

## Determination of efficient factors on increasing productivity of on model design of supply chain by approaching dynamic system (Flour industry: Case study)

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Received: May 14, 2015

Accepted: August 27, 2015

### ABSTRACT

Flour industry is one of the main and major industries of any country. Since productivity is one of the main factors of accessing to the economic target in any industry .thus level of affecting in planting flour is very important. This study is done with regards to the efficient factors and defining efficiencies of increasing productivity in Iran flour industry. Therefore, this study which is done by interviewing with newsmen, chairmen and managers of the mentioned industry and also with productivity of dynamic system in this study, efficient factors includes 31 parameters recognized and by studying the relation between these parameters a model for increasing productivity of flour industry has designed. After applying the model by Vensim duplication and analyzing the system ,answers were ranked (characterized ) and it is defined that in addition to different factors ,supplying desirable raw material have the most efficiency in increasing affection in planting flour in Iran.

**KEYWORDS:** supply chain, productivity, dynamic system, flour industry, Vensim.

### 1. INTRODUCTION

Today's corporate world is a competitive and challenging world. High-speed changes and unstable of environment could threat the life of organizations .in the meantime those who want to guarantee their durability and think about their location in market ,inevitable to more consider on new management techniques .This agitation of environment made organizations to oriented to seeking perfection and constant improvement as their competitive strategy in nowadays world. Many organizations, would rather to have improvement productivity for their better competitive market condition. In recent years, better productivity and superiority is transmitted to Iran market as well. Many factors like: competition, display, harmony, demonstration, force and ultimately real evolution caused many actions (Rabinz, 2005).

As we said before, Flour has the very specific importance in Iran. Whereas bread is the main strength of the human, so this part is one of the most capable of economy in Iran. Designing a model relevant to facilities and equipment of industrial plants consider to the information and environmental condition to access the maximum productivity is a complicated process. In fact if we can predict the effective factors of productivity through designing a model and after that by applying efficient points, dealing with growing industrial plants, then we can prevent the huge section of private capital which results in growing economics of the country. Moreover such model can be a good guide to many of experts in flour industry who think about increasing productivity.

### 2. Productivity

The term "productivity" was used for the first time by Francois Quesnay a Mathematician and an economist of physiocracy of defending nature. He defines the strength of any government to the increase of the productivity in agriculture section, by designing the economic table. (Taheri, 2007)

Productivity is a concept to show the relation between the outcome and the income of a person, section or an organization. (Yadollahi, 2003). Efficiency means implementation the duties in a proper way as the ratio of the real time of work implementation to the predefined standard time. Indeed for being productive, efficiency and effectiveness are necessary .the level of increased efficiency is directly to the hands of managers. Increasing efficiency cause higher productivity and will be helpful in achieving organizational target. The word has a limited concept and will be applied more in intra organizations tasks. Efficiency of an organization is the sources which are used to produce a product and it is calculated by the rate of consumption. I f an organization can reach a target by using less sources compare to other organizations it means it has more efficiencies. In other words efficiency is defined as using less time against more work Or it is an actual work which is done compare to the work which should be done. (Kazemi and Abtahi, 1999)

In fact, effectiveness is examining the efficiency of the conducted implantations in order to reach the predefined objectives. In simpler terms, the ratio of target achievement is examined in an efficiency study. Organizational effectiveness is the scale or level that an organization can reach its goals. Effectiveness has a general concept and it simply means "doing things right". Effectiveness is indicating that how much of the desirable objective are met. However

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applying process and productivity of resources to the results is related to the efficiency. (Taheri, 2007). Pitter Dracker believes that effectiveness is doing the right work. In his view effectiveness is the key success of any organization.

After all, productivity is defined as a continuous increase of the ratio of receiving to the giving along with the increase in quality. Productivity in the firm or workshop level is defined as the measurement of product tonnage or the number of production or working hours, and in the national level the productivity index is the relationship between the national income and the society's costs (Kazemi, 2007).

Increasing productivity is the final target of all managers. All managers are trying for increasing productivity in organization under surveillance and management. Lower productivity could result in following problems.

- Difficulties of selling commodities and services in domestic and international markets
- Low level of life style and decreasing competitiveness in universal level.
- Difficulties of society to the hygienic, education and social affairs standard.
- Recession and increasing inflation

Unlikely higher productivity can cause less expenses, higher industrial plant, higher interest, more occupation, and also making job satisfaction in staff. Additionally, as it is seen in Japan, higher productivity can help the better competitive position of the products in the world markets. (Taheri2007).

Effective factors in productivity are divided into two main sections of intra organization (in disposal and authorities of organization) and outer factors or environmental one which are out of the control of organization in short period of time: Intra (inner) factors are included:

- Hardware factors: machinery ,equipment and tools, technology ,raw material ,human resources and ground(floor)
- Software factors: information ,instructions, maps and formulas
- Human ware or Brain ware factors
- Human resources: capabilities, specialty, experience, education, motivation, ambiance, and management attitude.
- Management: philosophy and management process, accessing informational technologies.

Outer organization factors are those factors which are very important but corporations are not able to control them such as: government politics, national and international rules and regulations, work environment, reaching to the financial resources, electricity, water, transportation, communication and raw material. (Taheri, 2007)

In Iran, importance of productivity in manufacturing as a serious subject is considered and it has opened a new version of management in comprehensive quality. (Najafbeigi2004).The objective of productivity at first is getting the maximum usage of resources, human resources, equipment and machinery and etc. in academic manner to reduce the expenses of production, inflation, commodity and services quality, market expansion increasing occupations and etc.

Productivity in the sense of exploitation and influence combination of existence resources in organization make competitive advantage. Efficient Improvement like other software organizational elements are the hidden requirements of any organization's nature. Applying the optimization management productivity cycle can lead to the development of productivity as a permanent process with specified methods and necessary substrates. Productivity implementation is required for an organization's growth and development and cause institutionalization of it in various organizational systems (Edward son, 2008).

### 3. Flour industry

Bread as the main power of human has an important role in all group level .so that flour is a major substance of bread in all society factors, but this industry like other industries had changed in recent years. Since November 2006 selling freely wheat had happened and all could purchase it freely. And as bakers were looking for flour in high quality, thus many competitiveness happened in this field. However this strategy had its own advantages and could issue competitiveness and also caused quality and improvement in flour and bread but on the other hand mediatory and mediation had happened and many of manufacturer in this section were closed. It is clear that in this agitated economical and industrial market increasing productivity as one of the main factors is very substantial .After the mediation of government to prevent corruption and unfair selling wheat, the big gap between the subsidiary wheat and freely one and also making the price stable made manufacturer to think about the main factors in productivity to increase the quality and customer satisfaction for delivering wheat.

### 4. Dynamic system

Dynamic system is an approach with the help of computer for analyzing and solving complicated issues rely on analyze and designing politics(policies) which is was firstly called industrial dynamic.(Forrester,1961).

Dynamic system is a system based on computer simulation object oriented which in addition to user's participation in any model to expand it, it made a significant speed in system definition and model development. One of the abilities of this process is to develop group models and simplifying modification in reflects to the changing system (Nasirzadeh 2013). By exchanging the term industrial dynamic to dynamic system this phenomenon had changed to understanding the concept of the specific kinds of complicated issues in a system ,planning, surveillance and coordination of component .available problems in this system were included characters of dynamics and feedback structure .on the basis of dynamism ,quality and quantity of the system during the time had changed and it is offering some information on the basis of feedback system during the process of evaluation .in other word, this science is used for recognition, concept and analyzing behavior and system components movement. Such a capable science is this that can be modeling different and complicated issues by the help of it and also surveying all the behaviors of that time (Hamidzadeh2000).

Clearly all the models have one role which is helping to the managers to conduct their organization very well. Dynamic system mostly is useful for reaching this goal. The real worth of a process will be defined once the models are applying for redesigning. In resolving small issues, small benefits are there. If the goal is finding management politics and organizational structure great success will follow (Sterman, 2008).

### **5. Productivity of flour industrial plants:**

In this study by applying the concept of productivity and major factors influenced on dynamic systems productivity in flour industry in Iran will be evaluated. Effective points on productivity such as total expense, production, sales income is defined which any change in these parameters can effect on other parameters as well as productivity. To define other subsidiary parameters scientific evaluations and interviewing with reporters, managers and owners in flour were used and all information about parameters were reported on the basis of objective data. All analyses are designed between the year 2011 and 2013 which was studied during the years.

So that in this study it is tried to demonstrate a diagram to show the model of cause and effect. This diagram is a tool to show the main feedback structure of an issue. Thus in this, the details should be really clarified, neither so general and vague nor very trivial and vain. Because exaggeration in detail makes conception difficult and generalization also hurts the reason of causing relations .Diagram can show the current structure and system .Major goal of diagram is to show the trivial and detail structure of a system in the sense of tiny structure to developing a mathematics model to make simulation easier. To this, first we are introducing model variables .variables are into four characters. Level variables which are accumulated during a year and can be measured any time. Rate variables which are measured in during a period and subsidiary variables which are measured in a specific time and only be shown for present time. Fixed variables which are dealing with a fixed number in a period of time .Model variables of this research is as follows:

#### **Level variables**

- Productivity
- Production
- Total cost
- Sales income

#### **Fixed variables:**

- Wheat subsidy
- Wheat free
- Sales
- Receiving facilities
- Cost of sales, administration and general
- Depreciation costs
- Cost of energy
- Cost of maintenance and repair
- Cost of wages
- Non-operating income
- Fixed salary
- Other staff incentives
- Over time
- Other staff incentives
- Over time
- Packing bags
- fuel purchase
- Other fixed expenses
- Other variable expenses

#### **Subsidiaries variables**

- Break even points expenses
- Salaries and wages expenses
- Delivering wheat
- Fixed expenses
- Material and energy expenses
- Raw materials

#### **Rates**

- Variable costs
- Sales rate
- Experts
- Investment

### **6. Diagram of casual chain of productivity of flour plant**

Analytical process applied in this research is the process of simulation and modeling. In the process of simulation, programming and other different software are there but in this investigation the software used is Vensim. After building a

thinking model there is a need to define the relation between the components and model parameters and after that it should be evaluated and implemented .The diagram of productivity model of flour in industrial plant is shown in the figure 1

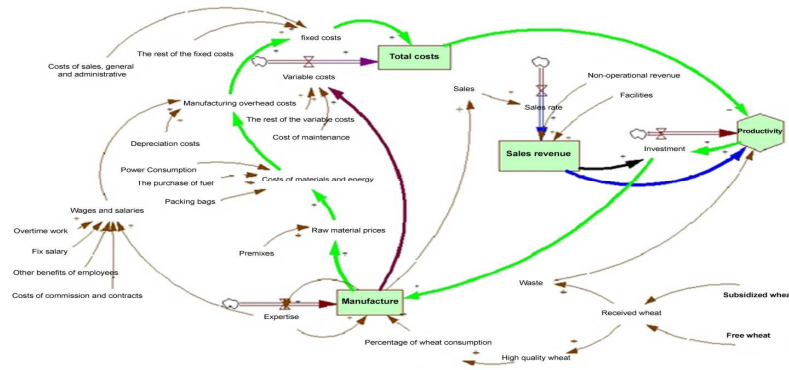


Fig.1. diagram of the productivity model of flour industry

**7. Optimization Modeling**

It is very important to have suitable tools while accumulation information, on other word before beginning an executive activity designing models and data are necessary to be tested by a small group of factory managers and lecturers to get the points of present vague and doubts. A suitable model should be included intangible factors under study and help the behavioral analyses and evaluation of those factors on the best manner. Therefore one of the other credible parameters model is the scale of model capability in making quantitative of intangible factors (Hamidizadeh, 2000)

In this study for dynamic testing of tools measurement we are using sensitivity analyses .this method shows, if we give a different numbers to the analytical model, the result would be more reasonable after implementing model. In current study, optimization process of model in flour industry is done and the expected result is achieved.

**8. Analysis**

Model offered in this research is designed for manufacturing flour section is the reason of studying on productivity supply chain. After modeling and designing formulas and amounts parameter, our model is applicable through Vensim software. By implementing program we can change the fixed parameters and deal with the evaluation of parameters in increasing and decreasing productivity. On the other hands we are able to analyze and evaluate model with the help of diagram, value and expected trends for a dynamic system in Iran flour industry. As it is seen in the model there are four level variables which four streams have been imposed on them and accumulated, 21 fixed variables which is affecting 6 subsidiary variables and caused different result from each changes on parameters. To analyze each in put any of variables are evaluated. So that, by changes in any parameters related diagrams and tables are extracted. To analyzing input any of variables were evaluated. As it is shown from the results differences between delivering subsidiary wheat and free wheat has an effective role in production, sales and income sales has the most influence on decrease and increase of productivity. Figure (2) is shown tables result of increased of raw material out of 4000 tons of wheat to 4800 tons on productivity, costs, income and production.

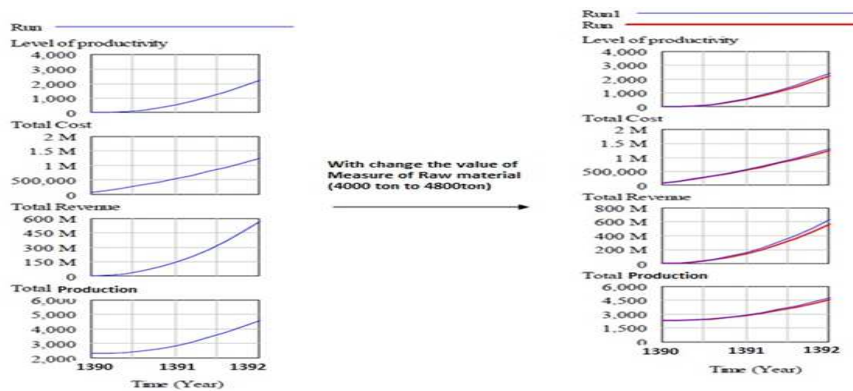


Fig.2. diagrams representing the increase of raw material (author)

**9. Conclusion**

This study is designed in order to find a way of surveying productivity in Iran flour industry. And because of the designed model and series of effective factors and components on flour industry is studied during time. These factors are classified in 4 parameters such as total cost, income sales, production and productivity. Each parameter also includes some sub parameters. In this article all the parameters are defined and in depth were studied. In our process of designing

and completing models, how different parameters are related to each other is defined. With the help of model offered we can achieve a suitable survey of Iran flour productivity. Productivity of flour, nowadays became an undeniable necessity .Nevertheless, the mentioned industry have many potential and weaknesses that, the solution is nothing but productivity as well as productivity evaluation which can help to the managers to increase more productivity.

#### REFERENCES

1. Abtahi, S.H and B.Hazemi, Productivity 1999. Tehran: Institute of Business Studies and Research.
2. Stermann, J. Dynamic systems (systematic thinking and modeling for the complex world) 2008. Translated by Keyvan Shahgholian *et al.* 2<sup>nd</sup> edition, Tehran, Termeh publication.
3. Hamidizade. M.R, System's dynamics. 1<sup>st</sup> edition 2000. Tehran, Shahidbeheshti Publication center.
4. Stephan.R, Organization theory 2005. Translated by seyed hasan alvani & mehdi Danaeefard. Tehran safea publication 10<sup>th</sup> Edition. P.49
5. Taheri. SH, Productivity and analysis in organizations 2007. Tehran. Hestan publication. 8<sup>th</sup> edition
6. Najafbeigi. R, Organization and management 2004. 2<sup>nd</sup> edition, scientific publication of Azad University.
7. Yadollahi. H, Research and evaluation of efficiency and productivity in Iran factories 2003.
8. Forrester, J.W, Industrial Dynamics, Cambrics, Cambrdege: MIT Press 1961.Currently available from Pegasus Communications: Waltham. MA
9. Kazemi B, production management 2007.PayamNour Publishing, sixth edition, pp.23.
10. Nasirzadeh, F.and P.Nojedehi, Dynamic modeling of labor productivity in construction projects 2013. pp. 903–911.
11. Edward son. S, Improving organizational productivity 2008. International journal of management science.
12. Taheri, SH, Productivity and analysis of that in the publishing 2007. 8<sup>th</sup>edition. Tehran, pp. 20- 21. Organizations Hestan.