep all processes on track throughout the software development.

Future research will take into consideration the presented approach on human and intellectual capital management [11, 16-18] for increasing competitiveness [19].

6. REFERENCES

[1] Futurum. *Unlocking the Potential of the Human Economy with Workforce Management Solutions.* [podcast on the internet]. London: Futurum Tech Webcast; https://futurumresearch.com/?s=ATOSS.

[2] Simon, G., 2017, *Business-Software für Dienstleister: Cloud versus On-premises*, https://www.proles.ch/blog/business-software-f%C3%BCr-dienstleister-cloud-versus-on-premises.

[3] Ines, B., *Nutzerstudie 2018: Wie Projektmanagement-Software in Deutschland genutzt wird*, 2018, https://www.capterra.com.de/blog/407/nutzerstudie-wie-wird-projektmanagement-software-in-deutschland-genutzt.

[4] Florian, K., 2017, *Was ist On-premises?*, https://www.cloudcomputing-insider.de/was-ist-on-premises-a-623402/.

[5] Jin, H., *Work Allocation – How to Efficiently Assign Tasks in 5 Steps*, 2020, https://zipforecasting.com/resource-allocation/work-allocation.html.

[6] Ulli, P., *Wenn nicht PEP, was dann?*, 2020 https://www.personalwirtschaft.de/news/hr-organisation/ki-in-hr-personaleinsatzplanung-97526/.

[7] Tanja, Z., *Mobile Zeiterfassung via App: so geht's!*, 2020, https://www.infoniqa.com/blog/mobile-zeiterfassung.

[8] Keyed, *Zeiterfassung und Datenschutz*, 2020, https://keyed.de/blog/zeiterfassung-und-datenschutz/.

[9] Dakota, S., *Why Time Tracking is Important in Project Management*, 2020, https://altametrics.com/employee-time-clock/project-management-time-tracking.html.

[10] Maren, G.J., Thomas, H., Rahild, N., *More self-organization, more control—or even both? Inverse transparency as a digital leadership concept*, Business Research, 13, pp. 921–947, 2020.

[11] Franz, L., *HR Performance: Aktuelle Arbeitszeiterfassung/Folgen des EuGH-Urteils*, 2019, https://www.hrperformance-online.de/media/archive/74/64/6b/epaper-Whitepaper_Zeiterfassung/index.html#0.

[12] Koskinen, P., Mikkonen, T., Abrahamsson, P., *Product-Focused Software Process Improvement*, 17th International Conference, Proceedings of the conference, Silverio Martínez-Fernández (Ed.), pp. 176-191, 978-3-030-35333-9, Catalunya PROFES, October 2019, Springer, Barcelona.

[13] Norbert, H., *Das kleine QM-Lexikon (2)*, 2011, WILEY-VCH Verlag GmbH & Co. KGaA., Weinheim.

[14] Claudius, R. D., *Innovationen kreieren und patentrechtlich schützen*, 2015, vdf Hochschulverlag AG, Zürich.

[15] Hendrik, A., *Produktentwicklung für den Kunden: Wie QFD, FMEA und TRITZ bei der optimalen Erfüllung von Kundenanforderungen helfen*, 2013, Diplomica Verlag GmbH, Hamburg.

[16] Gogan, L. M., Duran, D. C., Draghici, A., *Structural capital-A proposed measurement model*, Procedia economics and finance, 23, 1139-1146, 2015.

[17] Gogan, M. L., Sirbu, R., Draghici, A., *Aspects concerning the use of the Moodle platform - case study*. Procedia Technology, 19, 1142-1148, 2015.

[18] Harpan, I., Draghici, A., *Debate on the multilevel model of the human capital measurement*, Procedia-Social and Behavioral Sciences, 124, 170-177, 2014.

[19] Paschek, D., Rennung, F., Trusculescu, A., Draghici, A., *Corporate development with agile business process modeling as a key success factor*, Procedia Computer Science, 100, 1168-1175, 2016.

Analizarea „vocii angajaților" cu referire la programul de înregistrare a timpului de lucru pentru managementul eficient al resurselor umane

În revoluția industrial denumită generic Industria 4.0, entitățile globale, precum și companiile mici și mijlocii participă la transformarea digitală pentru a-și îmbunătăți procesul de programare a forței de muncă pentru a fi mai competitivi și mai agili pe piață. Pe baza literaturii tehnice am prezentat și analizat 13 funcționalități ale unei aplicații profesionale de înregistrare a timpului și de gestionare a forței de muncă care influențează procesul de afaceri al întreprinderilor mici, mijlocii și mari. Pentru a determina cele mai relevante atribute de calitate am aplicat metodologia Kano și instrumentul QFD.

Andrei DRAGUT, Eng., Politehnica University of Timisoara, Faculty of Management in Production and Transportation, andrei.dragut@upt.ro, +40 256404286, 14 Remus str., 3001919 Timisoara, Romania, Timisoara, Romania.

Sabina POTRA, Lecturer Eng. PhD, Politehnica University of Timisoara, Faculty of Management in Production and Transportation, sabina.potra@upt.ro, +40 256404286, 14 Remus str., 3001919 Timisoara, Romania, Timisoara, Romania.