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THE NATURE OF PRODUCTION SYSTEM'S DEVELOPMENT IN A HOLDING COMPANY

The article focuses on the issues of the development of production system. The authors have produced the guidelines to implement lean production and lean best practices and improve production system. The nature of production process is carefully studied. As a result of the study lean methodology has been developed, the use of which will enhance the efficiency of lean projects implementation and increase labour productivity.

Key words: lean production, company's production system, methodology of production system development

Based on the experience of international and national companies, modern business approach to the development of production systems are mainly oriented to safety, quality enhancement, client's satisfaction, increase of production efficiency, motivation of company's personnel [1,2,3]. Inevitably the ideology of company's production system is built on strategic management and focuses on client's needs. Production process and personnel development are in the focus of management.

Production system is a sustainable way to achieve company's goals, so is the philosophy of constant improvement and self-development, where everyone thinks of working in a fashion of a turnkey. Toyota's personnel call Toyota's Production System as Thinking People System. Production system assumes a certain vision that allows people to get a feeling of job satisfaction and improve its effectiveness and, finally the efficiency of their company. The enhancement of personnel awareness and changes in their vision are the pillars of modification in production system. The instruments are secondary; today there may be one set of tools, which are likely to be replaced concerning a current situation and personnel awareness.

With the hindsight of the world production systems and experience we identify their particular traits in the development of production system . See the picture below.

Fig. Characteristics of forming and development of company's production system

1. Ambitious goals

Ambitious goal is underpinned by the understanding of the idea of “impossible is possible” (the right balance of impossible-possible). Easy-achievable goals demotivate company’s staff, though unrealistic goals are twice demotivating. Talent to set ambitious goals is based on the awareness of removing mentality barriers, expanding conventional boundaries and persuading company’s employees.

Goals should be based on benchmarking principle, however, there is a danger of mixing up “apples and oranges” and most adequate way in this case is to set goals on half-life principle. That means some 50% of a gap between current situation and achievement threshold comes in the period between 1 through 3 years.

2. Incremental problem solving

Generally, upgrading production process in an industrial company is a complex and multitasking process where several production areas are in the management focus. In particular, they are supplies management, delivery management and production capacity management. Constant production efficiency enhancement should rest on certain principles and ideals that are shared by all participants of production process. Otherwise, production process enhancement will be confined to “band-aid” approach and simply removing bottlenecks in a production process.

To solve the problems of this kind top management have to intorduce incremental problem-solving. To achieve the goals it is crucial to identify problems step by step rather than create them artificially. Among most common problems the company faces is the problem of discrepancy between takttiming (that is client-driven estimation) and a company’s potential. That requires first, solutions to the problems in an assembly line, and then, in an organization at large; by this the synergy effect is achieved. Another problem to be solved is under /overstock that will cause much of company’s losses and even conceal other problems (mistakes in planning, delays in parts deliveries etc.). The task in this case is to gradually manage stock by identifying the problem and finding solutions. It makes sense to do mapping of value flow, which is the basis of lean instruments and allows estimating losses and remedy the situation.

We suggest looking at the algorithm to systemic problem solving:

Step 1. Identify the problem and its location.

Step 2. Analyze the Root Cause Problem by “5 why” method; for this we analyze workforce, method, equipment, facilities. Isikava’s diagram may help.

Step 3. Explore reasons why the problem has remained invisible (was unidentified at the point of control while the root cause was unveiled.

Step 4. Building sequence of operations that will prevent the company from the root cause problem in the future. To avoid this it is advisable to develop standards.

Step 5. Dissemination of the experience to help solving similar problems.

Step 6. Monitoring the problem solving effectiveness in order to remove root cause problem.

Step 7. Move to another cycle of problem solving.

3. It requires creative approach, while ready-made prescriptions do not work well.

From philosophical viewpoint, production system is far beyond to be creatively approached in majority of company. However, there are great companies that are able to do this task whereas the others are the followers and learn from their experience. It is significant to be aware of the fact that production system is not a ready-made recipe of success, it is not a set of rules and guidelines to follow in order to increase competitiveness and labour productivity. Production system is a travel to the kingdom of thinking and this journey is challenging yet exciting. Above all without thinking and readiness to put efforts to develop advanced production system it will not work. There are no prescriptions used for each company, though, there are certain instruments and methods that can help find a solution to a particular problem. Application of instrument for the sake of instruments creates even more paperwork and reports, that will discredit the whole idea of production system. Therefore each company should develop their own production system which has to be based on their unique goals-setting, effective tackling the problems and removing barriers to achieve these goals. Companies cannot do without creative approach to the production system. For instance, happy life cannot be created without creativity as it is a result of a person's creative approach, and cannot be built up just on the basis of a certain prescription. For this, much of efforts should be made.

In practice production system aims to upgrade production process. Production process is seen as the synergy of actions, workforce and work equipment to manufacture certain range of products. The technological process is the basis of production process, i.e. immediate production. Non-technological process(transport, warehousing, load/unload etc.) is part of production process. So-called natural processes (draining, cooling etc.) that run without human input are also introduced into production process. System approach to production process is vital as it allows uncovering bottlenecks and results in more systemic process of improvements.

4. Production system development is a result of ongoing and long process of changing employees mentality.

Production system is not a magic word that changes the company's life, it is a long process of changing employees' thinking that makes them more labour conscious. As a result, the company has an opportunity to self-development. An effective production system contributes to company's development and enables company's management to:

- To be awareness of the goals and their ambitiousness they are most significant things in an organization;
- To apply Instruments that highlight the problems and help solve them in order to achieve goals (one has to be brave enough to identify the problems and solve them). For instance, to estimate takttime to meet clients need sand make adjustments on this basis);
- To be equipped with Instruments that allow effective problem-solving so as to stop turning back to this problem again neither at working place nor in a working situation.

5. Standardization is an essential pre-requisite for constant improvement

Standard is an instrument that allows avoiding problems. Standardized operation is the most effective cycle that includes worker's operation, provisions of quality and safety and standardized documentation. Standard formalization and introduction is certainly made not for the standard itself , on the contrary, it is essential to find a solution to the problem so as to avoid similar problems at work in the future. Yet standard is the basis for constant improvement of production as it allows scheduling and systemizing worker operations. In case of different sequence for each operation and unorganized worker's movements we will not be able to evaluate efficiency and hardly identify malfunctions or assess outcomes. Surely, the first step to kaidzen is standardization that results in quality improvement, cost reduction and safety enhancement at working place. The objective of each manager is to identify the cause of the problem and be able to solve it and standardize solutions.

Suggested characteristics of production system's development are not particularly new. Both researchers and practitioners constantly discuss philosophy, principles, ideals of lean production. The uniqueness of the suggested approach lies in a synergy of ambitious goal-setting and incremental problem-solving in goal achieving. The method was piloted and proven in one of the largest production company's in Udmurtia. Based on production principles of the company it aimed to articulate company's ambitious goals. For instance, the capacity of production is forecast to increase by 20-30% of that of last year. The major urgent problem to be solved for the end of 2013 was non-compliance with the plan. The root cause problem was unbalanced production load. To solve that problem the company estimated daily production rate for each product line, accordingly the timelines for each product line was calculated, planed deadline was shifted up to three months. The company implemented balanced load, engaged full workforce and introduce just-in-time system. It has resulted in the labour productivity increase by 56.7%. As a result of certain project's implementation the staff of one of the workshops have been engaged in production circle that has allowed labour savings and increase of productivity as twice. One of the project outcomes is that the stock has reduced in 3.8 times, production timeline has decreased in 3.7 times. It should be noted, that this is just an initial stage of production system development in the company. Undoubtedly, the results are overwhelming. Only a few of production companies in Russian Federation can showcase such big success, majority of the companies have been working over their production system development for two or three years and show much more modest results. The root cause of this lies in the fact that lean instruments are used without fundamentals of lean philosophy. On top of this, the experience manifests that use of lean instruments (5C, mapping, TPM, SMED) for instruments is able to produce only temporary and unsteady outcomes, that will bring to red tape in the end, and discredit the whole idea of production system.

How can we introduce the transformations in a company? How can we prevent the whole production system idea from narrowing to routine process that stop the company from an effective change? To find a solution we suggest guidelines and method that can be effectively used to develop company's production system, to make a road map or any other proceedings that outline the role and responsibilities of company's top management, work out "game rules", and movement direction. Method and guidelines are shown in the table.

Production System Development

(Method and guidelines)

Stages	Outcomes
1. Decision-making of a company top manager to develop production system. Acceptance of lean philosophy by top management.	Shift in mindset and change in top management style. Active engagement of a company top manager (production system is not able to be developed without top management involvement). Focus is on to production site where the value is created. It is unlikely to solve the problem off site, inside the office. It is necessary see firsthand and get firsthand knowledge. .
2. In-company training for production managers at their work site. The way to create a new image of manager at the plant.	A manager creates the value by improvement of environment in the company. Managers should spend some 50% of their work time in "gemba" where the value is created. Meetings last up тодо 30-40 minutes. Briefings in network centers are up to 10 minutes.
3. Company's diagnostics	Current assessment of potential improvement $[4,5]$. Personnel assessment. Assessment of effectiveness of potential projects. Estimations of work-in-process, stock in process, and through this we start identifying and solving existing problems.
4. Teamwork	Setup commission for enhancement of production effectiveness and cross-function teams. Training commission and team members. Development of project proposal system. Team development should be based on the principle of a manager personal behavioural model. Development of top management's leadership skills.
5. Setting production goals. Those are built up on the assessment of company team's potential.	Design and articulation of key effectiveness criteria. Project design and evaluation. Ambitious yet potential-adequate goals; both under and overambitious goals are bad for company's development. Design of road map and tactics.
6. Managers' pilot and personal projects implementation.	Elimination of bottlenecks. Production process improvements, SOC. Implementation activities. Methods study, skills-training. Achieving target production indexes.
7. Lean instruments implementation	Application of lean instruments to perform certain production tasks and key efficiency criteria. Use of instruments for instruments increase documentation flow and discredit the idea of production system.
8. Evaluation of efficiency and set new ambitious goals (move to stage2)	Evaluation of program outcomes. Goal-outcome compliance analysis. Further action plan of production system development.

Suggested guidelines pay much attention to a vision and a role of company's CEO (Stages 1 and 6). Yet the leading role of CEO is seen through all developmental stages. It is unlikely to build up company's own production system without CEO's concern and interest. That's not only the acceptance of lean ideas, it is rather a demonstration of company's leader active role and his/her personal creativity. This is either the project of company's leader, or development of personal leadership skills, or setting ambitious goals.

Recommendations suggested will help enhance effectiveness of lean projects implementations as well as the development of company's production system. To sum up, the enhancement of company's competitive edge depends on company's development of production system to a large extent. Above all it relies on the quality of strategic management, right goal-setting, adequate implementation tools, lean philosophy and ideology, effective team work and introduction of kaidzen proposals ,efficient losses reduction and resource management, client-driven work strategies.

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