

The Integration of Lean Accounting and Activity-Based Public Budgeting for Improving a firm's Performance

Hatem Karim Kadhim^a, Abdal Abbas Hassan Kadhim^b, Karrar Abdulelah Azeez^c, ^{a,b,c}Department of Accounting, Faculty of Administration and Economics, University of Kufa, Najaf, Iraq, Email: hatimk.kadhm@uokufa.edu.iq, Abdalabbas.kadhim@uokufa.edu.iq, ckarara.alkhaldy@uokufa.edu.iq

This research aims to determine the level of integration between lean accounting and activity-based public budgeting for providing useful information to evaluate the public sector firm performance. We followed the analytical method, using a statistical questionnaire depended on the individuals of the research sample, represented by accounting, administrative, technical and engineering staff. The research sample consists of 55 individuals in public sector for hypothesis testing, the statistical software (SPSS) is used. The research hypothesis was tested and accepted after calculating a set of statistical measures such as arithmetic mean, standard deviation, coefficient of variation, and percentage weight. Findings significantly showed that lean accounting, integrated with activity-based public budgeting for public firm performance, were evaluation indicators. The most important conclusions were that the integration between lean accounting and activity-based public budgeting leads to the provision of financial and non-financial information, to improve the efficiency of performance evaluating in a public firm. This integration supports managers to decrease the idle capacities and generate important recommendations which improve the public sector firm's performance in the future.

Key words: *Lean Accounting, Activity-Based Public Budgeting, Firm Performance, Public Sector.*

Introduction

In public sector companies, the traditional cost systems are not able to meet the requirements of lean production in the light of the modern business environment; the lean production is based

on the philosophy of economy in everything and eliminate all kinds of waste and loss. Lean accounting is one of the most important tools for continuous improvement in the modern business environment; the lean term is a set of tools that help in determining waste and exclusion. Waste affects the value and quality of the achieved work, while lean accounting reduces the cost and time of production. Recently, the firm has adopted a lean accounting approach that develops and improves work to reduce cost, meet customers' desires and improve the quality of the firm's products (Maskell & Kennedy, 2007). Activity based Public Budgeting is the planning and controlling process of the expected activities of the firm, to derive the effective budget of the costs to determine the expected work and achieve the objectives of the firm. It aims to determine the requirements of the necessary activities to accomplish the tasks of the firm and determine the volume of the necessary resources. Thus it is a good tool for evaluating performance, especially the modern production systems, including lean production (John, 2005). The problem of research is the lack of traditional systems of performance evaluation based on traditional cost accounting indicators and measures in the current production environment to meet the requirements of evaluating and improving the performance of the firm. Therefore, the lean production system is easy to apply some modern accounting practices such as lean accounting and activity-based public budgeting to improve the evaluation efficiency of its performance and knowledge of the strength and weakness of the firm. The problem the study posed is according to the following two questions: Is it possible to overcome the shortcomings in evaluating the performance of the firm using lean accounting and activity-based public budgeting? Does the integration of lean accounting and activity-based public budgeting lead to improve the performance evaluation efficiency?

The research aims to identify the knowledge bases of some modern accounting practices such as lean accounting and activity-based public budgeting. It determines the possibility of the integration between lean accounting and activity-based public budgeting to provide appropriate information and to evaluate the performance of the firm, in light of the adoption of the lean production system. The importance of this research stems from the fact that it deals with the most important modern accounting practices that contribute to improving the performance evaluation indicators of the firm. This leads to improving the quality of the products, maximising the value provided to customers and gaining the competitive advantage. The role of these practices in determining the volume of necessary activities is to achieve the objectives of the firm and to determine the volume of the resources required. It is a good tool for planning, control, decision making and performance evaluation.

Literature Review

The part shows some related studies which provide a theoretical base. Wang & Yuan, (2009) Studied Lean Accounting Based on Lean Production. The aim of this study is to compare lean accounting and classical or traditional accounting, in addition to using the value stream to

eliminate waste in production, reduce costs, improve quality and gain a competitive advantage. Mishra & Pradhan, (2010) examined Lean Accounting: A Recent Development in Management Science. The study aims to replace traditional cost and managerial accounting systems with lean accounting, avoidance of waste, cost reduction, quality improvement and increased flexibility to meet competitive market demands. Ademirli,(2010) Studied Activity Based Budgeting Case Study about ABB Usage. The purpose of study is to provide a clear explanation for the importance of the ABB use for a company in the Netherlands, as well as a good means of communication and control within the firm and control of costs in a highly competitive environment. Huynh & et al., (2013) tried to examine an Integration of Activity Based Public Budgeting and Activity Based Management. This study aims to develop an ABB model with an ABM, to overcome the limitations of managerial accounting methods' application. This integration focuses on both the actual results and the preparation of the budget based on these results, which gives managers a comprehensive view of the firm results and helps them in assessing the responsibilities of all management levels.

The concept of lean term is the economy in everything from the needs or requirements of production, since the production requires less human resources and less time to prepare the new product and lower cost of equipment and tools, less inventory in the factory, less defects, the diversity of products and economy in the requirements of production by eliminating waste and reduce demand time ...etc. (Shah & Ward, 2007). The lean approach of management is to find ways and methods that are less wasteful and time-consuming to create value from a customer's perspective and to reduce waste of operations by delivering the same value to customers at a lowest cost (Amusawi, Almagtome & Shaker, 2019), (Lawrence, 2005, 18). There are several definitions of Lean Accounting (LA). The most important are: - The method aimed at supporting and encouraging lean manufacturing in order to avoid obstacles, difficulties and errors in work and the need for changes in production costs when moving from the traditional production system to the lean production system, by calculating the Value Stream (Hansen et al., 2009). It is also known as: - A professional approach to business management based on the principles of lean management and lean production that provide the appropriate basis for the use of accounting information that supports lean production and management, in order to support cost management, value chain activities and eliminate waste of accounting systems applied in firms (Gamal, 2011). It is also part of an integrated system and administrative method that has become common in the field of work in recent years, which provides the reports and analysis of the values and reducing the differences in production costs, operations, employment, equipment... etc. (Richard & Karen, 2007). The analysis unit of all the above literature is a public firm, and the incentive is economic incentive. If so, how does one ensure that the public firm process is efficient?

The real reason is the decision-making responsibility of the public firm for enhancing a performance evaluation (Bulut-Cevik et al.,2019), (Kbelah, Amusawi & Almagtome, 2019).

While Guan et al. (2009) argued which costs are prepared and designed according to the value chain concept, which collects both financial and non-financial information, in order to provide the firm with financial statements that reflect performance, using quantitative and qualitative information (Guan et al., 2009:405). While (Horngren & et al.) defined it as: The method that supports the creation of value for customers by calculating all costs of value streams, rather than calculating the costs of specific products or individual departments and thus eliminating all kinds of waste in activities (Horngren et al,2012). (Maskell & Baggaley) defined it as: A system that produces the firm with relevant information to make decisions that lead to increased returns and cash flows by using a set of tools and techniques such as Value Stream Mapping (VSM), Box Scores (BS)...etc. to eliminate waste and non-value added activities (Maskell & Baggaley, 2006). The following definition of the lean accounting technique can be formulated: A method designed to apply the concepts of lean production to reflect the better financial performance of the firm and work to eliminate all losses and wastes in production processes, in addition to it's dependence on the value stream, methods of inventory assessment, specifications and quality of products and other non-financial information. The difference points between classical or traditional accounting and lean accounting as shown in table (1):

Table 1: The Differences Between Traditional Accounting and Lean Accounting

Lean Accounting	Traditional Accounting
1. Includes simple and quick operations.	1. Include complex and large operations.
2. The cost object is the value stream.	2. The cost object is the product.
3. Value stream indicators contribute to decision-making.	3. Reports of standard variances contribute to decision-making.
4. The continuous improvement method is used to decision-making.	4. Differential cost analysis is used to assist in decision-making.
5. Pricing based on value.	5. Pricing based on cost.
6. Focusing on financial and operational performance.	6. Focusing on financial performance only.
The inventory is little or none.	7. The inventory is large.
8. The culture of the firm is based on cooperation and equality.	8. The culture of firm is based on control and leadership.

Source: (Vineeta,2016; Qingmin & Lin,2009)

There are many tools and methods of lean accounting application. The most important includes Value Stream Mapping, Target Costing, Kaizen, Box Scores, Hoshin Policy, Low Inventory, and Sarbanes Oxley Risk etc. (Maskell & Baggaley, 2006). The using of the ABC technique for budgeting is called ABB. The cost of the resources consumed by the activities expected to be achieved in the firm is determined. This type of budget focuses on understanding the activities and recognising their impact on achieving the strategic objectives. Diversity and difference in operations results from the requirements of certain products or services in the firm and lead to

cost management and forecasting (Brimson & Antos, 1999). ABB is a modern budgeting method that shows the relationship between the production volume and the activities needed to produce these production units, and to provide accurate estimates of the activities needs for the suggested production plans (Kaplan et al., 2007). There are several definitions of the Activity Based Budgeting (ABB) technique; the most important are: Quantitative expression of inflows and outflows that seek to draw future plans of the firm and achieve their objectives (Atkinson et al., 2004). While (Balick) defined it as "the correct and proper use of firm resources to support key activities proportional with the volume of these activities" (Balick, 2010). It was also defined as: - One of the methods of preparing the budgets used by the firm to understand it's activities and it's relation to the cost drivers, to quantify the required resources as part of a continuous work plan (Gosselin, 2007). While (Julia) defined it as: A method similar to the costing (ABC) approach and the activity-based management (ABM) approach involving planning and control in line with the value added - activities and processes (Julia, 2011: 28). The researchers can provide the following definition of ABB technique: One of the modern approaches in the process of preparing budgets that focus on employment, are the activities of the firm to provide products according to the customers' desires, the cost and quality required. The integrating of lean accounting within activity-based public budgeting supports an efficiency of performance evaluation: The implementation of the lean philosophy requires the introduction of new procedures for the process of performance evaluation, which allows the planning and control processes of activities and operations on a continuous basis. This is what ABB technique aims at - creating the link between the work cell and the value stream on the one hand and the objectives of firm on the other hand. The evaluation of the performance in accordance with the methods of lean thinking is not only based on financial indicators and measures, but should be supported by operational indicators and this requires the involvement of all workers in the evaluation process, with the aim of continuous improvement of all administrative levels in the firm; this is what is intended by the ABB technique (Kennedy & Brewer, 2005), (Lopez & Santos, 2010). The lean production firm cannot ignore the legal financial statements and should look for an accounting method or system that can identify and measure the financial and operational improvements of it's operations, the practices followed by the lean firm and impact on the ABB as follows:

1. The inventory of raw materials and work in process in the lean firms is less than the firms that follow the traditional production system and their volatility is less because it schedules lean production and the inventory is not followed up but only appreciated.
2. Indirect factory overhead costs are not used to estimate the quality of the production process because they are managed by the individuals responsible for them.
3. There is no need to follow the changes in prices because the production on demand and statements of payments equal the labour costs of the goods sold.

4. Reduce the paperwork which does not add value and there is no need to prepare reports on the performance of individuals or departments, because the production is adapted to the demand and no one leads to work less or more than the specified.
5. Increasing the accuracy of allocating indirect factory overhead costs by using the cost of raw materials and labour together, not only the cost of labour, and also allocating the depreciation according to the working hours of the machine.

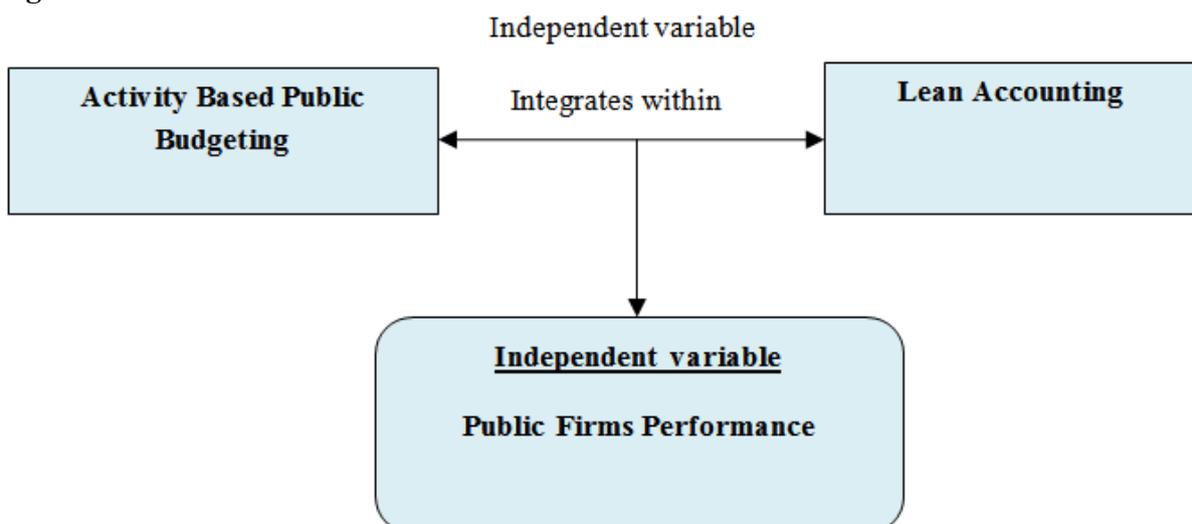
Indirect costs are very important in many firms compared to direct costs. Therefore, the ABC technique helps to calculate the costs properly and according to the activities that are inputs to the ABB technique, which allow to follow up the waste and loss of resources. This is one of the lean production pillars which improves the efficiency of evaluating the firm's performance and helps in determining indicators of operational improvement and benefits. ABB and lean production make it possible to redesign processes and activities, lead to cost management and reduce costs.

Research Methodology

Research hypothesis

This study depends on a basic hypothesis that the integration of lean accounting and activity-based public budgeting leads to improved efficiency of public firm performance evaluation indicators based on the lean production system.

Figure 1. Research model



Sample of the Study

The sample contains 55 distributed firms among the accounting, administrative, technical, engineering and production designers' staff at the Cement Factory of Najaf as a public sector company. The period of application for the questionnaire is during 10/2018-12/2018. Cement Factory of Najaf is one of the factories belonging to the General Company for Southern Cement, which is one of the formations affiliated to the Ministry of Industry and Minerals. It is located in Najaf province, 7 km south of Kufa city centre. It was established by the India ACC company in several production lines to produce Portland Cement, which is resistant to salts, and has reached more than 500 employees, as we note the extent of absorption for a large number of human resources and it's contribution to the creation of jobs for citizens.

Materials

Based on the results presented by the questionnaire forms and after analysing the data obtained by analysing the responses of the individuals from the study sample of the study community from accountants, administrators, engineers, designers...etc. and to describe and diagnose the most important research questions of the hypothesis in order to identify the different opinions of the individuals. The researchers used the Likert criterion to conduct the statistical analysis for these questions and to test the research hypothesis, which states that: The integration of lean accounting and activity-based budgeting leads to improve efficiency of public firm performance evaluation indicators based on the lean production system.

Table 2: Indicators of individual responses for hypothesis testing

#.	Items	Statistical Indicators			
		weighted arithmetic mean	Standard Deviation	Coefficient of Variance	Weight Percent
1.	The integration of lean accounting and activity-based public budgeting contributes to more control effectiveness of resources consumed and the identification of idle capacity.	3.745	1.280	34.168%	74.909%
2.	Provide information on the activities required to carry out the tasks of the firm and then determine the amount of resources consumed.	3.821	1.157	30.274%	76.429%

3.	This integration helps identify that value added-activities and non-value added-activities, lead to reduce costs and improve the performance of activities.	3.339	1.202	35.982%	66.786%
4.	This integration increases the accuracy of cost allocation, providing relevant and reliable information for planning, control and performance evaluation.	3.929	1.029	26.203%	78.571%
5.	Provides the possibility of identifying the firm's needs from resources and how to optimise it's utilisation.	4.089	0.933	22.805%	81.786%
6.	The need to provide a highly flexible accounting system that is appropriate to the changes surrounding the firm, to keep up with developments in the field of strategic cost management techniques.	4.125	0.983	23.822%	82.500%
7.	This integration helps firm to develop financial and productive plans through which sources of access to resources and at the lowest cost.	4.036	1.041	25.803%	80.714%
8.	Participation of employees at all administrative levels in drawing plans and setting goals in line with each level of the public firm.	4.143	0.951	22.944%	82.857%
9.	This integration encourages continuous communication with customers to know their wishes and requirements.	4.071	0.983	24.142%	81.429%
10.	The integration of lean accounting and activity-based public budgeting helps to provide the necessary information on financial and	4.554	0.570	12.507%	91.071%

	non-financial indicators and measures to improve the efficiency of performance evaluating in a public firm.				
11.	This integration helps to spread the culture of eliminating waste and loss and avoid non-value added activities among workers.	4.214	0.805	19.109%	84.286%
12.	Follow-up all the activities necessary to obtain this product from the beginning of the order receipt until the product delivery under this integration, which further improves the indicators of the performance efficiency evaluation of the public firm.	4.250	0.814	19.152%	85.000%
General average		4.026	0.979	24.742%	80.528%

Results and Discussions

The results in Table 2, which includes 12 questions, indicates that the general response rate of the sample was 80.528% with a weighted average of 4.026, a standard deviation 0.979 and a Coefficient of Variance 24.742%. The most important paragraphs that contributed to enriching this variable are the tenth paragraph: The integration of lean accounting and activity-based public budgeting helps to provide the necessary information on financial and non-financial indicators and measures to improve the efficiency of evaluating the firm performance. The severity of the response was 91.071% with a weighted average 4.554 and a standard deviation 0.570 against the Coefficient of Variance 12.507%. The following paragraph is (12): (Follow-up all the activities necessary to obtain this product from the beginning of the order receipt until the product delivery under this integration, which further improve the indicators of the performance efficiency evaluation of the firm). The severity of the response was 85% with a weighted average 4.250 and a standard deviation 0.814 against a coefficient of variance 19.152%, while the lowest percentage in this variable is for the third paragraph: This integration helps identify that value added-activities and non-value added-activities and it leads to reduce costs and improves the performance of activities, The severity of the response was 66.786% with a weighted average 3.399 and a standard deviation 1.202 against a coefficient of variance 35.982%. It is noted that the weight percentages of most the paragraphs exceeded 70% and that the arithmetic mean of the sample exceeded the default mean of the measurement performance (3) at significant level (5%), degree of freedom (54) and all the research variables.

Table 3: T test results of the research variables

Variab les	1	2	3	4	5	6	7	8	9	10	11	12	Averag e
Calcula ted (t)	4.3 20	5.3 13	2.1 13	6.7 50	8.7 41	8.5 67	7.4 43	8.9 97	8.1 57	20.4 14	11. 284	11. 492	8.633
Tabled (t)	1.6 73	1.67 3	1.6 73	1.6 73	1.673								

(df= 54, significant level 5%)

It appears from the table above that the calculated t-value is greater than the tabled value of t for the degree of freedom (54) and the significant level (5%) for all the research variables, as well as the general average of these variables, where the calculated t-value amounts to 8.633 which is greater than the tabled value of t and amounted to 1.673 of df = 54 at level 5% , which leads to acceptance of the research hypothesis, which states that: The integration of lean accounting and activity-based public budgeting leads to improve efficiency of firm performance evaluation indicators based on the lean production system.

Conclusions

This study is interested in investigating the integration between lean accounting and activity-based public budgeting, which leads to the provision of financial and non-financial information to improve the performance evaluation efficiency of the public sector firm. This integration helped in spreading the culture to eliminate waste and loss among the firm staff. Achieving the optimal utilisation of resources and determining the amount of idle capacity was found as a result of the integration. The statistical analysis results of the research showed that the general average of the research hypothesis variables in which the calculated value of t amounted to 8.633. This is greater than the tabled value of the t-test which amounted to 1.673 with the degree of freedom (54) and the significant level (5%). Acceptance of this hypothesis, which states that: The integration of lean accounting and activity-based public budgeting leads to improved efficiency of public firm performance evaluation indicators based on the lean production system. This is done by improving performance indicators to achieve the optimal utilisation of resources, reducing costs and increasing the firm's productivity. Finally, the research recommended that work on the establishment of a database that contributes to the provision of all information to apply the lean accounting and activity-based public budgeting techniques. Obtain support from top management to implement this integration and encourage employees to implement it. Hold training courses to develop the skills and experience of the general firm staff to apply lean accounting and activity-based public budgeting.



REFERENCES

- Ademirli, S., (2010). Activity Based Budgeting Case Study about ABB Usage, Master thesis, College of Economics & Business, Amsterdam, Netherland.
- Amusawi, E. G., Almagtome, A. H. & Shaker, A. S. (2019). Impact of Lean Accounting Information on The Financial performance of the Healthcare Institutions: A Case study, Journal of Engineering and Applied Sciences, 14(2), 589-399.
- Atkinson, A. & Robert, S. & Kaplan, S. (2004). Management Accounting" 14th Ed., Prentice Hall, USA.
- Balick, Bruce, (2010). Activity-Based-Budgeting: Preview of Academic Impacts For U.W. Faculty, Chair of The Faculty Senate, 10 March.
- Brimson, James & Antos, John (1999). Driving Value Using Activity-Based Budgeting, John Wiley& Sons INC., Canada.
- Bulut-Cevik, Z.B., Sen, H. and Kaya, A., (2019). The Khaldun-Laffer Curve Revisited: A Personal Income Tax-Based Analysis for Turkey. Transylvanian Review of Administrative Sciences, No. 56 E, pp. 132-148
- Gamal, S. (2011). Lean Manufacturing Basics, P: 8, www.Devisland.net.
- Gosselin, M. (2007). A Review of Activity Based Costing: Technique, Implementation & Consequences, Handbook of Management Accounting Research, Vol. 2, Amsterdam, Elsevier.
- Guan, L.,& Hanson, D. & Mohrym ,M., (2009). Cost Management", 5thEd., Swiy, South-Western India.
- Hansen, D. & Mowen, M. &Guan, L. ,(2009) .Cost Management: Accounting and Control, 6th Ed., South-Western, a part of Cengage Learning.
- Horngren, Charles T., & Foster, George & Datar, Srikant M., (2012). Cost Accounting A Managerial Emphasis, 14thEd., Prentice – Hall Inc., New Jersey.
- Huynh, Tandung & Gong, Guangming & Huynh, Huyhanh (2013). Integration of activity-based budgeting and activity-based management, International Journal of Economics, Finance and Management Sciences, Vol.1, No.4, p: 181-187.
- John, Antos, (2005). Activity Based Management, Activity Based costing, Activity Based Budgeting, Value Creation Group Inc, December.



- Julia, A., (2011). Budgeting & Budgetary Control as Management Tools for Enhancing Financial Management in Local Authorities, Afigya Kwabre District Assembly as a Case Study, A Master's Thesis in Business Administration, Kwame Nkrumah University of Science & Technology.
- Kaplan, Roberts S. & Atkinson, Anthony A. & Matsumura, Ella Mae & Yong, Mark S., (2007) "Management Accounting" , Prentice Hall, USA.
- Kbelah, S. I., Amusawi, E. G. & Almagtome, A. H. (2019). Using Resource Consumption Accounting for Improving the Competitive Advantage in Textile Industry, Journal of Engineering and Applied Sciences, 14(2), 575-382.
- Kennedy, Frances A. & Brewer, Peter C., (2005). Lean What's It All About?", Accounting & Strategic Finance, Vol. 87, Issue 5, p: 26- 34.
- Lawrence P. Grasso (2005). Are ABC and RCA Accounting Systems Compatible with Lean Management? Management Accounting Quarterly.
- Lopez, Patxi Ruiz deArbulo & Santos, Jordi Fortuny, (2010) .An Accounting System to Support Process Improvement : Transition to Lean Accounting , Journal of Industrial Engineering and management , November, P: 576 – 602, Spain .
- Maskell, B. H. & Baggaley, B. l., (2006) "Lean Accounting what is it all about?" from Lean Accounting Summit in September.
- Maskell, B. H. & Kennedy, F., (2007). Why do we need lean accounting and how does it work? , Journal of Corporate Accounting & Finance, March- April, P:59-73.
- Mishra, K. & Pradhan, B. (2010) Lean Accounting: A relent Development in Management Science, Amusandhan University Orissa.
- Qingmin, yuan & Lin A., (2009). Lean Accounting Based on Lean Production, article, P: 3.
- Richard.E & Karen.M, (2007) Lean Accounting Fad or Fashion, Unpublished doctoral dissertation, Appalachian State University, North Carolina, USA.
- Shah, Rachna & Ward, Peter (2007). Defining & Developing Measures of Lean Production, Operation Management Journal, 25(4).
- Vineeta, Arora, (2016). Lean Accounting: A Case Study of Selected Enterprises in India, Department of Accountancy & Statistics, Faculty of Commerce, Mohanlal Sukhadia University, Udaipur, India.



International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 11, Issue 5, 2020

Wang, Lin & Yuan, Qingmin, (2009). Lean Accounting Based on Lean Production.
www.ieeexploro.ieee.org.