

Review paper

**VALUE STREAM PERFORMANCE MEASUREMENT
AND THE LEAN BUSINESS CONCEPT**

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Abstract. *Lean business concept is characterized by providing value required by customers, prompt delivery of products, eliminating all forms of waste from production process as well as from all business processes in the company, etc. In order to achieve and maintain competitive advantage, it is appropriate to carefully consider and apply the basic principles of lean business concept and establish a value stream. Value stream is a basis for creating value for the customers, on the one hand, and for the enterprise, on the other hand. In that context, it is necessary to choose a set of performance measures for assessment of the value stream success, which is named Box Score.*

Key words: *lean business concept, value stream, Box Score, performance measurement*

INTRODUCTION

In a business environment which requires speedy response to customer demands, a high level of product quality, a shortened wait time, and other similar aspects, existing business concepts show their inadequacy. In these contexts, contemporary enterprises which aim to deliver the demanded value to the customers while striving for excellence apply, among others, the lean business concept. The first emergence of this concept was in the production process, in order to extend to all other parts of enterprise and relationship with suppliers, after achieving many improvements. Conceptual basis for management and performance measurement with application of lean business concept is a value stream. Value stream includes all activities from the suppliers to the customers and is not only connected to the production process.

Performance measurement in the lean business concept is carried out at the value stream level. There are not any precisely defined set of measures which should be applied to the value stream level, but with the purpose of following its success and its compliance

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with the objective and the strategy of enterprise, the application of Box Score is suggested. Box Score is a three-dimensional display of key performance measures of the value stream, which includes operational performance measures, performance measures of capacity and financial performance measures as well as their mutual relations.

In that context, the first part of the paper is directed at lean business concept and its basic principles that represent the key point for the successful business. Establishing of the values stream as a conceptual basis of new business environment is shown in the second part of the paper. At the end, the paper concerns the three-dimensional system performance measurement Box Score. Through monitoring of operational performance measures, and measures of capacity and financial performance, it provides the insight to a way and effectiveness of available resources of the enterprise and to the overall efficiency of enterprise management.

1. LEAN BUSINESS CONCEPT

The roots of the lean business concept began after World War II, only to spread worldwide during the mid-1950s after the publication of the book, *The Machine That Changed the World*. The authors of the book presented a model that was led by Toyota company. This model helped Japan's industry experience economic and social rebirth and take a leading position in the production of automobiles. This model is named Lean and it implies more results with less use of human resources, equipment, time, and space that are needed for the production of products that meet the needs of demanding consumers.

Lean business concept raises the awareness of the need to create and increase value through a determination of factors that influence the value and control of performed activities and provides an undisturbed and continuous flow of process which at the same time achieves a given efficiency. In this manner, a higher value is achieved for the enterprise through increasing of profit of the value stream, reduction of inventories, and waste of resources. Also it brings greater value to the customers through increasing of the quality and functionality of the product, reduction of time of delivery and waiting for the product.

In the initial stages of development, lean business concept focused only on operation improvement. At that level, the tendency was with the implementation of certain lean techniques and tools to improve efficiency and reduce cost in the production process. The goal was to eliminate resource loss, deliver demanded value, achieve defined performance, ensure better understanding of process, and facilitate the improvement of business processes and performance (Salehi & Yaghtin, 2015). During the nineteen-nineties, the focus of lean business concept was extend from operating to strategic level. At the strategic level the tendency was towards understanding of value which is provided to the customers in terms of product quality, cost, speed of delivery, etc.

Lean business concept was first implemented in the production process. Its implementation enables a lot of positive improvement, and after that it is extended to all business processes and all activities. Extended application of lean business concept led to forming of a lean enterprise. Lean enterprise consists of a group of individuals which within legal norms perform their task or carry out functions in such a way that creates a synchronized company (Womack & Jones, 1994).

Basic principles of lean business concept are (Hilker & Carsten, 2011):

- Specify value
- The Value Stream
- Flow
- Pull system
- Perfection

The value that is created within the enterprise is defined by the ultimate consumers. The ultimate customer defines the characteristics of the product that will meet their needs in the best way, and a manager of enterprise accepts that value as an objective which should be produced in order to meet the consumer demands and increase their loyalty. Value defined in such a way should be communicated to all the employees involved in the creation and delivery of it.

The second principle refers to the establishing of the value stream. Value stream includes all activities that are necessary for creating the value for the customers. In the value stream are joined all the activities that are necessary to be performed from the moment of creating of idea of the product, through its production to the moment of delivery to the ultimate final customers. As the value stream represents the conceptual basis for managing in the new business environment, it will be dedicated a special attention in the second part of the paper.

Once the value is identified and the value stream is established, it is necessary to put the attention on the real object, i.e. the specific design, order and the product itself. In that context, the efforts of the management and executives would be on eliminating all the obstacles to the continuous flow of product products. At the end, management should inspect once again the overall flow of product in order to avoid duplication of the activities and eliminate unnecessary activities in the business.

Introduction of pull system is the fourth principle of lean business concept which is implemented in a contemporary enterprise. As the purpose of lean enterprise is the reduction of waste and the elimination of non-value added activities, introducing pull system is of great importance for that process. Pull system is focused on the demands of customers and, in that context, it is tent to providing of the conditions to start with production of product at the time when the manager gains a signal from the market. The customers are those who determine when to begin with the production of required value.

With the application of lean business concept the transformation process into lean enterprise and the process of the continuous improvement does not end. When one enterprise gains the attention of the customers, it wants to keep it by anticipating future needs of the customers and creating products which will meet their needs, and in that way build an image of being sensitive to customers and create an image on the market as a quicker producer of products better than those of their competitor (Novićević et al., 2013).

2. VALUE STREAM – CONCEPTUAL BASIS OF MANAGING AND MEASURING OF PERFORMANCE

Value stream includes all the activities and tasks that are carried out in the enterprise with a purpose of creating the value for the customers (Baggaley & Maskell, 2003a). It is both the spot where the value is created for the customers and at the same time where waste and non- value activities occur.

Establishing the value streams implies previously identifying the resources and tasks that are performed in the enterprise. In one value stream, there are products with similar characteristics that pass through similar production process, machines and use the same resources. Production process is one part of the value stream, and it is necessary to distinguish between these two terms. If the value stream is identified with the production process, the managers will not be able to look at the overall flow of the product through the enterprise and will not get a clear picture of the flow of the material, information and cash through the enterprise. Lack of the clear picture of the product flow will lead to the inability to detect where the resources are consumed unreasonably and the waste appears, and therefore it would be impossible to make an improvement of business.

The best way to identify all resources, works and tasks that are carried on in the enterprise is the physical inspection of the process. In that manner one can get an accurate picture of current functioning of the business process. The majority of the employees in the enterprise know only the activities and the tasks that they perform, so the development of the diagram of the entire process will be the key for establishing the overall process of the business. In addition to showing all the details of the process, the purpose of the all-encompassing diagram is to provide understanding of material flow, identity of waiting and delay, the level of inventory and the other relevant information (Maskell et al., 2012). For the enterprises that produce a small number of similar products, it is relatively easy to establish value stream. In some enterprises it is possible to establish a main value stream, and beside it, there exist some other products that cannot be included in the main value stream. In order to be an efficient enterprise and to successfully perform its activities it is desirable for there to exist three or four value streams. The most frequent value streams identified in the enterprise may be: the realization of orders, gaining new customers, new product development, process control, etc.

In addition to the number of value streams in the enterprises, their size should be defined in terms of the number of employees that are participating in it, and the number of machines that are used. The desired outcome is that all the employees would be connected to some value stream. It is suggested that in one value stream participate between 25 and 150 people. This is due to the fact that too many employees in one value stream may move the focus of value stream from the improvement of activities, and too few people would not be enough for effectively carrying out of the activities. In order to realistically assign a cost to each value stream it is desirable for each value stream to have its own machine that is used only in it. This is according to the need of overcoming the cost allocation and finding adequate allocation keys. However, some enterprises have used large and complex machines that are shared among more than one value stream. From a long-term perspective, managers of that enterprise should find a way to avoid cost allocation, because that may have multiple benefits for the operation of the enterprises.

Value stream manager controls the value stream. Value stream manager should have certain knowledge and skills, and should be attached to the enterprise and understand and establish a relationship between the objective of the value stream and strategic objective of the enterprise (Tapping et al., 2002). Furthermore, in order to improve the business process and achieve perfect quality it is preferred that value stream manager comprehends the essence of lean business concept and for that knowledge to be relayed to all employees. In addition to the value stream manager, and for the purpose of monitoring accomplished improvement, in each value stream there exist the continuous improvement team. The purpose of the continuous improvement team is the analysis of the performance of the

specific values stream every week and the recommendation of the project of the performance improvement.

The tool of the lean business concept which is very helpful for understanding the current processes in the enterprise and the establishing of the value stream is the value stream map. Mapping the value stream involves monitoring the occurrence of products from suppliers to consumers. This process begins with a careful analysis and presentation of the current state of the business process. The result of mapping the value stream in the graph that visually shows the entire process of creating value in the enterprise with the documentation of time, waste and cost. Value stream mapping helps managers of the enterprises to consider and better understand the functioning of the entire business process. Value stream map is important for the following reasons (Rother & Shook, 2003; Womack et al., 2003):

- Focus is on the customer,
- Allows timely presentation of the activities flow,
- Establishes a common language with a high level of standardization of symbols,
- Allows analysis of current values,
- The flow of information and their impact on the launch of other activities, and
- Shows where certain activities add value, and where in the course are value losses.

Creation of the value stream in the enterprise is important for several reasons. Establishing of the value stream allows enterprise to respond to the demand of the customer through the delivering of asked value and, thus, realize defined goals and achieve appropriate business result. Also, the non-value activities are eliminated, defects are reduced, waste is eliminated, etc. The correctly established value stream will expose any potential delays and bottlenecks that may occur in the process of creating the value. Based on that information, the managers may make the plan of correction activities for eliminating possible interruption in a timely manner. The correctly established value stream in the best way points to the flow of material, information, and cash throughout the enterprise.

3. THREE- DIMENSIONAL APPROACH OF PERFORMANCE MEASUREMENT

Lean business concept is a kind of business philosophy that firstly had to be accepted from the top managers who will spread and implement it to the employees on the lower level of the organization. The implementation process of lean concept starts with a research and analysis of the existing way of working and based on that choosing of certain lean technique that may be applied in the specific business practice. In order to reach and maintain long term results, it is necessary that the lean business concept would be discreetly connected to the strategy of the enterprise, organization culture and the system of performance measurement. Multiple useful tool for the monitoring of the implementation of strategy and managing of the enterprise which allows following the events through all levels and in all process and activities is the Box Score. Box Score includes financial information about business, nonfinancial information about operation measure and information about utilization of the capacity (DeBusk & DeBusk, 2013). Performance measures that are entered in the Box Score are carefully selected and connected to the strategy of the enterprise in order to provide effective monitoring and maintaining the process of implementing of define business strategy. In that context, the Box Score represents an integrated system of performance measure of the value stream, and, as such, is an important source of the information for the employees in the enterprise (Maskell et al., 2012):

- Value stream managers use it to plan and evaluate the lean improvements,
- Members of the value stream use it for designing improvement programs that will have the biggest impact on the financial and operation result,
- Plant and division managers use it to understand value stream improvement plans and to evaluate of the performance
- Other executive use it as a basis for simulating the potential impacts of the market trends and capital investment plans.

Through the monitoring of the performance measure that are contained in the Box Score, enterprises managers may obtain important information about the way of performing activities and operations in the value stream, the way of utilization of the resources and the financial consequences. Monitoring is provided due to the fact that Box Score, in addition to the information about current state, contains a required short term and long term future state as well as the potential changes.

Box Score is a three-dimensional display of the value stream performance measure. Operation performance is found in the first dimension, performance of the capacity utilization is found in the second dimension, and in the third dimension the financial performance is found. Box Score of an enterprise is shown in the table 1.

Table 1 Box Score Report

Value stream performance measurement		Current state	Short term future state	Change	Long term future state
Operational performance measure	Dock-to-dock time	20.5 days	4.5 days	16 days	4.5 days
	First time through	48% FTT	96% FTT	48%	96% FTT
	On time shipment	90%	99%	9%	9%
	Sales per Person	24,389	25,346	957	35,906
	Average cost per unit	328.88	308.61	(20.27)	296.88
Capacity utilisation	Productive capacity	19%	16%	-3%	15%
	Nonproductive capacity	59%	31%	-28%	42%
	Available capacity	22%	53%	31%	43%
Financial performance measure	Inventory value	58,502	13,997	44,505	13,997
	Value stream revenue	1,292,640	1,292,640	0	1,292,640
	Material cost	512,160	477,160	(35,000)	477,160
	Conversation cost	189,868	181,416	(8,450)	153,373
	Value stream profit	590,612	634,064	43,450	662,107

(Adapted by: Katko, S. N. (2014) *The Lean CFO, Architect of the Lean Management System*. NY: CRC Press. p. 4.)

The positioning of capacity utilization performance measures between operational and financial performance measures in the Box Score is not accidental. This dimension of the Box Score is used for assessing the use of resources within the value stream and connecting the operational and financial performance measures. Namely, when the operational performance measures are achieved through the appropriate lean improvements, capacity utilization performance measures also improve. Capacity improvements are shown through the reduction of nonproductive capacity and through increasing the available capacity. In this way, value stream managers will be able to act proactively and to plan the use of available capacity to improve operations and increase profitability of the value stream.

The first dimension of the Box Score is the operational performance measurement. Operational performance measurement at the value stream level shows how successful value streams achieve their goals. Some of the goals of the value stream may be: increasing of the output with existing resources, accelerating the flow, reducing the inventory level, achieving perfect quality, increasing productivity etc. There is not a defining set of the operational performance measurement for all the enterprises; the already selected set of the measures directly depends on the characteristics of the business of the enterprises. The most frequent performance measurement in the practice can be (Stenzel, 2007):

- *Dock-to-dock time,*
- *First time through,*
- *On time shipment,*
- *Sales per Person and*
- *Average cost per unit.*

The first operational performance measure is ***Dock-to-dock time***. Dock-to-dock time measures the speed of conversion of raw material into finished product within the value stream, specifically, the time of the flow of material through the value stream. This measure presents the time it takes from the moment in which material entered the warehouse, the time it takes when the material is in the production process and the time when the material is on the inventory of work in progress and finished products (Novičević et al., 2013). It is desirable for the Dock-to-dock time to be as short as possible because that is the way in which the speed of material processing will be increased, the inventory level within the value stream will decrease, which in turn will cause the increasing of the value stream profitability. The calculation of this measure first implies calculation of the total quantity of material both in the inventory of work in progress and finished products, reported through the number of units that may be produced from that material. After that is calculated the average speed of delivery of finished product per hour within one week, which is calculated by dividing the number of units shipped within a week and the hours in the week. By dividing the total quantity of the material contained in all types of the inventory with an average speed of delivery finished product, the *Dock-to-dock time* is gained.

Next performance measure within the Box Score is ***First time through (FTT)***. First time through shows the percentage of the product manufactured in the value stream that do not need any rework, repair, i.e. the percentage of the product that is produced immediately according to the required quality. This shows the number of the correct products in the value stream. This measure is particularly used by teams working on the continuous improvement time, because it directly exposes any problems in the business process, the cause of the existing problems and the way to overcome and resolve those problems. The amount of the *First time through* is obtained by multiplying all FTT indexes of the production cells within the value stream. Individual FTT indexes are obtained by dividing the remainder of the total number of products with the number of produced products with no defects with the total number of produced products (Gunduz, 2015).

The third performance measure is ***On time shipment*** (McVay et al., 2013). This measure indicates the percentage of orders delivered on time to the consumer and the level of control established in the value stream. If the percentage of orders delivered on time to the consumers is on a high level, the specific value stream is considered to be under an adequate control. However, if the company does not deliver products on time, managers have to reassess the process and determine if there are any specific delivery issues. There are two methods

to calculate this index (Kennedy & Maskell, 2006). The first and the stricter method, requires relating the number of products delivered on time and the total number of products. The milder method to calculate this performance measure is dividing the number of products delivered on time with the promised date and the total number of products. It is suggested to start with the milder method and switch to the stricter method when the value of this index exceeds 90 %.

Sales per person is measuring the productivity of the value stream. The productivity of the value stream should be increasing, because in that case the company produces and sells more products with the same resources. Sales per person is calculated by dividing the income from selling products produced in one value stream with the number of employees in the same value stream (Maskell et al., 2012).

The last operative performance measure in Box Score is **Average cost per unit**. Average cost per unit of product is quotient of the total value stream costs in the given period and the number of products delivered to the consumers (Stenzel, 2007). This performance measure supervises the functioning of the established stream value and valuates products in inventory. If the number of products in inventory is increasing and there is a bottleneck, the amount of this measure is high. However, if the number of products in inventory is decreasing, the amount of this measure is low.

The usage of capacity performance measure is the second dimension of Box Score. In a lean company the resources are used for productive and nonproductive activities. When estimating whether an activity is productive or nonproductive, it should be observed from the point of the final consumer. Productive activities are the activities that are necessary to produce and deliver the wanted value. These activities increase the value. And the consumers are willing to pay for them. Nonproductive capacities are used to perform activities which do not increase the value, which produce spoilage, demand corrections of the products, etc.

In order to obtain the amount of productive and nonproductive capacities, the present daily and monthly capacity of the company should be calculated. In order to obtain the daily capacity, the effective work hours should be divided with the duration of the longest operation in the process. The effective working hours mean the eight hours working time expressed in seconds. When the effective working hours are divided with the duration of the longest operation in process we get the number of products that can be produced daily in the value stream. The number of products multiplied with the number of days in the month gives us the monthly capacity, which is the number of products that can be produced monthly within the value stream. In order to obtain the productive time, monthly capacity of the value stream is multiplied with the time needed to perform productive tasks (Lopez et al., 2013; Maskell et al., 2007). Time needed to perform nonproductive tasks multiplied with the daily capacity is nonproductive capacity. Productive and nonproductive capacities are expressed in percentage in the relation with the total capacity.

There is another performance measure of capacity, called **Free capacity** (Baggaley & Maskell, 2003b; Maskell et al., 2007). Free capacity is the difference between the total capacity and the sum of productive and nonproductive capacity. One of the lean companies' main goals is forming free capacities, and later using them to perform activities that increase the value. Increasing productive capacities on account of nonproductive capacities is achieved by increasing the number of products produced in the value stream. In order to achieve that, time needed to perform the longest operation in the process should be reduced, and the existing bottlenecks should be removed. The managers of the value stream have tasks to reassess the capacity usage and, in cooperation with other executors, propose some corrective actions to shorten the longest operation in the process.

It is possible to calculate measuring the capacity performance for the machines as well as for the employees in the value stream. In that sense, in order to manage capacity successfully, it is necessary to precisely determine the time needed to perform productive and nonproductive activities. These information are easily accessible, because all the data needed are already collected and registered in the map of the value stream. Including data about value stream performance capacities into the management analyses will ensure the unhindered flow of the product, and the consequences of the continuous improvement will show their financial effects too.

The final dimension of the Box Score refers to the *Financial performance measures*. Financial performance measures shown in the Box Score are: the value of the inventory, material costs, processing costs and the value stream profit.

Inventories in the lean company are at a low and stable level. Therefore, the lean companies' managers are exactly aware of the supplies amount needed in each production cell in the value stream. Stable and lower level of the inventory creates the opportunity for using simple and easy methods for the valuation of the inventory, semi-products, and final products. When choosing the method for the inventory valuation one should pay attention to (Maskell et al., 2012):

- Time of keeping the inventory
- Possibility for the visual control
- Possibility for the monitoring of inventory by computer and
- Difference between the mixture of the inventory and the selling mixture.

If the time of inventory holding is shorter than 30 days, it is recommended to apply the method of the number of the inventory holding days or the method based on the number of units (Stenzel, 2007). The application of the method of the number of days implies knowing the number of holding days of all kinds of the supplies. The total expense of the value stream is divided by the number of the days in the month, and then the obtained amount is multiplied with a number of the holding days of a particular kind of supplies. The number of the units method implies tracking the number of the units of a product that are produced in the values stream of one month. The value of the inventory in a lean business is small, so it is considered that it does not have a big effect on the value stream (DeBusk & DeBusk, 2012). In that sense, the value of the inventory is relocated from the traditional profit and loss report of a business and is used only for correcting the profit of the value stream. The value of the inventory shows the fair inventory value, i.e. the inventory value that is not burdened by the material expenses. It is important to state that this kind of presentation of the inventory value in the profit and loss report is in accordance with the Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS). This is due to the fact that the supplies are evaluated according to the real production costs of a product in a period in which the supplies are made, which are the prerequisites of the mentioned standards.

The revenue, the material expenses, the processing expenses and the value stream profit as the elements of the Box Score are taken from the profit and loss report of the value stream. The profit and loss report of the value stream is based on the information obtained from the value stream expenses calculation (Antić & Novičević, 2013, 2015). The value stream expenses calculation represents the adequate informational basis for a lean business and lean business conditions, and its basic characteristics are (Baggaley & Maskell, 2003):

- Focus on the value stream,
- Ease of use,
- Dedication to the performance measures of the value stream,
- Focus on the elimination of the calculation and allocation of the general expenses, and
- Clarity and intelligibility for all employees of the company.

The material expenses presented in the profit and loss report of the value stream, i.e. in the Box Score, represent the amount of the materials provided for the value stream and multiplied by the purchase price of the appropriate kind of materials.

The processing expenses of the value stream include: labor expenses, manufacturing support expenses, machine expenses, facility expenses and other value stream expenses. The labor costs represent the sum of the salaries of all employees who are included in the value stream itself. The labor costs of the lean businesses include the expenses that are traditionally considered direct and indirect labor costs. The manufacturing support expenses are the costs of the maintenance, the costs of the quality, the salary of the engineers and the supervisors, planning logistics, supply and the like. The amortization, spare parts costs and the repair costs are the machine expenses. Despite the tendency to avoid allocation of the general traditional costs during the value stream expenses calculation, still, all facility expenses must be allocated for every value stream. This comes from the fact that expenses added to the value stream are only the expenses resulting from the activity done in the value stream, and not all the expenses. The allocation of the facility expenses is done based on the number of square meters used by the employees in the value stream.

The value stream profit is calculated by deducting of the material expenses and the processing expenses from the earnings of the value stream. In this way, the value stream profit represents the real number that can be planned and controlled.

The application of the three-dimensional system of measuring performances as Box Score is of the utmost importance for the success of the business. This above all since the measures contained in the Box Score are connected to each other and as such they allow measuring of the advancement of the business towards the defined goals. Also, even though the financial results are not visible in the beginning, a long term measuring of the key aspects of business is possible to reach through a significant competition advantage. Since they are the starting point in advancement of the operational performance measures, it is important for them to be aligned with the basic principles of lean business concept. In the following table a review of the connection of the operational performance measures and the lean business principles is given.

Using the resources in the right way in a company, productive capacities will be employed in a most efficient way, and the effect of their advancement will be visible through the shortening of the product delivery time, increase in the number of the products that do not need additional processing and treatment, reduction of time of keeping the materials, etc. In that sense, we can say that the performance measures of the capacity use are indirectly connected to the basic principles of lean business concept. Presentation of the financial results through the profit and loss report of the value stream within the last dimension will provide the clarity and transparency of all presented data.

Table 2 Operative performance measures and principles of lean business concept

Operations performance measurement	What does it measure?	Lean principle
<i>Dock-to-dock time</i>	The efficiency of value stream expressed in terms of sales amount performed by employees. Sales amount is divided to the number of persons in value stream.	Increase value created by the same or less resources.
<i>First time through</i>	The sufficiency of value stream in delivering the product to the customer on the desired day or time. The sales by percentages delivered on the correct time	Control the whole process within value stream.
<i>On time shipment</i>	The amount of inventory s throughout value stream expressed in terms of required day or time. Total amount of inventory within value stream is divided into delivery rates of products.	Increase material flow rate throughout value stream.
<i>Sales per Person</i>	The sufficiency of value stream for always-perfect production and service. First time through products are calculated in every step of value stream process.	Always do standardized enterprise throughout flow stream process.
<i>Average cost per unit</i>	Total cost of value stream is divided into the number of manufactures delivered to the customer.	Always decrease resource amount necessary for producing and selling products

(Adjusted according to: Gunduz, M. (2015) Value Stream Performance Measurement in Lean Manufacturing Business. *International Business and Management* Vol.10, No. 3 pp. 40-47.)

CONCLUSION

After having been applied in Toyota company, lean business concept attracted the attention of many managers from the West, who implemented it in their own companies. Establishing the adequate value streams and assuring their continuity is just one of the ways to deliver the wanted value to the consumers. Optimal functioning of the business can be managed if, by using numerous techniques, all forms of losses and activities that do not add to the value are removed.

For lean business managers it is of high importance to follow the positive effects of the changes that are being made in the company. For tracking the achieved advancements the application of the Box Score is proposed. The Box Score is a three-dimensional approach to the performance measuring and as it is, it gives the insight into the movement of the key performances of the company, as well as the insight into their mutual causality.

The first dimension of the Box Score is related to the operational measures of performances such as: *Dock-to-dock time*, *First time through*, *On time shipment*, *Sales per Person* and *Average cost per unit*. These operational measures of performances show the success in reaching the given goals in the value stream. The next dimension is related to the use of capacity. The use of capacity represents a strategically important dimension in the way of using the resources. Financial performances are shown in the last dimension of the Box Score. The basis for showing the financial measures of performances is made of the cost calculations of the value stream. A clearer and more precise presentation of the data in the financial dimension is made easier by the way of tracking the changes and the achieved advancements.

The effects of the advancements such as the reduction of the inventory and the losses, the reduction of the waste, the lead time, reduction of the overproduction and the like, are visible very soon. The listed advancements are the primary goal of the lean business concept. The reduction of the losses and the activities that do not add value are an important part of the advancement since by eliminating the loss, the expenses are reduced and free capacities are made. When the company has free capacities, the key role goes to the managers of the company whose mission is to employ these capacities in a way which will bring the increase of the value. On the way and the success in the employing of these capacities will depend the long-term success of the company. If there are free capacities and the products' demand increases, the profit of the company can be increased by simply employing these capacities. In that case, the cost of materials will increase while the other expenses will stay at the same level. On the other hand, if the company does not have free capacities, and a big percentage goes to the non-productive capacities, the chances are that the company will lose a certain number of the consumers and will stay deprived of the profits. In that sense, the role of the Box Score does not refer to the following:

- it is connected to the lean business principles and it starts the advancement of the value stream results,
- it gives the review of the operational performances, which are the basis for the advancement of the business,
- it gives the review of the capacity performances, that are tightly connected to the operational and financial performances, which, till this moment, did not get the needed attention,
- it gives the review of the financial performances that are presented in the profit and loss report of the value stream,
- it gives an insight into the results that should be accomplished and it presents the basis for the evaluation of the advancement,
- it gives the basis for planning the strategic changes and capital investments.

Measuring of the performances is a constituent part for efficacy and success evaluation of the company. The business that works according to the lean principles must choose a set of measures within the Box Score which will present, in the best possible way, the key indicators and initiators of its activity. In that sense, the research of the author was, for the most part, oriented to the understanding of the theoretical aspect of the system of performance measures in the lean business. The research of this problem opened numerous questions and dilemmas related to the choice of the measures that would be presented in the Box Score, as well as a question of the possibilities of the practical application.

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MERENJE PERFORMANSI TOKOVA VREDNOSTI I LEAN KONCEPT POSLOVANJA

Lean koncept poslovanja karakteriše se obezbeđivanjem zahtevane vrednosti od strane potrošača, brзом isporukom proizvoda, eliminisanjem svih oblika gubitaka kako iz proizvodnog tako i iz svi poslovnih procesa u preduzeću i slično. Da bi se postigla i održala konkurentna prednost uputno je pažljivo razmotriti i primeniti osnovne principe lean koncepta poslovanja i uspostaviti tokove vrednosti. Tok vrednosti predstavlja osnov kreiranja vrednosti za potrošače, s jedne i preduzeće, s druge strane. U tom smislu, potrebno je odabrati set mera performansi za ocenu uspešnosti tokova vrednosti, koji se naziva Box Score.

Ključne reči: lean koncept poslovanja, tok vrednosti, Box Score, merenje performansi