

“Lean Manufacturing”: The Economic Potential of the Resource of the Republic of Mari El

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Abstract: Modern development of the Russian economy and especially the processes of nationalization of the economy, the formation of regional trade and financial markets have led to increased interest in the issues of improving the competitiveness of enterprises. “Lean manufacturing” is now widely recognized as the most efficient, reliable and rational way enterprises to overcome the crisis and improve competitiveness. Methods of “lean production” allow to increase productivity without significant capital expenditures to improve the quality of products or services to reduce costs to cycle time. “Lean production” an innovative approach to management and quality management including the optimization of production processes, improve product quality, reduction of costs of various origins. The concept of “lean manufacturing” process optimization considers the forces of all employees. By and large, “lean production” is a technological philosophy expressed in practice people creatively suitable to eliminate losses.

Key words: “Lean manufacturing”, competitiveness, efficiency, regional, optimization

INTRODUCTION

The current stage of development of economy of the Republic of Mari El together with new technologies and effective market institutions require increasing the competitiveness of products of regional enterprises which determine the pace and quality of economic development of the territory. Under these conditions “lean production” is becoming an essential tool for improving the competitiveness of enterprises in the region.

Methods of “lean production” allow without significant capital expenditures to increase productivity, improve the quality of products or services to reduce costs, cycle time.

The aim of the method of “lean production” is building production, capable of quickly responding to changing consumer demands and to make a profit in any market change including a fall in demand. This is creating a perfect production system which would be at the order entry immediately supplied the required products and thus there is no accumulation of intermediate stocks.

Of course, the introduction of “lean” on each company will have its own characteristics associated with the current structure of the relations of production.

However, there are some key steps that need to be done to increase the probability of successful implementation of “lean production” at the enterprises of the Republic of Mari El.

LITERATURE REVIEW

Despite the fact that the tools of «lean production» are described in numerous literatures in great detail its practical implementation in a particular company is a creative process.

The transition from conventional production to the “lean manufacturing” marks a complete revision of the foundations of the organization as the relations of production within the enterprise as well as relationships with suppliers and customers. It is no secret that the main task for manufacturers of enterprise management is the task of maximizing profits. Favorable conditions of the recent past-high consumer demand when there is insufficient supply of goods and services contributed to the fact that the price of goods is established on the basis of costs of the enterprise for production by adding often as does not sound “cheat” (Kudryashov, 2013).

However, the market situation has changed over time. Market goods and services are gradually included in the saturation regime. Offers of a variety of manufacturers stimulate competition between suppliers. The situation in which supply exceeds demand leading to a drop in the market forced the prices of goods and services and consequently to a drop in profits of the enterprise. The only way to avoid such circumstances, falling profits-reducing production costs as prices of raw materials and resources as determined by the market situation.

Currently, the enterprise management practice has developed a list of ways to improve performance including reduced costs, reforming the organizational structure, optimization of employment, stimulating investment activity. A qualitatively new level of production efficiency, achieve stability of financial and economic position of business entities as well as bringing qualitative and cost characteristics of products to a level competitive in the framework of a single market space can be provided through the implementation at the regional companies the tools and principles of Lean Manufacturing (Davydova and Klotchkov, 2012).

One important aspect of the implementation of “lean production” concept as well as Kaizen system and TQM principles-universal quality management (Total Quality Management) is a deep analysis of the current situation to find the root causes of problems.

Search for causes is essential for the development of corrective and preventive measures to make management decisions, the establishment of new production sites and so on (Zaretsky and Ivanova, 2012). In this context, it becomes especially urgent implementation processes “lean production”.

“Lean production” is one of the new trends in the development of management which is the next stage of penetration of Japanese and Western business culture to the Russian market.

To implement “lean production” it is necessary to understand the principles of this system. By themselves they are quite simple but its implementation requires the organization to greater effort. The basic principles of “lean production” system can be summarized as follows:

- Determine which creates value of the product in terms of the end user. The company can do many things that are not important for the consumer. Only in the case when the company knows exactly what is needed to the consumer it can identify which processes are focused on providing value to the consumer and which are not

- Define all the necessary steps in the chain of production and eliminate waste. To optimize performance and to identify losses of all the action from the moment of receipt of the order is necessary to describe in detail, to the delivery of products to the consumer. This makes it possible to determine the potential for improved processes
- Restructure activities in the chain of production in such way that they constituted a workflow. Actions in the processes necessary to build such a way that between the operations were not expected downtime or other losses. This may require re-engineering of processes and application of new technologies. All processes must consist of activities that add value to the product
- Do only what is necessary to the final consumer. The company should produce only those products and in such amount as is necessary to the final consumer
- Strive for excellence through continuous reduction of unnecessary actions. Implementation of the system of “lean production” can not be a one-off event. Grasp the implementation of the system is necessary to continuously improve the work at the expense of finding and eliminating waste (Nedbaylyuk *et al.*, 2000)

The objective of the enterprise, implementing “lean production” system is to reduce the action, not bringing value. This will greatly reduce the production cycle and lower the final cost of the product.

In terms of the “lean production” of goods the ability to meet the expectations of the consumer is called “value”. The consumer is willing to pay only for the compliance of the goods to their expectations of performance (for functionality, quality, lead time, price, etc.). If the production process is carried out or how the activities for which the user does not intend to pay, i.e., activities that do not add value this activity is called “loss.”

Economic estimation of losses is carried out on the basis of the information received on the results of the enterprise. For registration information in the field of loss should be created information collection points which is carried out not only the registration of the results of production activities but also made some preliminary processing. “Lean production” identifies eight types of losses:

Loss of overproduction (over-production), one of the most obvious ways to increase profits is increasing enterprise productivity. However, in the pursuit of performance of business leaders often forget that the amount of product that consumers are willing to buy is

determined by market demand. Suddenly, there comes a time when a product which only yesterday was lacking accumulates in the warehouse (this time for some reason always comes suddenly, regardless of whether we are talking about seasonal variations in demand or changing market conditions). Sales managers have to realize stale or tarnished goods and to have to forget about profit. There has to think how to compile the costs or minimize losses is it possible to eliminate losses at all? Can? And for this you need to:

- Just in time to produce only what the customer wants (to work “under the order”)
- Produce goods in small quantities which are guaranteed to be implemented (in the fall in demand quickly switch to another type of product)
- To reduce loss during changeovers reduce changeover time to a minimum, making the profitable production of small batches

In this case, you need to forget about the profitability of the production of large batches. Loss on over production ($P_{l.o.}$) defined by the equation:

$$P_{l.o.} = L_{s.e.} + L_{p.c.} \quad (1)$$

Where:

$L_{s.e.}$ = Losses related to the cost of the deposit of unclaimed products within a limit period (rubles/period)

$L_{p.c.}$ = Losses related to the cost of production of unclaimed items within a limit period (rubles/reporting period)

$$L_{s.e.} = \sum_{i=1}^n K_{Bi} \prod_{ki} C_i \quad (2)$$

Where:

n = The number of types of unclaimed goods

\prod_{ki} = The number of unclaimed items i-type outside the range period pieces

C_i = The cost of storing items (rubles/day)

K_{Bi} = The number of days to keep the ith type of unclaimed items

$$L_{p.c.} = \sum_{i=1}^n \prod_{li} (N_{mi} C_m + N_{ei} C_e + N_{ti} C_t + N_{fi} C_f + N_{si} C_s + N_{inti} C_{int.}) \quad (3)$$

Where:

\prod_{li} = The number of unclaimed items i-type outside the range period pieces

$N_{mi}, N_{ei}, N_{ti}, N_{fi}, N_{si}, N_{inti}$ = Consumption of material, energy, technical and technological (equipment) financial, labor (physical labor) and intellectual resources, respectively in the production units of the ith type of product

$C_m, C_e, C_t, C_f, C_s, C_{int.}$ = Unit material cost, energy, technical and technological (equipment), financial, labor (physical labor) and intellectual resources, respectively at the end of the set limit period (rubles)

Transport losses (excessive movement of raw materials, products, materials), any more or less complex production is a flowchart for converting raw materials or semi-products in the final product. Transport is the time and the risk of product damage.

In order to reduce losses during transportation should create a map of the routes of vehicles and conduct a thorough analysis of the appropriateness of a particular movement. After that you should eliminate superfluous transportation due to alterations, the redistribution of responsibility to eliminate deleted stocks. In addition in transportation will not prevent the system: every movement values must be justified by the relevant regulatory documents and no amateur. Losses due to transport unnecessary objects ($L_{l.T.}$) determined by the equation:

$$L_{l.T.} = \sum_{i=1}^n \sum_{j=1}^J \prod_{li} (N_{mi} C_m + N_{ei} C_e + N_{ti} C_t + N_{fi} C_f + N_{si} C_s + N_{inti} C_{int.}) \quad (4)$$

Where:

n = The number of kinds of products which made a gentle movement

l = Kind of transportation

L = The number of kinds of transportation

\prod_{li} = Number of products i-type subjected to excessive lth type of transport during the reporting period pieces

$N_{mi}, N_{ei}, N_{ti}, N_{fi}, N_{si}, N_{inti}$ = Consumption of material, energy, technical and technological (equipment), financial, labor (physical labor) and intellectual resources, respectively, to hold the lth mode of transport i-type products

The standby losses (production activity is not carried out during working hours), losses associated with the expectation of the beginning of the treatment of the material (parts, semi-finished products) indicate that the process of planning and production process is not coordinated with each other. By itself, the planning process is quite complicated because it requires analysis of many factors. These factors include:

- The structure of customer orders
- The state of the raw material market, the performance of the equipment
- Work schedule changes, etc.

A truly optimal planning requires serious mathematical training and honed interaction marketing service, purchasing and production. You must organize all the factors and find the best solution to the problem. As a rule, the planning process is a pseudo-optimal nature and is based on the subjective approach of people who have a certain experience in the industry. A priori, we can assume that the ability to improve the planning process is always there.

In addition to non-optimal planning for losses associated with the expectation of significantly affected by uneven capacity of the equipment. In this case, the accumulation of products awaiting treatment may occur before the operation with the lowest band width. The performance of such operations should be improved. If this is not possible, provide flexible working equipment or redeployment of staff between operations. Losses due to expectations as a result of downtime ($L_{e.d.}$), defined by the equation:

$$L_{e.d.} = L_{e.d.} + L_{s.w.} \quad (5)$$

Where:

$L_{e.d.}$ = Losses associated with downtime

$L_{s.w.}$ = Losses associated with idle workers

Losses due to expectations depend on the following factors: equipment performance (labor), the waiting time and the production costs per unit of product. Under the performance is to be understood the efficiency of resource use in the production of goods which is determined by the number of products produced per unit of time:

$$L_{e.d.} = \sum_{i=1}^{n_4} \sum_{w=1}^W P_{iw} T_{iw} C_{iw} \quad (6)$$

Where:

n = The number of types of products which were not produced as a result of downtime

w = kind of equipment

W = The number of types of equipment

P_{iw} = w -performance of the equipment that produces the i th type of product (pieces/hour)

T_{iw} = W -downtime of the equipment producing the i th type of product

$$L_{s.w.} = \sum_{i=1}^n \sum_{z=1}^Z T_{iz} C_{iz} \quad (7)$$

Where:

z = Employee profession

Z = The number of types of equipment

T_{iz} = Waiting time employee z th profession producing the i th type of product, hours

C_{iw} = Rate workers z th profession payment, generating the i th type of product (rubles/hour)

Losses due to inventory (excess amounts of raw materials, semi-finished products), inventories is frozen money, i.e., money recovered from the market and losing their value. Thanks stocks can be compensated jump in consumer demand. Inventories allow the company to produce products with interruptions in the supply of raw materials as well as allows to align the production flow. Can I do without reserves if they so useful?. To answer this question we must look at the inventory problem from a different perspective. Stocks seem to be needed but:

- As already mentioned, the reserves is frozen current assets
- Stocks need maintenance (storage space, staff, logistics, etc.)
- And most importantly-reserves hide production problems: poor planning, a strained relationship with suppliers, the unevenness of the production flow, etc.

In fact, stocks conceal the loss of other species, creating the impression of a happy working environment. Losses due to excess reserves ($L_{1.s.}$) are determined by the equation:

$$L_{1.s.} = \sum_{r=1}^R K_{br} \prod_{Kr} C_r \quad (8)$$

Where:

r = Type of stock

R = The number of types of stocks

K_{br} = The number of days r th type of stock

\prod_{Kr} = The number of stocks r th type of species

C_r = The cost of storing the r th type of stock

Losses due to production defects (marriage), the output, non-conforming consumer entails obvious costs of raw materials, working time, labor costs for processing and recycling of marriage. The traditional measure of reducing losses associated with the release of defective products is the organization of various regulatory departments and services. It is believed that such units must promptly take measures to prevent the issuance of marriage.

Eliminating losses in the production of the marriage it is advisable to start with the analysis of the effectiveness of the control units. We need to understand how much control services help to eliminate the causes of defective products. In any case, control is usually carried out only after products are manufactured. Consequently, the impact on the quality of operational controllers have

no opportunity. The only way out of this situation to build in quality control procedures in the production process. The total loss due to the release of defective products ($L_{d.p.}$) is given by:

$$L_{d.p.} = L_{c.d.} + L_{m.s.} \quad (9)$$

Where:

$L_{c.d.}$ = Losses associated with the costs of correcting defects

$L_{m.s.}$ = Losses related to the cost of production to the final marriage

$$L_{c.d.} = \sum_{n=1}^n \sum_{k=1}^K \prod_{ik} C_{ik} \quad (10)$$

Where:

n = The number of types of defective products

k = Type of defect

K = The number of kinds of defect

\prod_{ik} = Number of i th to k -product m defect

C_k = Correction value k th marriage i th product

$$L_{m.s.} = \sum_{i=1}^n \sum_{q=1}^Q \prod_{iq} (N_{m_i} C_{m_i} + N_{e_i} C_{e_i} + N_{t_i} C_{t_i} + N_{f_i} C_{f_i} + N_{s_i} C_{s_i} + N_{int_i} C_{int_i}) \quad (11)$$

Where:

q = Final view of marriage

Q = The final number of species of marriage

\prod_{iq} = Number of i th to q -products defective m

$N_{m_i}, N_{e_i}, N_{t_i}, N_{f_i}, N_{s_i}, N_{int_i}$ = Consumption of material energy, technical and technological (equipment), financial, labor (physical labor) and intellectual resources, respectively in the production units of i -type products

Loss of excessive processing (processing, not bringing valuables or add functionality not required). As already mentioned, the consumer is willing to pay only for the properties of the goods which are of value to him. If the customer needs such as a refrigerator it expects to receive the goods of adequate quality, endowed with appropriate consumer properties for a certain price. Therefore, if you embed in a refrigerator for example, a holder for dry ice, thus increasing the price by half, not the fact that there refrigerator to find their consumers. This is because the additional functionality of the refrigerator does not add value. Another example. If the consumer expects the refrigerator housing must be white but you only have a silver plastic, you're after construction of the hull repaint it in the color you want it is also unnecessary loss treatment. Losses due to the extra processing steps $L_{l.e.p.}$ determined by the equation:

$$L_{l.e.p.} = \sum_{i=1}^n \sum_{j=1}^J \prod_{ij} (N_{m_{ij}} C_{m_{ij}} + N_{e_{ij}} C_{e_{ij}} + N_{t_{ij}} C_{t_{ij}} + N_{f_{ij}} C_{f_{ij}} + N_{s_{ij}} C_{s_{ij}} + N_{int_{ij}} C_{int_{ij}}) \quad (12)$$

Where:

n = The number of kinds of products which is conducted over-treatment

j = Type of treatment

J = The number of treatments

\prod_{ij} = Number of products i -type subjected to excessive j th type of treatment for the reporting period pieces

$N_{m_{ij}}, N_{e_{ij}}, N_{t_{ij}}$ = Consumption of material, energy, technical

Loss on unnecessary movement (not directly related to the implementation of production activity), unnecessary movements that lead to losses could be called easy-vanity, thus underlining their unfounded and chaotic. On the part of such movements may seem feverish activity but looking more closely you will notice that they like losses, previously discussed are not conducive to the creation of value for the consumer. The source of this type of loss is usually one-poor organization of work. These include the lack of adequate regulations, poorly trained staff or low employee morale. This type of loss is different in that they can be fairly easy to find and discover quite obvious take measures to eliminate them. "Lean Production" offers for this purpose a number of tools: standard operating procedures, the system of workplace organization (5S):

- Sorting, deleting unnecessary
- Self-organization, the maintenance of order, the definition for each thing its place
- Cleanliness, systematic cleaning
- "Standardization" process
- Improvement of order and discipline

Losses due to unwanted movement of the personnel ($L_{s.m.}$) are determined by the equation:

$$L_{s.m.} = \sum_{d=1}^D \prod_d N_d T_d \quad (13)$$

Where:

d = Number work profession

D = The number of jobs

\prod_d = The number of employees in the first profession, performing unnecessary movement

N_d = Pay the employee d th profession in a unit of time

T_d = The total time of the unnecessary movement of workers d th profession

Creative potential losses (incomplete use of human resource capacity), familiar to your state when you feel the strength to do more when there is the will the knowledge, the creative impulse but circumstances did not allow to express themselves properly?

In this case, under the circumstances that prevent the employee to express themselves fully, means: unreasonable bosses will, lack of time and resources to implement the ideas, tensions in the workplace. All this leads to the fact that a person feels only an appendage of the production system, the part that can be easily replaced by another. In such circumstances, the employee performs his duties formally in the required minimum and in a hurry to leave the alien to his company. Meanwhile, all the people are inclined to a greater or lesser extent to creativity, even if the need to build is generated by the desire to avoid unnecessary work and reduce the burden of routine activities. An employee directly related to value creation can daily watch the same activity to notice the shortcomings and how to improve.

That is why one of the major problems to be solved in the course of implementation of "lean production" is in the universal involvement of personnel activities for continuous improvement-Kaizen (Kaizen) with a view to take full advantage of the potential of each employee.

DATA AND ESTIMATION TECHNIQUES

Losses on liquidation activities require financial investments in particular investments in lean manufacturing organization. Various methods can be used in the formation of budget investment in the organization of production such as:

Standard method for determining the level of investment in the organization of "lean production" involves the establishment on the basis of the allowable costs of the value of research for the introduction of one workplace of an instrument of "lean production". The scale of investments depends on the number of jobs covered by the activities of "lean production" and the cost of their implementation.

Expert method is based on expert evaluation group level of necessary investments, the implementation of measures for the organization of "lean production".

Resource method is to determine the cost of the required material, energy, technical and technological (equipment), financial, human and intellectual resources, aimed at the implementation of measures for the organization of "lean production". Simplified form of resource method is the formation of estimates of the costs of certain activities. This method is optimal for

determination of capital investments in the organization of "lean production" as the enterprise, without attracting additional financial resources, can make their own estimates for the costs of the event "lean production".

By "resources" category is meant a set of tangible and intangible factors that are used and may be involved in the production of products, goods and services. In this natural system has a characteristic feature the consumption of resources increases exponentially. The parameters of this growth is the time of assimilation. This is the time interval for which there is doubling of the value of consumption of a particular resource.

Thus, resource potential a set of features (reserves) which can be mastered (implemented) in time for all types of resources. It can be described qualitatively and quantitatively, however when using the resource potential within the framework of economic activity raises the question of the rationality of its use.

The potential of "lean production" which is an integral part of the economic potential of the company is the result of reducing resource consumption per unit of gross domestic product as a result of the realization of economic, organizational, legal, scientific, industrial and technical measures in order to achieve efficient use of resources:

$$LM = \sum_{p=1}^p \Delta L_i \quad (14)$$

Where:

LM = Potential "lean production"

L_i = Loss for all transactions not increase the value of the finished product or service

It should be noted that the resource potential growth is a positive development in the economy and the potential growth of "lean production" has the opposite tendency. Arrangements for "lean production" can be made in the form of an investment project.

Investments in companies' lean production are capital investments in all its forms in the different instruments under consideration of the concept in order to reduce losses and achieve other economic and non-economic effects, the implementation of which is based on market principles and connection with the factors of time, risk and liquidity. Knowledge and practical application of modern principles, mechanisms and methods of effective management of investments in lean manufacturing uniquely allow for qualitative transition of the enterprise to a new stage of economic development in the market environment.

A key advantage of the investment in the "lean" tools is the fact that the implementation of the conception by 80% consists of organizational measures and only 20%

is made up of investments. The criteria for the effectiveness of implementation of measures for the organization of lean manufacturing are encouraged to use traditional indicators of efficiency of investment projects, such as:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Discounted Payback Period (DPP)

DISCUSSION

Initially, the “lean production” is used in the automobile factories. Over time, the approach has been adapted to the conditions of different industries. Now, among the companies applying “lean production” can be seen as industrial, large enterprises and small businesses and service organizations. The use of “lean production” can be found in areas such as:

- Logistics “lean logistics”
- Banking services
- Trade
- Information technology “lean software development”
- Construction “lean construction”
- Education
- Medicine “lean healthcare”
- Oil production

In whatever field is not applied lean manufacturing approach, all it requires some adaptation to the specific conditions. However, its use in any organization allows to achieve a significant increase in efficiency and reducing losses.

Leaders of Mari El are going to make a breakthrough in the economy using the techniques of “lean production”.

Advancing import substitution requires a different economic system and the other ideology, the philosophy of life of our state. It is understood in the regions. Therefore, the Republic of Mari El has chosen one of the key areas of development the promotion of the ideology of “lean production”.

Of course for an inclusive implementation of the methodology and ideology of “lean production” needs the support of the Republic’s leadership.

Among the Volga Federal District the Mari El Republic took the 8th place and the 37th place in the Russian Federation in the rate of growth of investment in fixed assets. Investments in fixed assets amounted to 47.2 billion rubles in 2015 and this figure is expected to reach 49.6 billion rubles in 2016.

In the near future in the country, it is planned to implement a number of new investment projects in industry, agriculture and small business using “lean production” model actively modernizing production, develop and produce new products including products aimed at import substitution (Kreneva *et al.*, 2015).

In agriculture in the nearest future it is planned to implement a number of large investment projects. One of them is the implementation of the ninth stage of the development of the agricultural holding “Akashevo”, involving the construction of a meat processing plant in the city of Volzhsk, construction sites for growing of poultry in the Volga area, the construction of a plant for processing and disposal of waste in the area Paranginsky, construction elevator and feed mill plant loudspeakers for the first and the second orders in the village. Volga region, the reconstruction of the plant for processing biowaste in the Soviet area. The total cost of the project is about 8.9 billion rubles is planned to create about 600 job places as part of the project.

Agroholding “Akashevo” in the long term is considered the implementation of the tenth stage of the development of the agricultural holding.

In Mari El opened pedigree hatchery. Construction and equipping of the hatchery were made with the latest technological solutions in the field of poultry farming. The total investment in this facility is >179 million rubles of which about 86 million rubles up credit funds Rosselkhoz bank. The new equipment will produce 15 million eggs per year which will satisfy the need for chicken breeders.

In general, eighth place poultry farm project envisages construction sites content grandparent and parent stock as well as the organization of innovative animal-breeding center in the region, thus creating a vicious cycle of growing breeder pedigree reproducers within the first and the second orders.

With the launch of a new hatchery in the company there will operate its own database for the incubation of breeding eggs. The quality of the material will not yield to foreign and will provide an egg up to 40% of the Russian poultry market.

JSC “Teplichnoye” in 2016-2017 years is planned to implement the project on greenhouse agriculture modernization and increase in space indoors for growing vegetables worth about 1.5 billion rubles.

Also in the future other organizations of the republic working in the production or processing of agricultural products plan to implement new projects or modernization of existing plants.

Industrial enterprises of the republic are JSC NPO “Tavrida Elektrik”, CJSC “Ariada”, LLC Company

“Printstyle”, NPF “Geniks” and others are also being implemented or planned for the implementation of projects to create new industries.

Nearby enterprises of the republic (JSC “Mari Machine-Building Plant”, JSC “Mari pulp-and-paper plant”, JSC “Semiconductor Devices Factory”, JSC “portal”, JSC “Ariada”, JSC “Krasnogorsk plant vans”, LLC “Potential”, JSC “Marbiopharm”, JSC “Volzhsky electromechanical plant”, JSC “Yoshkar-Ola meat-packing plant”, CJSC Plemzavod “Semyonovskiy”) are also implemented projects on technical re-equipment and modernization of production.

Support measures financed by the national budget and provided tax breaks and other support measures should primarily stimulate economic growth and the inflow of investments into the country and promote import substitution, development of industry, agriculture, small and medium-sized businesses.

Also as part of the development of import substitution the Republic of Mari El has prospects for a significant increase in the production of pharmaceutical products by JSC “Marbiopharm” significant potential for increasing the volume and range of products to NPF “Geniks”, LLC “Shelangersky chemical plant “Sayver” and other enterprises of the republic.

As part of this work should be aligned as much as possible effective and “short” chain from the producer to the final consumer product and on the part of regional governments and local authorities to provide maximum assistance for the promotion and sale of products of producers of the Republic of Mari El in retail chains in the country and beyond.

Today, industrial and agricultural enterprises of the republic have a significant potential for the production of import-substituting products and expanding the range of products export. It is also significant potential for development are enterprises producing construction and finishing materials using local raw materials.

Such projects of course will be supported by the Government of the Republic of Mari El we will contribute as much as possible the implementation of new business initiatives in these areas.

Given the techniques of “lean production” is planned to further develop the Southern industrial area of the city Yoshkar-Ola area of 50 ha on the territory of which is currently formed of 30 plots of various sizes which may be provided to investors in use.

In the municipalities of the republic already formed or formed investment areas suitable for placement of industrial and other purposes based on the model of implementation of “lean production” in Table 1.

Table 1: Model system “Lean” enterprise

“Lean”	Content
Objectives	Improving the efficiency of the enterprise Increasing competitiveness, product quality
Losses	Reduction of losses Overproduction Defects and alteration Movement Material handling Supplies Excessive processing Expectation
Product quality	Strict adherence to technology and Product standards Strict compliance with state standards Self-control The achievement of compliance with the specifications of the first times
Expenses	Free from defects and the marriage of finished products Increasing productivity Reduction of inter-operational stocks Reducing downtime Optimization of production facilities Rational consumption of resources
Preparation time	Product manufacturing cycle time reduction, reduction of time for elimination of the marriage and finishing balancing and synchronization processes
Principles	
Teamwork	The contribution of each employee in achieving a common goal The task manager team building
Respect	Bugs and problems the result of the whole system and not individual
Ambitious goals	Goals should be elusive and require constant development
Continuous improvement	The basis of development of the enterprise is not innovation break throughs and frequent small improvements
“Go and look”	Adoption of the head of management decisions based on facts and personal study of the problem at its source
Tools “lean production”	Analysis technology improvements in technology involving technology

It is necessary to highlight the principles for the implementation of lean production at Russian enterprises, under which it can be stated that the company implemented the tools and techniques of the system “lean manufacturing”:

- Implementation of lean manufacturing tools will be effective only when the work will lead by senior managers which now need to change the management structure
- In the process of improving the business management and the introduction of lean manufacturing is necessary to involve all members of the organization
- For the implementation of lean production is necessary to educate leaders and specialists to prepare for the implementation of lean manufacturing principles
- Start with pilot projects to show the effectiveness of the organization’s staff the tools of lean production and use of the principle of “come and see”

- A key element of lean manufacturing is the standardization, consolidation achieved without which there will be no development and return to the starting position will be inevitable

Today, it is necessary not only to create the best conditions for doing business in the region but also to convey to investors that the Republic of Mari El a region which is favorable to cooperate and to investors created favorable conditions for the beginning of the investment and entrepreneurial activity.

CONCLUSION

“Lean manufacturing” is not just a set of concepts, tools and rules. It is first of all I established views on the organization of the relations of production affecting all layers in the organizational structure of enterprises, requiring the presence of his followers in the enterprise. The foundation of “lean production” is rational and their implementation does not require major investments.

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