THE PRINCIPLES AND THE SPECIFICS OF TRADING IN COMMODITIES

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Abstract

In the present period of instability on financial markets, investments in commodities are the solution for elimination of the consequences of inflation and ensure the yield. When investing in commodities, the use of specifics of commodities compared to other assets. The distribution of commodities we can interpret for agricultural commodities, commodities of energy, precious and other metals, and weather. Therefore, in the framework of the investment portfolio are the commodities. This is the reason why one of the most popular types of investment assets now become commodities. In the interpretation of particular commodities we talk about commodity futures. The reason is that the spot market with commodities is limited storage facilities. The growth of the popularity, which allows a wide range of commodities, has caused that in addition to from institutional investors and speculators for trade may involve even small investors. This development will be supplemented by interpretation of the charts and figers, which will be commented and used for generalization of knowledge. Finally, the article will be interpreted by the further development of the market for commodities as it by article assumes from the results of research.

Key words

commodity, futures, investments, liquidity, inflation, financial market, portfolio, risk, metal.

Introduction

Investments in commodity markets are still considered to be unusual by the general public. Within financial markets there was a long period in which trading on commodity markets remained in the background. The reason for this being in subdued trading with low prices of commodities and limited opportunities for small investors to participate on the market. Despite of that in the last period commodities have increasingly been gaining attractiveness as valuable investments for many investors. This change in thinking of small investors led to the growth of popularity of trading with commodities. At the same time the

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product range of this market has been significantly democratized and smaller investors have also been allowed to participate on trading with a segment that was formally exclusively designed for corporate clients and speculators with large volumes of investments. There are many possibilities to get involved and to take part at the incomes of the worldwide growth of prices of commodities, as well as views and opinions on each type of investments into commodities. There are several options to take advantage of growing prices of commodities on both prompt and forward markets. The most significant and widespread terminated trading are derivative securities futures.

Futures contracts

Futures is a standardized forward traded on derivative exchange. Practically, it is a contract for settlement (exchange and delivery) of underlying instruments at a certain date in the future, while the settlement period is longer compared to the practice on spot market (2, pg. 186). Futures contract is an agreement between two parties to buy or sell certain underlying instrument in standardized quantity of a prior specified quality at a certain date in the future, i.e. at the so called contracted delivery month, and at a predetermined date. (1, pg. 29).

The interested traders do not have the option to withdraw from the contract. Futures contracts are traded on public derivative exchange.

The development of futures

The first standardized futures exchange market was founded in the USA, in big cities like Buffalo and New York. However, the development of modern futures began in Chicago in 1840. Chicago exchanges arose when large fertile prairies of Midwest were sown with corn. This area was interesting for its location and construction of railway. Thus in the mid 19th century Chicago became the crossroad and the centre of trade between farmers and lacking people from the eastern coast of the USA. These factors gradually lead to formation of central market. During this period trade, that took place here, was inefficient and disorganized.

Fluctuation was great, prices ranged from one extreme to the other. In the time of harvest prices would fall and the bigger the harvest was the lower the prices were. As consequence of this situation, the lack of place for storage and the absence of long term storage resulted in corn and wheat rotten in the streets or on fields. Trading worked as a cash market –corn and wheat was delivered and paid on spot. This phenomenon – seasonality, caused that commodities, which the population inevitably needed the following spring when there was a lack of supply, became inaccessible basic necessities. Prices of these commodities would grow exponentially. Traders and brokers safeguarded against changes in price so, that they paid very little to farmers while on the other hand sold these product to consumers at significantly higher prices. We find in historical documents that in 1848 a group of 82 businessmen founded the first commodity exchange Board of Trade of the City of Chicago (CBOT). At this commodity exchange trading was carried out initially only on cash markets. Producers and dealers soon realised the benefits of contracts for sale or purchase in the near future, the so-called “to arrive” contracts. These contracts allowed buyers and sellers to determine the supply of a selected commodity at prior agreed upon price and fixed deadline of transaction. These contracts, which helped buyers and sellers in long-term planning are known as forward contracts (2, pg. 101). In the same time, with the increasing number of forward contracts their shortcomings emerged to the surface. There were deficiencies as

failure to fulfil obligations, deadlines, quality of supply, as well as the complexity of negotiation of these contracts. This was the reason, why the Board of Trade of the City of Chicago (CBOT) decided to make forward trading more effective and to unify it in terms of quantity, quality of delivery, dates and place of delivery of the commodity. According to this, in 1865 trading was standardized. Since then these contracts have been called futures contracts. These standardized forward contracts unlike other forwards have been possible to trade only at designated times. Another difference was that the offer and the negotiated prices of deals have been published. The only variable element remained the price. Standardization of contracts and the possibility for compensation of position caused that people who wanted to decrease losses from the closed position, could compensate futures contracts with participating in opposite trade: purchase of contract which they have sold before or sale of the contract they have bought. The main benefit of futures was clear, so over the next decades further futures exchanges have been founded in the USA. Regardless of that that Chicago has become the most influential and dominant place for trading futures in the USA (2, pg. 91).

Division of commodities

The first underlying asset of futures contracts were agricultural crops. During the twentieth century new financial instruments were formed – financial futures. Regardless of the fact that the volume of purchases of these financial futures contracts far exceed the volume of transaction with commodities, contracts are included into the field of commodity trading. According to this, the term commodity is used for all futures contracts.

- Types of Agricultural Commodities

- ***Agricultural commodities of plant origin:*** soybeans, soybean oil, soybean meal, rapeseed, crude palm oil, corn, oats, barley, wheat, rice, cocoa, coffee, cotton, wood, orange concentrate, sugar, wool, silk, etc.
- ***Agricultural livestock commodities:*** fattening beef, beef for slaughter, whole hogs, pork sides, milk, butter, cheese, etc.

- Energy Commodities

- ***Energy commodities:*** crude oil, gasoline, heating oil, natural gas, emission allowances, kerosene, electricity, coal and so on.

- Types of Metal Commodities

- ***Precious metal:*** gold, silver, platinum, palladium
- ***Industrial metal:*** copper, lead, aluminium, zinc, tin, nickel, uranium, etc.

- Weather

- Temperature, snow, frost, rainfall, hurricanes, etc.

- Financial Instruments

- ***Equity indexes:*** Dow Jones, S&P 500, E-mini S&P 500, Nasdaq 100, Russell, E-mini NASDAQ-100 Futures, Nikkei 225, FTSE, SMI, EuroStoxx 50, US Dollar index, etc.
- ***Commodity indexes:*** Rogers International Commodity index, Dow Jones - UBS Commodity Index, Goldman Sachs Commodity Index (S&P GSCI), Thomson Reuters/Jefferies CRB Index, CRB Continuous Commodity Total Return Index, etc.

- **Currencies:** U.S. dollar, Australian dollar, British pound sterling, Canadian dollar, Euro, Japanese yen, Swiss franc, Swedish krona, Mexican pesos, etc.
- **Bonds and interest rates:** 90Day T-Bills 90, T-Notes 2yrs, 5yrs, 10yrs, US TBonds, 3mo Eurodollar, 3mo Euroyen, Libor 1 mo, F-funds 30 day, Bondfuture, etc.

Specification of futures contracts

Regardless of the type of investment or commodity contract it is important for investors to have as much information about their investment activities as possible, and in particular, clearly understandable information. It is necessary to note again that futures are always standardized. Meanwhile, there are significant differences between futures contracts, which can ultimately affect the outcome of the investment.

SHOWS THE SPECIFICATION OF FUTURES CONTRACTS ON AGRICULTURAL CROP – CORN

Table 1

Corn Futures

Contract Size	5,000 bushels (~ 127 Metric Tons)	
Deliverable Grade	#2 Yellow at contract Price, #1 Yellow at a 1.5 cent/bushel premium #3 Yellow at a 1.5 cent/bushel discount	
Pricing Unit	Cents per bushel	
Tick Size (minimum fluctuation)	1/4 of one cent per bushel (\$12.50 per contract)	
Contract Months/Symbols	March (H), May (K), July (N), September (U) & December (Z)	
Trading Hours	CME Globex (Electronic Platform)	6:00 pm - 7:15 am and 9:30 am - 1:15 pm central time, Sunday - Friday Central Time
	Open Outcry (Trading Floor)	9:30 am - 1:15 pm Monday - Friday Central Time
Daily Price Limit	\$0.30 per bushel expandable to \$0.45 and then to \$0.70 when the market closes at limit bid or limit offer. There shall be no price limits on the current month contract on or after the second business day preceding the first day of the delivery month.	
Settlement Procedure	Physical Delivery	
Last Trade Date	The business day prior to the 15th calendar day of the contract month.	
Last Delivery Date	Second business day following the last trading day of the delivery month.	
Product Ticker Symbols	CME Globex (Electronic Platform)	ZC C=Clearing
	Open Outcry (Trading Floor)	C

Table no 1: Specification of futures contract on corn

Source: [12]

Contract size

Contract Size indicates the amount of the purchased commodity of one futures contract. The exchange firmly fixes the amount of underlying assets it represents for each contract. For example, grains are traded in standardized units of 5000 bushels per contract (purchase of one grain contract is equal to purchase of 5000 bushels of grain.), for gold it is 100 troy ounces, for coffee 37 500 pounds, etc.

Contract size is the product of price and volume of the underlying asset. Specifically, if for example, the trading price of grain was 6 USD, this price would refer to one unit of measure. Contract size would thus be 5000 bushels x 6 USD, i.e. 30 000 USD. .

Product tickers symbols

All futures contracts have a determined unique one or two letter code for accurate identification. These symbols are especially important when entering orders for electronic trading. An error in entering can cause confusion, which may lead to major problems for the trader. Commodity Exchange also sets the quality standards for a given commodity, date and place of delivery of the commodity, terms of payment, which are required to keep.

Contract months symbols

According to the rules of trading on commodity exchanges particular commodities can be purchased with different dates of delivery even some years ahead. The list of months in which the commodity is traded is called the expiration cycle of a contract. Each month has its own abbreviation: January – F, February – G, March – H, April –J, May – K, June – N, August – Q, September – U, October – V, November – X and December – Z.

Last trade date

Last Trade Date or LTD is the absolutely last date when an investor can dispose of a contract and so avoid taking the commodity over physically. In addition to LTD, each futures contract has its own FND – First Notice Date, which is the date when the contract holders are notified, that they possess a contract for purchase of a given commodity. Traders, who are not interested in the physical delivery of the commodity, hold their position as long as possible, i.e. until the date of FND. Once FND is approaching, investors sell their contracts, so they dispose of the commitment to take the commodity over physically. According to experience, we can state that very few trades with commodities result in actual physical transfer. In this sense, we can distinguish two types of futures contracts.

First, there are contracts, which provide physical delivery of a particular commodity. The majority of speculators in the futures markets decide to realize their incomes or losses by purchasing or selling compensation futures contracts before the FND.

Some futures contracts progress typically on the basis of cash settlement and not physical transfer. As an example, we can mention a situation when a trader holds a position in a stock futures contract until its maturity. So, he simply receives (or pays) the final profit or loss based on the difference between the input and final buffer price (3, pg. 24).

Daily price limit

For each commodity, Exchanges set a daily price limit, which limits the volatility of prices during one day (Daily Price Limit). It is the maximum price deviation from the closing price the day before. The reason of introducing price limits is the limitation of the very high price volatility, or possible price manipulation. If the price moves beyond the price limit, trading is usually suspended to give traders enough time to calm down. Price limits also provide the clearing centre enough time to ensure larger additional margins from traders who have had losses. With increasing market volatility, limits are subject to change. We know that some

commodities do not have a stated limit for the last month of trading. Reasons of these limit movements come from several reports, or catastrophic news and the sudden onset of panic on the market (2, pg. 194).

Tick size

Tick is the minimum price movement, the smallest unit set for each commodity by which the contract price can move up or down. It is understood that different commodities have different minimums. As an example we can mention the commodity – grains. Their tick is $\frac{1}{4}$ of one cent per bushel. One contract is 5000 bushels of grain, the minimum price movement – tick size for a contract is therefore $0.0025 \times 5000 = \$12.50$.

Chart no. 1 shows the range of daily movement of futures contracts of agricultural commodity – sugar.

Chart no. 1: Range of daily movement of futures contracts on sugar.

Source: [13]

On the chart we can see the range of daily movement from 7.70 to 8.00 points. At the same time, according to the tick values in the chart, we know, that the minimal movement of sugar is 1/100 cent/lb and this movement is worth \$11.20 (112 000 pounds $\times$ 0.0001). Price of sugar changes in hundredth – the smallest price movement is from 7.65 to 7.66. The minimum value of this movement is \$11.20. Change of a single point (e.g. from 7.65 to 8.65) is worth \$1 120. In the chart no. 1 the price grew by 30 cents from 7.70 to 8.00. With the value of \$11.22 per cent this price movement results in the value of $30 \times 11.20 = \$336$. The range of daily movement according to the chart is \$336 this day (14)

Scrolling position

Each futures contract has a given maturity. That means that we cannot hold it indefinitely. After the last month, all contracts that fall into the month are settled. If a trader with futures contracts is not interested in physical delivery of the actual commodity, at the same time he wants to keep his open position, he has to sell and buy (or buy and sell) the contract in a further contract month. This procedure is called rolling futures contracts. This relatively

common situation is known as Contango. In such case, the spot price of the underlying instrument is higher than any forward price of the underlying instrument. That means that contracts with a remote expiry date are more expensive than current contracts. This situation arises when the maturity date is longer, so interest expenses become higher (financial expenses) and the cost of storing the underlying asset rises, too. For an agreement investor it is a problem, especially in the case of index investing. The consequence for the investor is that he may have a loss of several percent of his investment. The opposite of Contango is Backwardiation. In case of Backwardiation the price of a contract with a more remote maturity is lower than the price of a contract with a shorter maturity date. This condition leads to an abnormal positive impulse on the market, expressed by low demand or major offer of the underlying asset. In that case the investor has significant incomes, but such situation is very rare.

Conclusion

In the article, we introduced basic principles of commodity trading. We also represented some of specifics of trading with commodities. We interpreted the procedure and changes in commodity trading from physical form to trading with futures contracts representing derivative securities. Insignificant trading with commodities was mainly caused by low prices of commodities and limited possibilities for small investors to participate in commodity market. Nowadays, commodities are becoming more and more popular investment opportunities for small investors. The wide variety of products on this market has significantly democratized the market and allowed small investors to participate in trading with a segment that was previously reachable only for institutional investors and speculators with large volumes of investments.

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References

1. BARAN, D. *Capital Market and Corporate Finances (in Slovak)*, Publ. House STU Bratislava: 2003, 169 pp. ISBN 80-227-1856-4
2. JÍLEK, J. *Financial and Commodity Derivatives (in Czech)*, 1st ed. Prague: Grada, 2002, 623 p. ISBN 80-247-0342-4
3. NESNÍDAL, T., PODHAJSKÝ, P. *Trading in Commodity Markets (in Czech)*, 2nd rev. ed. Prague: Grada, 2007, 200 p. ISBN 80-247-1851-0
4. ROGERS, J. *Hot commodities (in Czech)*, 1st ed. Prague: Grada, 2008. 240 p. ISBN 978-80247-2342-6
5. JÍLEK, J. *Stock Markets and Investing (in Czech)*, 1st ed. Prague: Grada, 2009. 656 p. ISBN 978-80-247-2963-3
6. SVOBODA, M. *How to Invest or the Anatomy of Stock Market Lies (in Czech)*, 2nd ed. Brno: CP Books, 2005, 198 p. ISBN 80-251-0527-X
7. WILLIAMS, L. *Complete Guide to Commodity Trading (in Czech)*, Prague: Centre of Financial Education, 2008. 277 p. ISBN 97880-903874-2-3
8. *Oxford Futures* [online]. 2010 [cit. 2010-12-20]. Available in WWW: <<http://www.oxfordfutures.com/history.htm>>.

9. *Interactive Brokers* [online]. 2010 [cit. 2010-12-28]. Available in WWW: <<http://www.interactivebrokers.com/en/p.php?f=exchangesEdu>>.
10. *CME Group* [online]. 2010 [cit. 2010-12-28]. Available in W&WW:>http://www.cmegroup.com/trading/agricultural/grain-and-oilseed/corn_contract_specifications.html>.
11. *Financnik.cz. Více o čtení grafů (More about Reading Diagrams-in Czech)* [online], 209 [cit.2010-12-31]. Available in WWW: <<http://www.financnik.cz/komodity/manual/komodity-grafy-zdarma.html>>.
12. *U.S. Commodity Futures Trading Commission. Market Reports.* [online], 2011 [cit. 2011-03-01]. Available in WWW: <<http://www.cftc.gov/dea/futures/deacbtstf.htm>>.
13. *Financnik.cz. Základní typy příkazů (Basic Types of Orders-in Czech)* [online], 2009 [cit. 2010-12-31]. Available in WWW: <http://www.financnik.cz/wiki/obchodni_prikaz>.
14. *Futures Industry Institute. Trading Volume Statistics.* [online], 2001-2011 [cit. 2011-01-31]. Available in WWW: <[http:// www.futuresindustry.org/volume-.asp](http://www.futuresindustry.org/volume-.asp)>.
15. *Yale School of Management. Published Papers* [online]. 2011 [cit. 2010-11-21]. Available in WWW: <http://faculty.som.yale.edu/garygorton/published_papers.html>.
16. *Secular Bull and Bear Markets.* [online]. 2011 [cit. 2011-01-07]. In WWW: <<http://dshort.com/articles/SP-Composite-secular-bull-bear-markets.html>>.
17. *War, Legacy Debt, and Social Costs.* [online]. 2003. [cit. 2011-01-11]. In WWW: <<http://www.rcgai.com/articles/InflationPressures.pdf>>.
18. *U.S. Business Cycles.* [online]. 2011 [cit. 2011-02-13]. In WWW: <<http://www.thumbcharts.com/series/us-business-cycle-graphs-1913-2011>>.
19. *Commodity Correlations* [online], 2009 [cit. 2011-01-13]. Available in WWW: <http://www.marketoperation.com/index.php?option=com_content&view=article&id=121&Itemid=119&eec86572714ce954078ce954078c219351033410=5a548b23da5e0357abe09528ce1c01a5>.

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INDIVIDUALISATION OF LEAN CONCEPT IN COMPANIES DEALING WITH MASS PRODUCTION

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Abstract

The methods of lean manufacturing primarily designed for businesses dealing with serial production, are also used in other types of production. However the concept of lean production was not designed for these types of businesses, they are utilized only partially. Paper focuses on applying methods of lean concept in companies which are dealing with mass production and their options of exchange for other methods in the event of disagreement. Basis of the article is a list of lean methods with its description and its utilization in practice. The questionnaire was utilized to identify information from the practice. Based on this survey were identified the critical methods that are no longer appropriate for companies dealing with mass production. However, there are alternative methods of describing the problem. It is possible to say that companies are trying to get closer to their goal by modification of the basic concepts. And the concept of Lean Enterprise serves as a standard.

Key words

lean production, mass production, alternative methods, and lean methods

Introduction

Apart from past or recent times, the aim of production businesses was always to produce goods with low costs and high profit. Economic crisis showed that it is necessary to focus on reducing costs. Hiding problems of production lines by high stocks is no more solution in mass production. Corporate management has to focus on revealing and solving problems. The portfolio of solutions of these problems is globally large. It consists of complex systems of e.g. lean manufacturing, six sigma, TOC (Theory of Constraints) or elder approaches through simple methods. In this article, we will focus on application of lean methods in mass production and their modification with utilizing knowledge obtained from questionnaire survey. The modification is necessary because it is not primarily designed for mass production. This concept deals with restricting all activities to those that add value to the customer. When the conditions are ideal, the concept is very good and utilization is possible

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in current production system. In non-ideal world, many conditions limit the applicability of this concept. The main condition is to utilize well-repeated production with no major changes in orders.

Main text

The major part of article is to inform about the state of utilizing lean methods in praxis in mass production so we realized the survey in the V4 countries focused on knowledge and level of utilization of lean techniques in industrial enterprises. In this questionnaire, we contacted 605 respondents from industry. 161 organizations answered the questionnaire, which represents return 26.7%. 39% of that was large companies with a staff of more than 250, 35% was small companies employing up to 50, and 26% was medium-sized companies, where the number of employees ranges from 51 to 250. We evaluated the utilization of the fundamental concepts of lean manufacturing, which are usable in the production system, namely: KAIZEN, teamwork, bottleneck management, KANBAN, visual management, VSM (Value Stream Mapping), 5S, production cells, TPM (Total Productive Maintenance), SMED (Single-Minute Exchange of Die), EPE (Every Part Every day).

The questionnaire was focused complexly on utilization of lean methods in all types of industrial businesses. In the next step, we separated the corporations with mass production. It is possible to say that all methods of lean concept which not impact the production processes are applicable also in mass production.

The survey results showed the applicability of lean methods in mass production. The methods are ranked from most utilized to least utilized: Teamwork, KAIZEN, Visual Management, 5S, TPM, KANBAN, Bottlenecks Management, Production Cells, SMED, VSM and EPE. The order of these methods can be divided into two groups, methods applicable in mass production (blue zone at the figure 1) and the methods not applicable in mass production (red zone at the figure 1).

Fig 1 Utilization of lean methods in mass production

Mass production has specific conditions in some areas. We will discuss these conditions in descriptions of individual methods.

Useful method for application to mass production

The following sections briefly describe each method and its validity and utilization in mass production.

Teamwork - is a way of organizing the work based on common participation, common cooperation and responsibility of all the team members. The research showed that method of teamwork is one of the most common in mass production. Benefits in the area such as increasing production and an application of the idea “more people, more inspiration” are appreciable. Application of teamwork decreases the risk of making wrong decisions; it helps to strengthen interpersonal relationships; supports competition between individual teams and brings many other benefits, which are undeniable. Teamwork has disadvantages, too. Some of them are: we cannot utilize the management methods based on commands; shared responsibility can have consequence of lower personal responsibility; the work can be cumbersome; if the team has too many members, there are higher demands on time than individual. Opposite of teamwork is classical management of employees, which can be centralized or decentralized. In mass production, both types of management can be utilized. In the long term, the utilization of teamwork seems to be more valuable especially in improving the corporate culture. However, this is related to the investment in education and training courses, which can be considered as the biggest disadvantage (1).

KAIZEN – the method is designed to capture the improvement from all the corporate employees. This method is not designed only for manufacturing process, but it is designed also for every process where it will be implemented. Its principle is to process every suggestion of improvement. The main part is to analyze the impact of the change to corporation. Only after this step we are enabled to apply the change. The changes are captured anonymously without any claim on reward or directly from the employee. The aim of application of this method in corporation is to transfer the effect of change on employees and motivate them to search for another possible improvement. Effort of this method is to implement big and also small changes and after this we are able to achieve more productive corporation. There is a traditional improvement opposite the KAIZEN. In traditional improvement, the impact of the innovations is gradually disappearing. The figure 2 shows us a gradual improvement by small steps after big innovations, instead of loss of performance without the gradual improvement (2). Corporations dealing with mass production do not have any restrictions for application of the KAIZEN method.

Fig 2 Kaizen improvement

Visual management – it is possible to share important information through visual management. Shared information can be static or dynamic. The benefit is that they are permanently available, but the disadvantage of static information is that they can be outdated. Of course, not all of the commands can be mediated through visual management. Through visual management, we can have information about positioning the elements of production, number of operating units, operating aisles, transit route, restriction of movement of the employees, operating performance, the aim of corporation, operating plan, and production process. The benefits of this kind of management are: increase of the productivity, clarification of material flows, clarification of information flows, increase of work safety, decrease of accidents and reduction of stock. The best example of utilization of visual management in mass production is marking the minimum, insured and maximum number of stocks.

5S– the name of the method is a short cut for five steps that help us to achieve clean workplace, which is adapted only to work. It seems that the tidiness is a matter of every single employee, but it is not like that. Clean and to work, adapted workplace enables the worker to utilize the time, which he spends on searching for the tools and equipment. Saving the time is not the only benefit. Another benefit after application of this method is faster fault detection of the devices; increasing the workplace; increasing the stocks in workplace and also improvement of the corporate culture. Utilize of this method is suitable in all areas of the corporation. 5S method consists in the gradual implementation of these five steps: 1. removing all the unnecessary elements from the workplace, 2. positioning necessary elements to a good reachable place, 3. cleaning the workplace and defining the areas of cleaning, 4. standardizing of the first three steps, 5. adherence of established standards and signing the confirmation of work which was done. The 5S is not restricted by conditions in mass production. It is possible to utilize the method in production and administration processes.

TPM – this method is utilized to maintain the constant working pace without unexpected failures. Although the mass production characterized by the production to stock, and thus the

variation in the consumption of products is ready, shutdown of production due to unexpected disturbances may take some time. The TPM program consists of six areas: program of autonomous maintenance of equipment, program of planned maintenance, program of education and trainings, planning program for new equipment and units, maintenance system and information system, program of increasing of OEE (Overall Equipment Effectiveness). The TPM method influences the production processes indirectly by maintaining the system in operation without unexpected downtime. TPM has a supportive character on production processes, so the application without any restrictions is possible also in mass production.

Bottlenecks management – utilize principles of TOC (Theory of Constraints). In field of mass production is this method crucial. Removing bottlenecks and consequent increase in the flow line is the main objective of bottlenecks management. The traditional idea of the full utilization of all resources is not productive in this case. It is necessary to identify with the fact that the machines, which are bottleneck, must be the most utilized of capacity, and other devices must adapt production to the needs of bottlenecks, they cannot work otherwise. It is evident division of the production facilities, which are bottleneck facilities and are not bottleneck. The aims of TOC are maximize flow, minimizing stocks and minimizing operating costs. These objectives can be achieved by cycles of activities: **1 Identify bottleneck, 2 maximum utilize of bottleneck, 3 Customize the whole performance by bottleneck, 4 remove the current bottleneck, 5 back to point # 1.**

In accordance with the management of bottlenecks, it is necessary to invest resources to remove the bottleneck.

Less useful method for application to mass production

In the next part of this article, we will deal with methods, which have not been used often. These methods are in red zone in figure 1.

KANBAN – apply pull approach to managing the material flow. Its application is less applicable in companies dealing with mass production. The main reason is the gradual entry of work orders away from the final operation. Mass production is characterized by the production lines that are already configured for optimum run, it is not necessary to control the flow through the KANBAN. Push management system in this case is preferable especially in situations where it is necessary to use higher among stocks. It is mainly a single piece flow in KANBAN system, which limits the utilization of the method in mass production (3).

Production cells – material flow of production cells has a characteristic shape as a letter U or C. The requirements for successful application production cells are **one piece flow**, and variation of production, and multi-machine handling. The conditions of mass production are not adapted for the application of this method, similar to the method of KANBAN. Selection of conditions for application of production cells which are not in mass production: one piece flow, variant production small production cells with shape as a letter U or C.

SMED– the method of rapid changeover is in limit of applicability for mass production. Use of this method is of course possible, however it is necessary to compare the costs to implement of this method with saved resources. Among these costs, include preparation for production changes and training of personnel. Characteristic just for mass production, changeover will not be used. In the field of mass production would be possible to apply the

method in the first and second step. In Figure 3 shows the running applications SMED method. The length of the rectangle represents the duration of the activity.

First Step: Separate the work to be performed during switched off devices - internal activity from work that can be done on the fly - external activities.

Second Step: Move most of the internal activities to external activities.

Third Step: Reducing internal and external time, through changes in production.

Figure 3 shows course of application of SMED method. Length of the rectangle shows the duration of the activity.

Fig. 3 SMED

EPE- Application of the method EPE is closely related to production of multiple products. The primary purpose of this method is the production schedule so that each product was produced in each day, which should result in increased flexibility to customer requirements. Production of each piece every day is closely tied to the SMED method, without which the rapid change during the day was not effective. Since flexibility and mass production are far from each other is not appropriate to use this method in the main production process. Labeling the amount of products produced in mass production is mainly provided by the prediction of demand. The company learns to predict accurate demand for its goods so it learns to save on its costs. The forecasting method is therefore a key to saving costs in mass production.

VSM – The VSM method belongs to the first ones that are applied in the concept of lean production. It is possible to reveal areas in which we have to start improvements through VSM. However, if production does not change as it is in mass production using this method is not necessary. However, it must be guaranteed condition of good design of production. This procedure replaced VSM in mass production. Utilize these method is not excluded since can help especially with standardized processes and detect mistakes in the implementation of primary production, which has been revealed in the project documentation and simulation of production.

Conclusion

Mass production is mainly characterized by its production to the warehouse. It is focused on an anonymous customer. It is utilized in the production of large quantities. Its project part is much more important than in other types of production. Production lines are built for order. The production is limited by similarity of technological processes. That is why it is so important to well design the production lines at the beginning in corporations dealing with mass production.

Methods of lean concept support this type of production, with the exception of management bottlenecks. However, despite of the supportive character of these methods businesses dared to go in that direction. The stocks have the biggest impact on reducing the costs in mass production. The most important part of the production is the prediction of demand. In this case, mass production can save relatively higher costs compared to applying lean methods. However, the small improvement may prove after years as a significant cost savings.

References

1. WITKOWSKI, K. Quality of service in logistics. In: *Nové trendy v manažérstve kvality: 4. ročník medzinárodného vedeckého seminára*. Trnava: AlumniPress, 2011, pp. 285-289. ISBN: 978-80-8096-143-5
2. VIDOVÁ, H. Kaizen, áno či nie?. In: *Trendy ekonomiky a managementu. (Trends economics and management)*, 2010, p. 135-141. ISSN 1802-8527
3. SANIUK, S. *Prototyping of acceptable variants of manufacturing networks*. Transport & Logistics, 2011, iss. 9 spec., p. 286-293.

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FINANCIAL AND TAX MANAGEMENT IN SMALL AND MEDIUM SIZED INDUSTRIAL ENTERPRISES

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Abstract

Target of this paper was to evaluate the importance of small and medium sized enterprises (SMEs) in Slovakia and to determine the application of financial and tax management in this type of enterprises. The results of our findings confirm that SMEs have an important role in Slovakia, and also that especially small businesses have little or no experience with the application of financial and tax management. Therefore the paper contains recommendations for financial and tax management of SMEs.

Key words

small and medium sized enterprises (SMEs), financial and tax management for small and medium sized industrial enterprises

Introduction

SMEs play an important role in the economy of countries with a developed private sector and competitive markets. They are considered to be the engine of economic growth and a major source of technological innovation and new products. They increase competitiveness and efficiency in markets and are often more flexible than large firms in adapting to new customer requirements, facilitating workforce change employment and play a major role in removing regional and sector imbalances in the economy

Materials and methodology of experiment

Our target was to assess the importance of SMEs in Slovakia, to check the application of financial and tax management in this type of enterprises and to suggest measures for their financial and tax management. Information has been obtained by processing of statistical data, solutions from final papers and interviews with managers of industrial enterprises.

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