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CREATION OF A BETTER TECHNOLOGICAL ENVIRONMENT IN THE INDUSTRIAL ENTERPRISES

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Abstract. In a fast-changing world, industrial companies have less and less time to find, introduce and implement new ideas, so to keep up with competitors, it is necessary to constantly monitor the external and internal technological and organizational environment of companies, constantly improve processes and properly prepare employees. As the companies start to grow and get bigger profits, top-level leaders start to distance themselves a little from the processes and technological base problems, improvements in the enterprise, this attitude leads to the company stagnation. In order to avoid this and to ensure effective problem solving and enterprise improvements, it needs to create an internal environment improvement model for industrial companies. This article examines the creation of a more perfect technological environment in Lithuanian industrial companies, the factors which influence the improvement of the environment and ways of improvement, described technological environment definition, the employees behaviour towards changes in the company, also article presents the methodology for the research, results and the simple (not detailed) model for the improvement of the technological and administrative environment.

Keywords: technological environment, industrial enterprises, improvement, changes, process, company, industry, employees resistance, implementation, manufacturing.

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Notations

ERP – Enterprise Resource Planning;
 KPI – Key Performance Indicators;
 PDCA – Plan-Do-Check-Act cycle;
 PDM – Product Data Management;
 PLM – Product Lifecycle Management;
 ToC – Theory of Constraints;
 TPM – Total Productive Maintenance;
 TQM – Total Quality Management.

1. Introduction

In order to grow, improve results, become more competitive and efficient, easily face with unforeseen risks industrial enterprises are trying to find suitable systems for continuous improvement. Often after long analyses and testing period, companies chose well known and time-tested methods – they begin to apply in the company processes, such methods as LEAN, 6 sigma or ToC, also include employees in improvement process, trying find all possible improvement in seen able and non-seen able process, add new technical and technological solutions (new machines,

software, tools and etc.). Sometimes companies create and use only for them best environment improvement solution and methods. Before choosing methods and start implementing improvements in the industry company, it is important create the right, creativity stimulation system and environment in company where employees can openly render the suggestions. It is important, because in this rapidly changing world we have a very small amount of time to present new ideas and even less time for their implementation, so all in the company should be prepared to any changes, and at least a little bit open-minded. It will help faster find points, which need improve in enterprises, have a look to the future and easily prepare for implementation process, and chose best improvement process control system.

If in fast growing enterprise are needed improvements and top-level managers are slow to implement them, employees begin to raise long-standing problems and try to solve by them, but in this way those problems becomes only their problems and other employees or managers do not pay attention to it, therefore, over time, a person who wants to act loses motivation and in enterprise starts stagnation situation, when no one wants to do any

improvements in the process or technological base of the organization. Without seeing the scope of the company's process and common goals, employees are unwilling to work together and achieve more. Another problem is that managers usually do not share with employees enterprise visions of the strategy and employees do not understand whom and why changes in the process or technological base started and begin resist. In the internal environment of the company, due to that non clear company vision everyone start see different aims of vision and hostility arises among those who want to improve it. This rebellion inside company lead to situation where company began slow response to new external environment trends and may alienate from faster-reacted competitors and lead to a loss of market share.

Therefore, in order to ensure that in company will be working on continuous improvements and enterprises have clear improvement vision and goals to create a better technological and administrative internal environmental, must be created new universal process improvement implementation model for industrial enterprises. Model should include both in industry company: the improvement of the technological base and the evaluation and motivation of employees.

2. Technological environment definition and factors which influence technological environment changes

The technological environment in the broadest sense can be described as the state of technology in the country and with those related aspects, such as rapid technological advances, the institutional arrangements and requirements for the development and application of new technologies, etc. (Chohan, 2015). The University of Calgary distinguishes six business environments and technological is one of them. They technological environment describes as external technology factors affecting business operations. Technological changes in the environment may require a radical change in enterprise operational strategy (University of Calgary, 2022). The technological environment can also be described as the development of technology, which influences businesses with new production inventions and other improvements in work equipment (Pandit, 2020). The development of the technological environment is influenced by globalization, new equipment sellers and distributors, some training presenting new techniques and equipment (Pandit, 2020). According to this definition, it can be concluded that, in this case, the technological environment is more attributed to the external environment which initiate changes inside the company. One more, definition technological environment describe as the external part of the company related to the development and changes in technology, and changes in technical and equipment to companies are threatening and capabilities, it means, that emergence of new technologies helps to improve

productivity, such as internet helps books publishers, because they can publish e-books. However, new products are getting older faster, for example, the emergence of smartphones with high-definition cameras reduces interest in regular camera (Nasrudin, 2025). Oslo manual (OECD & Eurostat, 2018) says that technological environment is the ability to turn available resources into results. Employee knowledge and skills in engineering, in technical part are accumulated a technological production base which use right appropriate level of intellectual property. Technological ability to absorb technology, use it, improve, and analyse it. Using technology in the business process, methods and systems (OECD & Eurostat, 2018).

Thus, different authors describe the technological environment differently. In most cases, companies cannot control technological factors, but they must respond to them and, as far as possible, to update them in their technological base. Early adopters of new technologies often capture greater market share and higher returns. One of a main factor which contributing to create the decision to make changes and improve of the technological environment are: competitors, law and economic regulation, political approach, environment protection, society, internal culture of the organization, inventions and innovations.

3. Resistance to innovation and other obstacles hindering the creation of a better environment in the enterprises

Employees resistance to improvements and changes is one of the most prominent obstacles to improve companies' internal and external environment, processes and equipment. Human Resources specialist Semėnaitė described three main aspects why person start resistance: *fear of lose job* (improvement of the technological environment or process often reveals that certain jobs are no longer needed and that job functions can be done by robots, software or other persons with others their daily functions. But at the same time, innovation is a way of discovering personal growth, initiative and benefit in the organization which employees can use to themselves); *the need, why something has to change in the company, incomprehension* (people naturally resist when they do not understand the meaning and the result they seek, so it is necessary to inform employees in advance, to communicate the planned changes, after this employees are more consistent with the idea of change and are more ready to change work methods and use new tools); *fear not to learn the necessary competence, not to adopt to change* (the employees block themselves development due to their distrust of themselves). About 80% of the resistance reason is, that the initiator of the change did not properly explain to whom and why the change is or will be made, what is specifically changing and what will be the result and the consequences if the change will be not implemented. Information about changes should be communicated to employees from that co-workers who they trust. So, need

to choose the right persons and channels. If you start to think, that about change and improvement has already been communicated enough, still need to remind and repeated several times about changes, that have emerged in the process or production technology. As mentioned, the most important things are to prove the necessity of this or that improvement and what will be if the change is not realized (Mackevičius, 2020). The change in improvement itself does not happen only when the method, the procedure or the purchase of new equipment, for each change need people. Employees who are unable to adapt to the change and do not understand its necessity will be resisted for that, and those who want that improvement and find out opportunities with innovation should have ability to inform the person responsible for the changes, that they need more time to understand what is happening (Ruplytė, 2020). Usually employees can be divided into three groups (*No matter* (or in Lithuanian language *Dzin*) group is a group of people who are constantly dissatisfied about everything and we need to try to identify them as early as possible and to avoid add them into team (try to not hire them, because they will disturb normal team work); *Talents* people group which do their job and show initiative. We need this group keep in company as long as possible and allow them to grow; *Potential* – people, who usually is not formed yet and can become any group (or *Talent*, or *Dzin*) member, so need to notice them and directed in right way on right time). More open to change and experience accumulation usually is *Talents* group person (Tvarijonavičius, 2015). If, due to changes in dissatisfaction, there appears tension between the manager/responsible person and other employees. And tension is growing until it becomes impossible to work, starts the outbreaks of anger, rebellion and the number of resignations increases – such a situation is called steam pot – and does not lead the companies to the good (Strazdas et al., 2015).

In order to avoid resistance to innovations and improvements need:

- inform and involve employees as early as possible into changing process and explain reasons (Mackevičius, 2020). From carry out personal conversations about the meaning of improvement to group meetings and special message to co-workers change reports (Aršauskaitė & Drejeris, 2017). It is important not only to inform earlier as possible, but to do it in good way (quality) and several times, mark what the future changes seek, why they are needed. To identify and inform others about the potential risks and difficulties for all levels employees in implementation period (Semėnaitė, 2020a);
- involve subordinates in the implemented change as widely and diversely as possible and give them responsibilities for the implementation of the change and improvements, such involvement creates a motivating effect for employees (Aršauskaitė & Drejeris, 2017), continue to implement changes and spread it among employees not involved in the imple-

mentation, support those involved and their ideas (Semėnaitė, 2020b);

- select competent employees for improvement. To encourage them with greater management attention, material and moral incentives (Aršauskaitė & Drejeris, 2017). Also, ensure that employees trust the person which implementing and presenting the innovation. Harvard University professor David Maister described a trust equation. Individuals' confidence in others is determined by four variables, i.e. competence, reliability, closeness and self-orientation. A person who can be trusted must know what he is doing, know his job, have enough knowledge, be smart, wise. Others want to ask and will ask to him when they need work help. A person who is trusted must keep his word, say and do what he/she said, promise. It should be safe with him/her, a pleasure to talk to, knowing that if it is what must remain confidential and will remain confidential. A person to be trusted must be altruistic, take care of others (Green, 2012).

Thus, the main causes of resistance to innovation and changes are the fear of not reaching the necessary new qualifications, the lack trust level about innovation developer and the development of information about improvement. Not only the resistance of employees, but also the financial situation of the company, political and legal factors, incompetence of managers can be caused by obstacles to innovation and changes implementation (Arza & López, 2021). It is important to maintain a healthy, motivating environment in a company that encourages co-workers to continue to cooperate and find solutions to emerging problems.

4. Technology adaptation to improvement for better environment creation and more clearly process

Industrial companies can be exposed to several types of environments (external and internal), which influences the implementation of technological solutions. The external environment is an environment and factors, which is outside the company and still in one or another way influence a company. The top and middle level managers must know external factors, which can affect enterprise and must have strategies to reduce negative impact and ways how use positive impact (Buržinskaitė, 2015). It is almost impossible to control the external environment. As for the technological external environment, it could be describing how the equipment used by competitors, the options for the equipment to purchased and sold, suppliers chosen by competitors with a specific technological device line for competitors production, political factors, the laws and law governing for the equipment, etc. The internal environment is everything that happens inside the company, all every day and non-routine processes, rules, values, decisions, goals, the relationship between employees, structure, technical, financial and information

resources that take place inside the company (Thembains, 2023; Shao, 2019).

For the improvement and maintenance of equipment, the enterprise may use many different methods one of methods – TPM. The method is made for continuous improvement of production equipment and processes. According TPM everyone from top-level management to equipment operators should participate in maintenance. For example, operators take responsibility for the daily maintenance of their devices, the technicians supervise the operators, train them, encourage them to offer and carry out ideas for equipment improvement, maintenance and implement ideas. Top-level managers TPM “advertise” and apply to the entire company as an internal policy. In the manufacturing company, the total maintenance method of the equipment when it is properly applied reduces equipment failures, creates a safer workplace because it is constantly clean and maintained, increases the overall production productivity of the company (Fiix software, 2022). TPM method is closely related and often applied in conjunction with 5S, only with high quality 5S possible TPM application.

In order to make manufacture neat, improved and automated need improve not only the equipment, but also the processes. Process in production and process in administration should be coordinated and synchronized, and for combination of these two “worlds” uses computer programs that can neatly document information, define costs and help to control inventory, purchase materials needed for production and so on. Can be used such programs: PDM, PML and ERP programs/software.

5. Techniques and theories of continuous improvement

The creation of more advanced technological and administrative organizational environment is closely related with continuous improvements processes. If the technique of continuous improvement is well adapted, then there will be less problems to start improving the company’s internal environmental, will be less resistance from employees and problem ignoring actions from top-level managers.

Continuous improvement is continual process of targeting and eliminating waste in the enterprise. Continuous means be commitment to process, enabling cross-organization collaboration and embedding a culture of measurement, learning and communication (Milsom, 2020). Everyone in company should be oriented in continuous improvement. Improvements can be implemented in enterprises in natural way (just adding it in daily work) or can be implemented in radical form. Usually companies for continuous improvement chose well known tools, techniques and theories including PDCA, Lean, Six Sigma, Kaizen and etc. All tools, techniques and theories of continuous improvements helps increase enterprise efficiency and eliminate waste in company processes (Milsom, 2020).

One of the most popular techniques of constantly improvements are PDCA. Sometimes PDCA cycle is called Deming Circle (according its creator American engineer name William Edwards Deming), which is a never-ending cycle create to help get better results based on enterprise strides. It was developed for quality control and are used in ISO 9001 Total Quality Management (TQM) standard, but in general became an instrument for continuous improvement (Six Sigma Development Solutions, Inc., 2021). PDCA cycle is the basis for other development techniques (for example, Kaizen, 6 sigma) (Banelienė et al., 2020).

Speaking about Six Sigma can be said, that this improvement techniques focuses on defects and encompass an analysis of process capability, defects and a measurement system analysis (Milsom, 2020). 6 sigma have two modifications – DMAIC (Define, Measure, Analyse, Improve, Control) and DMADV (Define, Measure, Analyse, Design, Verify) (Banelienė et al., 2020).

One of the most popular process techniques and methodology is *Lean*. This methodology purpose is continue improvement and eliminate main seven waste. *Lean* have continued improvement element – *Kaizen*. *Kaizen* (rapidly improving processes) is often considered like base for all *Lean* methods (Ng, 2025). *Kaizen* process focuses on eliminating waste, continual improvement implementation and improving productivity in companies processes. *Kaizen* use analytical techniques, such as value stream mapping or/and *5 reasons why*, it helps be sure about implementing improvement necessarily and often is base for improvements which not required large investment (Ng, 2025).

One more continuous improvements techniques are ToC. It is a method that indicates that each system of the company must have a restrictive obstacle, bottleneck or restriction in them permeability. The method seeks to identify and eliminate obstacles/bottlenecks to maximize the permeability of the company activities (product or service making process from raw materials to the final product or consumer) (Impruver, 2023).

Moreover need to mention, that is created change management theories, which helps control employees reactions and meat changes calm. Change management is a company strategic approach to change, when managers support, train and properly inform their employees about process or equipment change in the company. Change management models let create strategic approaches to change and it can help overcome obstacles while company trying implement changes. They consist of methodologies, concepts, and theories for implementing change. Five best change management models according WalkMe Team (2023):

- a. Lewin’s Change Management Model.
- b. Kotter’s 8-Step Model for Change.
- c. Prosci’s ADKAR Change Management Model.
- d. Kübler-Ross Change Curve.
- e. Bridges Transition Model.

6. Industry enterprise environment SWOT and primitive environment improvement model for creating a better environment

In order to structure main factors, which was found in literature analysis, what helps or damage the technological and company procedural, organizational enterprise innovation implementation is created and shown in Figure 1 – the analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT).

In industrial enterprise where improvements should be implemented, need have a clear image of the current situation, the purpose of the future and the vision – where the organization wants to be after improvement should be drawn (Strazdas et al., 2015; Marcouse et al., 2014; Mackevičius, 2020; Aršauskaitė & Drejeris, 2017). Knowing it, the company's management and employees must reorient thinking into open innovations thinking, if it there was not in the company yet and one way to become more open – start evaluate the improvement ideas of employees, which were not evaluated before. By starting to implement their ideas. In this way employees will start feel, that they are important for company and step by step will become more open to changes. The main improvement implementer should be a colleague or employees group, or middle level manager, which is likeable by others and in other co-workers eyes trusted person. Such employees who can be implementers of improvements and motivators of other employees to be open minded to change must be noticed by company human resources specialists or the top level managers, who understand the meaning of improvement. Also, need give time or send employees to the trainings about improvements, which is related with company future vision, to introduce new technologies, to inform about the possibilities of ERP and PDM. When implementing innovations, it is necessary to properly inform employees about the changes, after that they will no longer

be afraid of losing their jobs, because they will know improvements purpose, process, what is needed from them for that changes implementation and will easier accept it. Only when all employees are properly informed, *Potentials* will not join to the group of *Dzin (No matter)* employees, and the *Talents* will remain to work and with willingness, actively will engage in the improvement process, because if *Talents* do not see a clear goal will lose motivation and will resign (Tvarijonavičius, 2015). For improvement realization are required create comprehensive, steps-based plan, in which also is described goals, as it reduces the risk of the improvement failure. Company which planning changes have to be oriented not just in production and profit numbers, but also in software, which is used in company and employees qualification and emotional level. Moreover, need not forget to always review the improvement plan according to company internal and external situation. From time to time, look at what is new in external environment and which new technologies or process ideas are used by competitors, where and how they look for new employees, who are prepared for constantly changes, how the economic situation in the country and the world has changed. Learn from competitors mistakes and make better improvements inside of companies. Industrial – companies have to not be afraid of innovation, invest in employee education and make time to understand their internal environment, improve organization culture, know what can offer external environment and how competitors work. Enterprise, which knowing themselves and others well, will be able to better prepare for the crises that occur as the company grows and plan how to overcome it. All of this determines, that the company keep pace from the market changes, have the high qualification employees, the qualified machines and tools to ensure qualified production. Improvement requires a favorable environment, so it can be created using the primitive model of creating a more improvement-friendly environment. The primitive model, from literary analysis (Figure 2) is created as a light bulb, because any improvement begins from the idea.

The first step – the analysis of the current situation. Often, companies do not clearly have description of

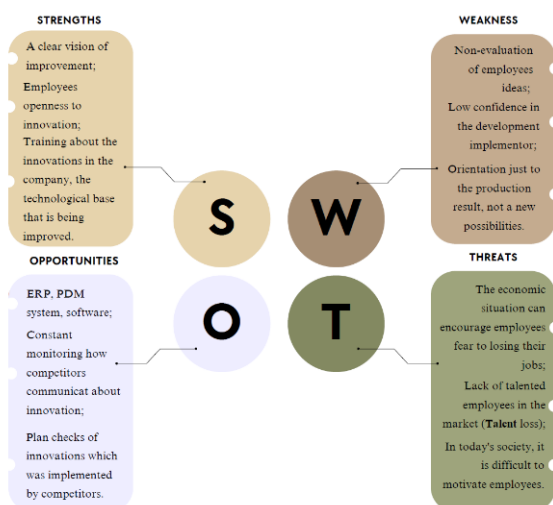


Figure 1. Summarized SWOT analyse for improvement implementation process in industry (source: created by the author)

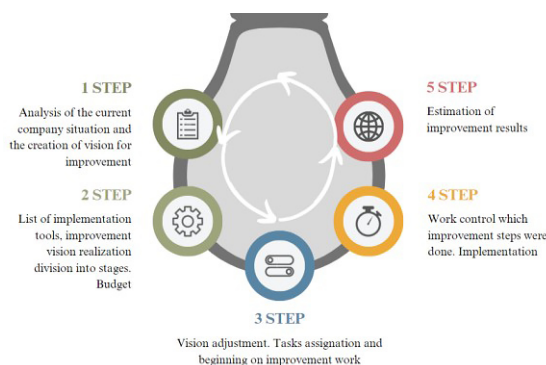


Figure 2. Summarized primitive model for creating a better improvement environment (source: created by the author)

processes, and the relationships between departments are unclear. Therefore, it is must to define them and determine their current efficiency before improving (Strazdas et al., 2015). When enterprise creating a vision for the future and the purpose of efficiency they want, for implementation need select right employees (who are prone to innovation and deepening to improvements, have sufficient motivation and can be empowerment). In this – the existing situation analyse step, when the current situation is already known, need to allow imagination to manifest improvements ideas uncontrollably and to come up with as many necessary improvements as possible, if in future steps will help to adjust the vision and to concretize it.

Step two – tools for innovation implementation is clarifying and description; selected employees group, which will work with the implementation, are informed and are listening to their ideas. Depending on the ideas, the vision is supplemented and the implementation process is divided into stages. Budget possibilities are evaluated to solve problems, for innovative solutions and ideas realization. The third step – vision correction, concretization and stages adjustment based on the budget. Tasks assignation between implementation team members and realization beginning. Fourth step – monitoring, controlling the improvement work being carried out so that everything is done on time or making deadlines changes according to a reasonable reason. Equipment and technology update, purchase. Training of employees which are non-participating in improvement realization. The fifth step – estimation of improvement results. The result of improvement is observed and identified – whether it was positive, negative, neutral. In this step is important to finding the reasons why results of the improvement are not good, or good, what had to be done differently. The improvement process is always cyclic, because there can be bigger or smaller improvements in enterprise environment always.

7. Research methodology

The aim of research is to determine current the technological and administrative environment in Lithuania industrial enterprises, which produce devices and construction, building elements. Find opportunities in firms which need to improve and include it into the procedural model of better environment, if will be possibility – formulate it for companies, which was participating in research, make conclusions.

For the research of aspects of creating a more perfect technological environment and opportunities for improvement in the industrial enterprise, an analysis of literary sources, interviews and a quantitative (survey) research method were used. In survey participated 56 respondents from three different industrial companies (2 company medium-size and 1 large enterprise, which works in the devices and buildings elements sectors).

Survey and interview were made to find out the current situation in the manufacturing sectors of the devices and building elements, find the “most painful” places in technological and administrative improvement process, which can be realized, optimized, improve, or helps increases the level of knowledge of employees. It was directly interviewed and visited three industrial enterprises and familiarize with their technological and administrative environment, their planned improvements. Once the research information was collected, it was analysed and was found common places in participated companies process, that can work properly in each company of the selected sector, can be improved in the same way and it will help to build better environment in enterprises. Collected information helped extend primitive model, which was created after literature analyse and created a universal process model which helps create a better improvement technological environment. In this article will be presented just simple model version with mains stages. The next section will present the empirical part which was made according to this methodology.

8. Research results analysis

During the interviews, 24 questions were presented to the employees managed by the companies or responsible for the company's process and an evaluation table was created from them, in order to be able to compare the results of the interviews and the survey. The survey contained 22 questions. Few questions are presented in this article.

Most attendants were from machines, devices and electronic parts manufacturing sector – 31 (55%) respondents, 22 (39%) participants were from construction elements sector and 3 (6%) chose to answer *Other* (Figure 3).

All three companies use Microsoft Office packages; planning program (Asana, Teamgantt, Monday, EasyRedmine or others) – use 2 companies (one enterprise has their one planning program which is made based on Excel), all three companies use computerized management systems (ERP, PLM and others), drawing and modelling programs (Solidworks, AutoCad, Draftsight, Revit, Inventor, CATIA and others). Important point of this question is *Other*, because according to it is possible to find out how enterprise is creative solve communication and software problems if before tried programs still not allowed get useful result for them. 10 participants said, that their com-

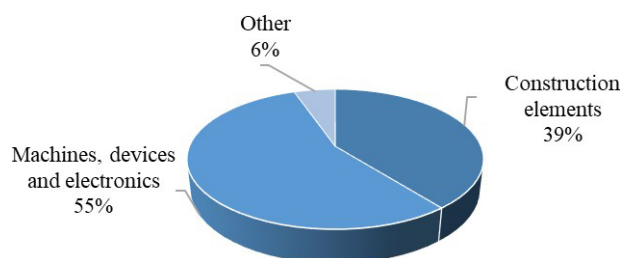


Figure 3. Answers to question about enterprises working sector (source: created by the author)

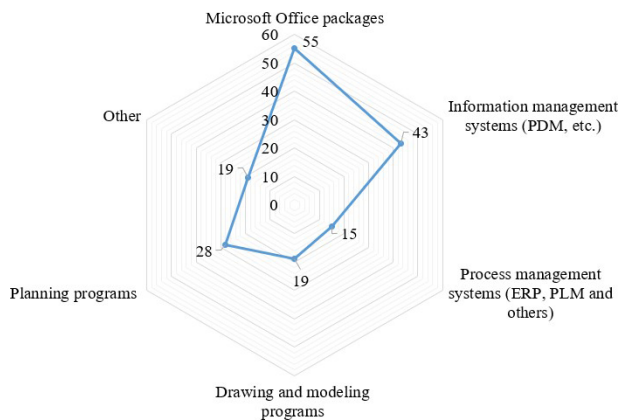


Figure 4. Answers to question – which software companies used (presented in respondents numbers) (source: created by the author)



Figure 5. Answer to the question does respondents notice possible improvements at their workplace (presented number of respondent) (source: created by the author)

pany have and create has created special Excel calculation sheets and Bills of Material (BOM) tables; 5 respondents said, that their enterprise use and employees create it by themselves Solidworks Macros add-in for PDF/DWG drawings saving; 8 answerers, in addition to the other additional programs already mentioned, remembered, that their company have special program which enterprise create by themselves for customer, that customers would have the opportunity to choose their own device modifications that they can order from the company. In this question for participants was present multi-choose question. Chart with answers shown in Figure 4.

Some experts say that employees usually notice what needs to be improved in their workplace, that places became better, just need to ask them, according to this research, this statement can be confirmed (Figure 5). Those involved in the survey were able to choose answer from multiple answers. 9 answerers do not notice possible places to be improved at their workplace; 29 respondents say that the software and equipment update is already very important; 23 persons mentions and identifies like one of the priorities must be improve and create organisation culture of their company and work on team building; 19 participants have constant ideas for their workspace improvements and implement them. 17 employees have approved

the need to apply LEAN or ToC methods more broadly. 14 respondents would like to get freedom in planning the deadlines for task performance. Three participants offered other possible improvements: applying a laptop to their workplace; Internal training to motivate employees initiative and do changes; team-building training.

When asked to evaluate the technological and administrative environment in companies, employees were more categorical when answering questions about the technological environment.

After the survey, employees say, that need more robotization and automation in the technological environment. There are companies with robots and flexible production systems, but workers want the principle of “one button” (one press and the product is almost assembled or fully manufactured and made). More flexible working hours and laptops.

In the organizational environment, employees want community building (team building), better planned workload, flexible working hours (to be able to come to work until 10, at any time, and from that time of arrival starts work till be worked 8 hours/day).

9. Creating a better technological environment in industrial enterprises model

After analysing literary sources, Lithuania enterprises employees survey and interview is formed a model of technological and administrative/organisational environment improvement. In this article is shown simple model, which was created after research is provided in the Figure 6. All detailed model can be found in full research report. The model is based on research results, ISO 9001 standard and PDCA cycle, Kaizen and Bridges Transition Model.

The first stage is the check of the current situation. In this stage company have to make analyse of process and decide or any improvement is needed in enterprise according to current situation and set key performance indicators (KPIs) for all company, which want to reach or be improve after changes implementation. If was decided that improvement is needed, enterprise should start looking for what specifically and in which part of the company need to make improvement. Check starts from technical and software situation check, then goes to employees check (all from lower-level employees till top-level managers).

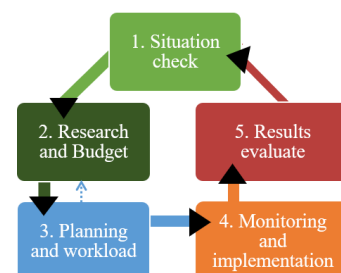


Figure 6. Simple model of creating a better company environment (source: created by the author)

If current situation in company does not require improvement, the inspection of the current situation begins again (it is regular check stage) or may happen situation, that there will be not found place which need to improve for achieve the desired results for company, then need to start the process again and look for other improvements, as most likely purpose of improvement was chosen incorrect.

If it was found that employee improvement is needed in the second stage (research), managers have to make the behaviour and motivation analyse of their employees – or they still meet the necessary qualifications and organization culture. Usually, this employee analyse is done during the conversation. After conversations, manager can evaluate employee and find employees who rebelling against enterprise system, culture, value and/or changes, set goals for each employee and develop department KPIs. In other hand, the employees become more open and more motivation to work in company after such conversation and can inspire other colleagues became more open to changes and organisation culture/values. In this step, it is important that the company has defined internal rules, values that follow it when working, if they do not have it, it must be created, otherwise it will not be possible to evaluate employees in properly way.

When is reached the third model stage – planning and workload – need start chose best solutions for improvement, make decisions about ideas and found market solutions, which can be realized in the company. This stage is closely connected with research and budget (second stage).

If in the second process stage, in the market is found technical solution (equipment or software) and will help to achieve new KPIs, the person or team responsible for improvement/change inform supply department to start the price analyse about those products. If the price is suitable, process go to four stage. If cost does not suit – starts new solution research. If there have been no solutions on the market, which can help improve the environment and KPI, company should create equipment or software which is need by themselves. If enterprise cannot create it with their own hands, improvement person/team should find of service company from the outside, which can create a non-standard solution and enterprise would be able to apply it for everyday work improvement.

In the third stage, in the employees improvement part is proceed detailed analysis from the data collected through conversations, determination and evaluation. And here are made conclusion whether the company has harmful employees who do not meet the company system and resist change. In the absence of harmful employees, workload calculations are made (if workload calculation show, that need more workers – enterprise hire and train new employees (fourth model stage)). If has found harmful employees, those employees are considered – whether they are really needed to be in the company. If they are unnecessary – they should be fired. If they still needed for a company – they are sent to training (fourth model stage).

Speaking about fourth model stage (monitoring and implementation) in technical environmental improvements is three possible ways for each, which comes from third stages. If in third stage was decided to design the necessary equipment for themselves, then the work of the improvement team is observed, the materials and tools purchased for the implementation of that equipment, tool or machine improvement are being purchased. After assembling a new equipment, it is tested and if everything works as intended, employees are trained to work with it. If do not work properly – back to the design and try to adjust the designed equipment again. If was found external company, which will design or program the necessary equipment or software, for that company is written a technical task, the work and design process of that company is monitored and the product, which they create is tested. If everything works properly, training is organized for employees to work with created product. If the necessary equipment or software was found in the market, it is simply purchased, tested and employees are trained to use it.

The fifth and final stage in the better environment creation model is the evaluation of the change result. If the results and the goals was achieved, the KPIs with improvement was improved – the company cango to other improvement, if the results were not achieved – need go to beginning and check change possibilities again. At the same time, several improvements and changes may be implementing.

10. Preliminary benefits and implementation recommendations of the model for creation of a better technological and organizational environment in industrial enterprises

Each industrial company can slightly modify the creation of better technological environment model according to the product which they produce, current processes and technological base, number of employees, values and etc.

The model is recommended to be implemented in medium size and/or large industrial companies, which have been working for more than 5 years (the average boundary from which the company is no longer start-up). Younger or small companies often do not get the profit, which they want, so they can make environment improvement decisions quicker, more clear control and planning process, because they know that it will improve them efficiency and then will increase profit. This statement was also proven by the research.

The model encourages:

- constantly find places where need change, constantly monitor the company internal environment and constantly look for innovations, which enterprise can implement, from the external environment;
- problem solving beginning and stop ignoring them;

- talking with employees and reducing the separation between managers and employees. Helps motivate and start to hear employees;
- finding an employee or a group of employees, who will always be responsible for improvements and monitoring the process, thereby ensuring, that will be seen able all company working process and operations picture and always will be implemented continuous improvement, done problem solving and found new innovations.

The economical calculations for this model – cannot be calculated yet, because it has not yet been fully implemented to the company. The economic benefits will depend on each industrial company individually. Financial usefulness will be influenced by the size of the company, the current processes of the enterprise, the employees and the ways of their thinking and open-minding, the technical base and software, the product produced, external situation, political decisions, competitors, economic regulation.

11. Conclusions and recommendations

It was noticed that while companies are young or small, the process of improvement and technological environmental improvement is faster and self-evident, because companies strive for efficiency in order to get the desired profit fast as it possible, but when a company starts to grow, continuous improvement slowly becomes forgotten. Improvement which produces positive results is almost impossible without a clear industrial company process. ERP, PDM, PML software helps to clarify it. The clearer the process, the better known the technological base of the company and the employees thinking way, the easier it is to find the places that need to be changed in order to create a better environment in the industrial company.

The technological environment can be internal and external. The external environment (new technologies, competitors design solutions, government political decisions and etc.) company does not control, but must observe and apply fast change the internal environment according to external environment changes (implement new processes, equipment or software) to remain competitive and attractive to the customer.

Most employees participated in the research are satisfied with the technological environment of their companies, but offer implement more automation and robotic in assembly processes (managers assured, that they are planning to do it, but not all companies can make fully automated production, because produce nonstandard products). The interviewed companies usually make small improvements, because it does not require a large financial resource. In other hands budgets for technological improvements and environmental improvements in researched companies are unlimited, just before fully implementation of changes must be provided proof of possible benefits.

A model for creating a better technological and organizational environment in industrial enterprises was developed (based on ISO 9001 standard, PDCA cycle and Bridges Transition Model). The economic benefits of this model will depend on each industrial company individually. From the model and summarized research results can be formed few main suggestions and recommendations for industrial enterprises technological environment improvements and help to avoid stagnation:

- if a company wants to improve its technological environment, should have a responsible employee or their team of all process and technological equipment improvements idea generation, implementation and clear process assurance. It helps to see the overall situation of the industrial enterprise, reduce the competition between the departments and ensure that the improvement in one department does not harm the other one. It means that ideally, if in all possible improvements implementation and idea generation always participants the same employees.
- also, companies have to have clear KPIs, written goals, values and basic rules of work ethics inside and outside the industrial enterprise, must know which type employee working in company (there are basically three types of employees) and predict how they will react into innovations (present changes in understandable way for them). Follow as much as possible ISO standards and certificates, which they have. Try adding in process *Lean* and *ToC* techniques. Clearly and specifically present work process. All this will be ensuring, that the company will have value-like employees, a clear communication between departments and producing process, open-communication and open-minded environment and reduces the stress of employees in the workplace – will be built enterprise community, where employees will want work in company and make enterprise/product better, will stay motivated.
- all changes should be very clearly presented for employees.
- employees usually know what is needed to make their workspace more efficient, so managers or improvement team need just ask them about needed technological environment process improvements or form a proposal system (mailboxes system or Kaizen according to company and purpose). From research clear, that employees in technological environment these days want to have more robots, flexible manufacturing systems, and user – friendly software. Employees thinking way mostly is based on: “one button” thinking way (one button make everything).

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TOBULESNĖS TECHNOLOGINĖS APLINKOS KŪRIMAS PRAMONĖS ĮMONĖSE

B. Kačinskaitė

Santrauka

Sparčiai kintančiame pasaulyje pramonės įmonės turi vis mažiau laiko naujoms idėjoms generuoti, pristatyti ir įgyvendinti. Norint neatsilikti nuo konkurentų, būtina nuolat stebėti išorinę ir vidinę įmonių technologinę bei organizacinę aplinką, nuolat tobulinti procesus ir tinkamai parengti darbuotojus naujovėms. Įmonėms augant ir gaunant didesnę pelną, aukščiausio lygio vadovai neretai ima po truputį tolti nuo procesų valdymo technologinės bazės problemų sprendimo ir veiklos tobulinimo, o toks požiūris veda į įmonės stagnaciją. Siekiant to išvengti ir užtikrinti efektyvų problemų sprendimą bei įmonės vystymąsi, reikia sukurti pramonės įmonių vidinės aplinkos gerinimo modelį. Straipsnyje nagrinėjamas pažangesnės technologinės aplinkos kūrimas Lietuvos pramonės įmonėse, aptariami aplinkos gerinimą lemiantys veiksniai ir tobulinimo būdai, pateikiamas technologinės aplinkos apibrėžimas, darbuotojų reakcija į pokyčius organizacijoje, pristatoma technologinės ir administracinės aplinkos tobulinimo metodika, tyrimo rezultatai bei supaprastintas įmonės aplinkos tobulinimo modelis.

Reikšminiai žodžiai: technologinė aplinka, pramonės įmonės, tobulinimas, pokyčiai, procesas, įmonė, pramonė, darbuotojų pasipriešinimas, įgyvendinimas, gamyba.