AProposed Costing System inResponse to the Considerations of Continuous Improvement in the Just in TimeIntelligent Supply Chain and the Agile system through the Use of Back-flushCosting and the Throughput Accounting

Abstract

According to the new advances in the form of new firms, including JIT and Agile, further advances in technologies, computer programs, and the systems of official accounting all become necessary to be modified. Also, the considerations of Kizen costing systems, in addition to the new movements towards the concern of the customer, should come first as a result of the new movements towards the customer profit analysis. In a JIT supply chain, suppliers are responsible for informing their customers of their products. Within the context of the current research, it was suggested to use the systems of Back-flush costing as well as throughput accounting systems to simplify the application of just-in time systems and agile systems to satisfy the requirements of achieving the policy of continuous improvement. Furthermore, the continuous debate between the different parties of the game supposed here will be realized and considered. The concept of an intelligent supply chain has led to the inclusion of competitors within other parties of the supply chain. Furthermore, the quick movement in the industrial and technological environment has put further heavy burden on a double-way movement, as in how to achieve what is required in a very short time with low costs and also how to achieve what customers want to obtain, and it might be more optimistic to say what competitors have not reached or achieved yet. The continuous progress in the world of artificial intelligence has necessitated further progress in production (quality concern) and in costing (cost rationalization). The fast movement in both the just-in-time/agile and the resilient systems has necessitated further pre-requisites regarding the applied accounting system and the chosen level of automated accounting system. The various different sorts of arguments within the context of the current work have been studied in a way that encouraged the used model for the application to be more sensitive to reality.

Keywords:Back-flush Costing; Throughput Accounting; Continuous Improvement;JIT; Agile System; Intelligence Supply Chain; Immediate Production.

Introduction and Aim of the Research

As a result of the need to apply and achieve the considerations of continuous improvement, the urgent desire to develop cost systems has emerged, which has encouraged the transition to systems that can meet the needs of project management of the information necessary to face cases of flexibility and diversity in production, the need to reduce costs, the desire to simplifying accounting procedures to reduce the cost of accounting measurement, by reducing the volume and type of operations that are recorded, and finally the need to reduce the cost in general by reducing the cost of storage to the least possible, in order to achieve the goals of JIT and Agile projects that seek to get

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rid of completely out of stock and limit damage, zero defect and total quality control, as well as reducing other cost elements, in particular, those related to number of purchase orders etc. (Dyckman et al.,1994) (Chhikara and Gahlyn, 2013).Agile supply chains focus on uncertain customer demand and other endogenous factors (Rosa & Lace 2018; Sharma et al 2020).

The just-in-time production system seeks, by following the policies to reduce spoilage, to reduce the volume of direct labor, and also by using computer-supported digital control machines. Customer knowledge as an intelligent supply chain has led to better values and sustainable levels of success (Nigri &Baldo, 2018). JIThas a positive effect on most dimensions of performance in terms of reduced costs, lowered inventory, shortened cycle time, quick delivery, and flexible quantity (Mackelprang and Naire, 2010; Nestra et al., 1996). In JIT practices, the scheduling of production and delivery is synchronized and accessible for the supply chain (Lee et al., 2000; Mas'udin and Kamara, 2018). Olivera and Handfield (2019) have observed that supply chain benefits can be reaped through building real-time supply chain capabilities, (Elgibaly, 1997) (Kinlaw, 1992). Considering continuous improvement is the most recent influencer in cost systems, it may have become the most important endogenous factor affecting the firm's cost model and its performance function after it was in the past an exogenous factor (Chhikara, N. and Gahlyan, A. 2017). The main thing that companies need to know about implementing a continuous improvement program is how the smallest idea can lead to the greatest results (Jarial, 2012). Hence, the efficient implementation of Kaizen emphasizes the importanceofadequate employee training. Kaizen becomes attractive because it enables companies to maximize their human productivity potential and enjoy numerous benefits (Vent et al., 2016). In order to ensure continuous improvement, the organization should review and analyze its sustainability goals regularly (Medne and Lapina, 2019). This work aims to try to reach a proposed cost system that suits just-in-time and agile production systems by emphasizing the need to use the Back-flush costing method, which depends on shortening the procedures and steps for measurement and accounting registration to the least possible and thus reducing the cost of measurement in the end. The research also aims to complete the analysis in order to show the impact of using the accounting approach on the immediate flow of production (i.e., throughput accounting). Throughput accounting is used as an auxiliary input to provide cost data necessary for making various decisions and, at the same time, to avoid the various problems arising from trying to use the cost system according to activities in those projects (Davale, 1989). Accordingly, the research aims to try to work with and employ the various previous methods of cost reduction in order to achieve the philosophy of just in time as well as the agile systems, which aim to reduce cost and achieve continuous improvement considerations that emphasize the importance of reducing cost continuously in support of consumer loyalty policies (Medni and Lapina, 2019).

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Plausibility and Limitations of the Research

The use of the Back-flush costing method, or what it is called in other places delayed costing and the entrance to accounting for the JIT of production make it of great importance to suit the nature of JIT production systems or Agile systems that need speed in completing accounting procedures and reducing the cost resulting from accounting measurement, as well as the lack of recoding on the accounting records for the JIT/agile production, which requires us to carry out the scientific basis of time constraints and restrictions on performance achievement (Narasimhan et al., 2006).

As for the other complementary method, which was called, the throughput accounting(TA), it focuses on providing cost data as quickly and at a lower cost, which encourages at the same time, and even works to get rid of the stock, and work to purchase the necessary materials only to the extent necessary for production, and from it we can determine a coefficient to measure the productivity and efficiency of the different economic units, which we will call later on the excess rate, and gives support to the concept of the intelligent supply chain.

Research Plan

This research into the following sections: The first section deals with an analytical study of the most important elements of the performance of JIT/Agile systems. The second section deals with the use of the Back-flush costing system to meet the elements of performance in JIT production firms. The third section deals with the study of the use of the throughputaccounting, to develop the application of the back flush costing system. The fourth section deals with the design and development of the proposed model for the integration events between the Back-flush costing system and the throughput accounting system. The fifth section deals with the most important findings and recommendations of the research.

1. An analytical study of the most important elements of the performance of JIT and Agile production

JIT/Agile production projects aim to reduce waste in all stages of production, marketing, and administrative processes, at the product level and at the level of all other supported activities. This has appeared under many names and definitions, the most important of which is that these firms mainly aim to eliminate waste during the product life cycle. Sanchez and Perez (2019) and Hariyani et al. (2022) have shown that agile production may be conceptualized as a production strategy to introduce new products in highly changing markets. In other words, it will try to be ready for unpredictable customers and unexpected demand (Sharma et al., 2021). Based on the foregoing, the loss is represented in many places. It includes various production activities that do not add value;also, the occurrence of damage or defects in production sometimes requires a restart of products to rework. In

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other words, the main objective of the agile system is to try to predict changes in the endogenous variables affecting the production process in states of uncertainty (Lyu et al., 2020).

Zhai (2018) and (2016) studied coordination schemes to solve buffer space hedging and lead-time hedging issues in prefabricated construction supply chain management with game theory models.

The concept of the immediate production system (JIT) is considered comprehensive as it includes a set of ingredients that affect the achievement of immediate goals, which can be summarized as follows:

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- **Reducing the inventory of merchandise and raw materials until they reach zero stock. It should be noted here that a set of sub-goals stem from the previous point, the most important of which are:**

1. Work on the supply in a timely manner, which requires Suppliers to be partners to producers.
2. Reducing the cost of handling raw materials and finished goods.
3. Reducing the time lost in producing products that may be difficult to dispose of after, and limiting the start of production to what is received by orders from customers
4. Reducing the start-up time so as to result in a speedy start of implementation production orders and the ability to fulfill those orders in a timely manner.

Job diversity for workers and multitasking, results in the following sub-benefits:

1. Workers do not feel repetition in the work they perform and get rid of the phenomenon of boredom and routine performance.
2. No choking points bottleneck due to a lack of abundance of a particular specialty of workers.
3. Linking one worker to several jobs will result in continuous encouragement to reduce the cost.
    - **Total quality control:** In light of the JIT/agile systems, both damaged and defective production and those that need to be restarted are considered among the things that are intended to be disposed of.
    - **Preventive maintenance:** As a result of considerations of comprehensive quality control and a desire to avoid loss or increase in the cost of quality as a result of a failure in the marketing of the product (Ostrenga et al., 1992), and with a last desire to achieve zero-loss policies, maintenance service was designed to be prior to the occurrence of faults, so that it operates through a policy of prevention and not only repair.
    - **The internal organization of the factory:** The JIT production system aims to work on making the successive production stages adjacent to each other. Integrated production

centers in the production of a product or a quality of products, planning and internal design of the factory to put them adjacent, which leads to a reduction in the cost of handling products and raw materials, and in turn helps to reduce the working capacity to the least possible.

- **Operational control standards:** Considered several performance evaluation criteria that were appropriate to be used in traditional projects, such as standards of workers' efficiency.

From all of the above, the development of standards has tended to adopt operational standards that take into account many considerations, including Kaplan's et al.'s views (1998) and (1992).

- **Pull System:** Whereas the immediate production system aims to make the demand for production elements (especially raw materials) linked to the demand for the final product. The objective of the regular flow (order time) of products in the JIT production system is to try to get rid of choke points (bottlenecks), whether they are represented by certain machines or certain processes, which result in any disruption of the flow of production (or perhaps what can be called an imbalance in production (Orazalin,2020).

From all of the foregoing, it becomes clear how important the functional integration of the different performance units involved in the formation of these projects is. Figure (1) indicates the elements for developing the productivity of JIT production firms.

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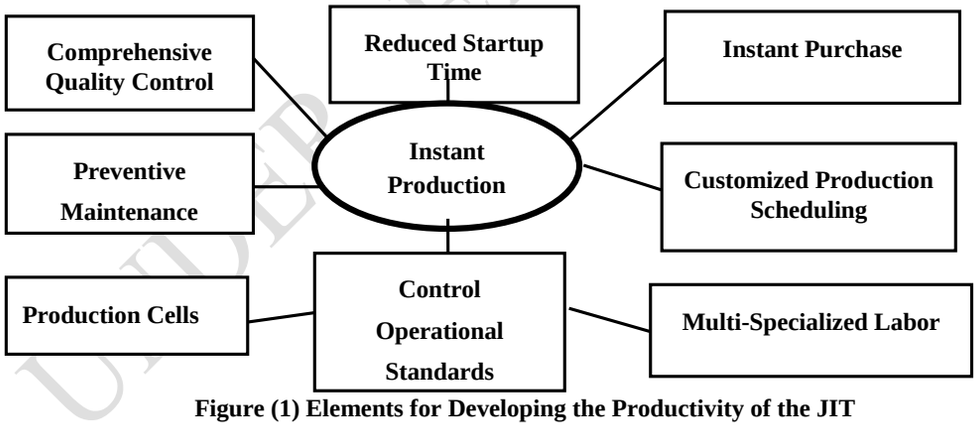

Figure (1) Elements for Developing the Productivity of the JIT

Accordingly, it is clear that the application of the immediate production system has resulted in a focus on determining the stages of production flow and production quality problems, which motivates the administration to quickly treat and solve previous problems, by developing the production flow and reducing the number of times of handling raw materials and products, and making integrated centers adjacent or shifting to what was previously called the integrated cell system.

Following the JIT production system in modern projects has resulted in a number of effects, which the researcher can summarize in the following points:

- **Reducing the number of production elements of a product.**
- **Work to follow the direct download method.**
- **Low importance of analysis of deviations from cost standards.**

After reviewing the nature of JIT/agile production firms, we review the following factors that necessitated the need to depart from the traditional procedures for cost accounting and work to find a satisfactory solution to them that matches the nature of these firms.

In view of the aim of the JIT system or agile system, which is to reduce the number of suppliers to the lowest possible number in order to ensure the stability of the supply process in time for production, this in turn encourages the simplification of accounting procedures for recording the supply and handling of materials, as well as reducing the associated costs of each of them and those resulting from damage to the raw materials that have been received. Gunasekaranand Yusuf (2002) indicated that researchers view the agile production paradigm as the post-mass production concept that focuses on meeting global competition by quickly responding to the dynamic demands of the customers.

2- Using the Back-flush costing system to meet the requirements of just-in-time, agile firms

In the previous part, it was discussed the elements of performance in JIT/agile production firms, and it became clear from the discussion the urgent need to achieve the goals of immediate purchase and delivery and, at the same time, work to reduce the cost to the least possible, by applying the Back-flush cost as a step to achieve the continuous development considerations (Janjie et al. 2019).

It has been observed that the control method stemming from traditional costing systems is not suitable to a large extent for application in JIT/agile production (Harris, 1990), (Epureanu et al,2021), and it is considered the best example of the above, that the analysis of efficiency deviations in the standard costing system, in light of traditional establishments, has encouraged to increase the volume of production, which is against a lack of acceptance under JIT production firms (Thilak et al., 2015). Agility was the emerging and gradually dominant concept introduced to explain these firms' strategies for thriving in uncertain environments and responding to change (Swafford et al., 2006). Although there are several definitions of agile production, some authors, like Gunasekara-

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nand Yusuf (2002), indicated that researchers view the agile production paradigm as a post-mass production concept that focuses on meeting global the dynamic demands of customers.

From the above, we note that until now, in light of the considerations and requirements of JIT production facilities have not been able to formulate an integrated cost model but only some proposals to simplify performance and evaluate operating results. In the next part we will discuss the validity of the Back-flush costing system for application in JIT production facilities and thus try to reach the most important assumptions, principles, and steps necessary.

In this regard, it is noted that the Back-flush costing system has appeared, which depends on the amount of outputbeing the quantity of the product, assuming that there is no production stock in operation, and accordingly, it is possible to determine the average share of the unit produced in the cost of raw materials. Accordingly, after determining the cost of total production of raw materials and excluding this from the cost of the purchased quantity from the invoice, the cost of raw material inventory (if any) is determined. Demirkesen and Bayhan (2019) among others, have pointed to the effective role played by the Back-flush costing determination system as an accounting method that suits the nature of JIT production firms, which helps to reduce the accounting procedures for accounting registration, which saves both the time and the cost associated with accounting rules.

In addition to this, the JIT production system has resulted in the changing of many cost elements into direct cost elements. Horngren et al. (1996), for example, indicated that, reverse-flow costing system (Back-flush) focuses initially on the project outputs and then follows the backwards method in determining the cost of the goods ready for sale, assuming the absence of commodity stock or raw material stock, which contradicts the traditional method of cost accounting.

Some may ask for a moment the reason for simplifying the procedures and resorting to the application of the reverse flow costing system instead of the traditional system for determining the cost, and the answer can be presented in a short form since in immediate production projects, we note that the volume of orders is usually very small and they are many in number. The matter that leads to the application and use of cost standards, whether for materials or for transfer costs, is an obstacle to the speedy provision of cost data and the application of accounting procedures. This encouraged the need to shorten the procedures. As some have pointed out, instead of setting cost criteria to complete the control process,it has become more focused on setting a target cost. From the beginningdesign and production are carried out in light of it,which ultimately results in a cost reduction and a shortening of the procedures and steps necessary for the control process.On the other hand, the process of attention to identifying and analyzing deviations has shifted (Hansen et al., 1997).

It is noted that for theBack-flushcosting, the ledger registration is done after the production is completed and the production is converted into sold goods, which helps to avoid entering into many

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details that were problems in the past and related to tracing the cost elements during the production process and entering into the problems of allocating indirect costs. **Horngren et al. (1996) have pointed out that:**

"Back-flushing means looking at the product's bill of materials and reducing inventory records".

In this regard, we are interested in discussing the claim of energy disruption and the occurrence of many elements of indirect expenditure in exchange for the actual inventory of final production units, until the accounting cycle begins (Luyu et al, 2020), the progress that occurred in the control methods by introducing digital control machines, which are related to controlling the quality of products, judging their suitability to the desires of customers, and at the same time automatically counting the actual sound production, without any additional cost or effort, can refute the previous claim resisting the application of the reverse flow costing method in the accounting recording.

On the other hand, some have indicated Hirsch et al. (1992) and pointed to the similarity between the reverse flow costing method, the costing approach, and the preparation of accounts on a periodic system basis, on the basis that each waits until the end of the period and then records the book at that time, which results in a delay in providing information for project management to make decisions until the end of the period. However, to respond to that, it is necessary to point out the big difference between the two inputs, which is the difference between the time of the end of production and the time of the end of the accounting period. Production in JIT firms is characterized by its short period and flexibility, which may take very short periods, which refutes the previous criticism. The lesson in the reverse flow costing system is the completion and delivery of production to the customer, and as long as production proceeds according to an independent order or payment and as long as delivery to the customer takes place on time, the deferred registration does not represent a noticeable delay in the provision of information, which leads to the absence of comparison, and to use the target cost approach (Elgibaly, 1997).

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Above all, the approach targeted for its application focuses on an important aspect, which is the attempt to get rid of unproductive activities that do not achieve the added values, including, as many writers indicated, those related to the allocation of indirect costs Cooper et al. (1996), and this is related to the multiplicity and complexity of the procedures for recording, identifying, and recording deviations in the price of direct materials, as the goal is to try to reach the lowest cost that can eventually achieve the goals of continuous development (Vento et al., 2016).

According to what the researcher previously indicated, the Back-flush costing system is based on starting with outputs and considering that the output point is the accounting registration

point. Trigger point, and back-to-back allocate the cost between the goods ready for sale and the stock (consisting of raw material stock and work-in-progress stock).

At the outset, we briefly refer to the form of accounting registrationswhich summarizes them in three steps that include determining the purchase cost and recording it, proving the cost of finished production, and finally the stability of converting complete production into sold production.

In this way, many of the accounting restrictions related to recording the exit of materials,**Hicks (1992) and Zang (2011) refer to three alternative methods of implementing a Backflush costing system as:**

- **First method:** It is to cancel the production in process account. But this method will not help to shorten a lot of accounting procedures.
- **Second (shortened) method:** It does not recognize an account for merchandise inventory or production in process, **but it is noted on this method that it is very brief and assumes several assumptions, the most important of which are :**
    - Purchases are made in small quantities.
    - Purchasesare made immediately before use.
    - Immediate sale and delivery.

Although these assumptions are theoretically appropriate, registration according to them does not achieve the appropriate amount of disclosure and does not help to provide a lot of cost information on many project transactions.

- **Third method:** It eliminates the production-in-progress account and the finished production account. It is noted in this method that the accounting registration points are represented at the point of purchasingraw materials, where the actual cost is used in evaluating the inputs, and at the point of the goods' transformation into ready-to-sale goods, where the standard cost is used in evaluating the outputs. The constraints of proving the cost of full production and at the same time, becoming more realistic, for fear that purchasing in relatively large quantities, may result in high deviations in the price, and therefore resorted to the need to refer to the price deviation.

As a result of all of the foregoing, the application of reverse flow costing systems resulted in the division of accounts into two types, one of which is the calculation of operating materials and the other calculating the transfer cost, and it also helped to divide the immediate production project into logical input and output points, which we called the accounting registration points. Accordingly, the inputs were recorded based on the actual cost, while the outputs were recorded on the basis of the

standard cost, which of course is only done at the standard cost, and then arriving at determining the value of the inputs, and all of this, of course, will help to implement the policy of continuous development. By excluding the production-in-progress account, it has been eliminated from the problem of determining homogeneous equivalent production, and it is finally noted on the previous system that it clearly refers to developments in productivity between the two accounting recording points.

3- Using theThroughput accounting and the Backflush costing

It was found by the researcher from several previous studies, Staubus (1990) and Janjie et al. (2019), that the large number of activities will complicate the application of activity-based costing, and the increase in activities that do not add value will complicate the achievement of the basic objective of activity-based costing, which could be avoided by reducing the volume of accounting activities when applying the Back-flushcosting. However, the problem of the reverse flow costing system not indicating the development of high-cost activities and the correction of this criticism may lead to an additional trend towards further cost reduction, which represents one of the aspects of criticism of the reverse flow costing system that made the application incomplete. It needs an additional system to complete that deficiency, which is what you see achieved when applying the activity-based costing system, which includes an analysis of activities with a view to getting rid of those activities that do not add value to the enterprise (Hansen et al., 1997).

It has been shown from the discussion of the activity-based costing system in many previous places (Hicks, 1992 and Vento et al., 2016). It is considered necessary and important to achieve accuracy in measuring the cost of various activities and thus accurately determining the cost of production in the end, which can often avoid activities that do not achieve value.

However, the practical experience of MacArthur (1996), in spite of all the above, has shown that the application of activity-based costing does not in all cases have a return that exceeds the cost of application. In instant production facilities, where there are many orders despite their small size, the compilation of the data needed to obtain cost information according to the activities is considered very expensive and, at the same time, contradicts the consideration and goal of reducing the cost sought by those projects, which gives a convincing justification for the lack of full application of the cost system.

From all of the above, it is clear that there is some conflict between the application of the activity-based costing system, which results in a high cost of measurement, and the philosophy of immediate production projects, which are based on cost reduction in various ways and means, which encouraged Japanese companies not to expand the application of the cost system. Depending on the

activities, restrict its used (Calvasina, 1989) and shift to an interest in applying the reverse flow costing system and surplus accounting, all with the aim of achieving cost reduction (Vesna-Janji, 2019).

To confirm the foregoing, it was indicated that Waldron (1994), as indicated by Dougdale et al., indicates the importance of the two systems coexisting by saying:

"Some sectors of the accounting world would want to set throughput accounting (TA) against activity-based costing (ABC).... That's a whole lot of junk because you need to add information, and they're both adding something. [ABC] doesn't tell you anything about how the business can make money; it doesn't tell you how many [products] they can make or how fast. But [TA] will never tell you the right price to go to the market for a product."

The accounting system is designed for the JIT/agile of production throughput accounting in a way that works to provide cost data ,about those establishments that are characterized by dollars in purchasing and production synchronous firms. At the same time, the accounting system for JIT/agile production has shortened many of the constraints of cost recording, such as the constraints of allocating additional cost to products, which were common in the traditional costing system(Inman et al., 2011).

It is noted that the previous application came in line with the orientation of many firms to the application of ideal systems and the expansion of optimized production technology, which aimed to shift from traditional production systems to the application of advanced systems based on computer-assisted production technology. The expansion systems in production technology aim at dividing resources into controlled (scarce) and uncontrolled resources in order to support and develop the exploitation of these controlling resources in order to reduce the total cost of the project. In addition to the foregoing, these systems aim to work on increasing the surplus resulting from the firm by focusing on controlling resources and increasing the degree of their exploitation, and finally working to reduce the total operating cost of the firm on the basis of extracting a rate of surplus at the level of each of the controlling resources, which is the matter. This has confirmed and indicated the importance of using the throughput accounting system for JIT/agile production as a complement to the efforts to reduce costs in immediate production firms.

The accounting system for the immediate flow of production is considered a short-term cost system, which simplifies the procedures for determining the cost, helps to develop the exploitation of scarce resources, and is easy to apply. **This system is divided into three cost measurement processes, which can be summarized as follows: Dyckman et al. (1994):**

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- **Surplus rate:** It refers to the rate at which the system achieves surplus funds resulting from sales operations, compared to a specific denominator used in determining it, such as the hours of operation of certain machines or the size of a certain investment.
- **Inventory cost:** It refers to the amounts that have been invested in the stock as a result of purchasing products or raw materials for the purpose of reselling or manufacturing them.
- **Operating costs:** This is represented by the sufficient costs required to convert the raw material into a finished product.

To clarify this, it is noted that using the throughput accounting approach for just-in-time production can have a strong impact on the effectiveness and efficiency of the use of scarce resources, which represent bottlenecks in the project. Formulating an excess rate at the level of each unit of scarce elements will enable the development of the effectiveness of the use of those units, or more precisely, it will help in the optimal use of those scarce units, which in turn supports the goal of continuous development by increasing the rate of exploitation and at the same time will indicate the development of the costly activities in the firm, the overall performance of the project depends on its development, which we have already indicated is one of the weaknesses in the application of the Back-flush costing system and led to the use of the throughput accounting system to complete and remedy that criticism, in addition to the full or partial application of activity-based costing in an integrated and coordinated form. In this context, Davale (1989) pointed out the importance of reaching a surplus rate that is used in evaluating performance at the firm level and at the level of the different performance departments.

$$\textbf{Surplus Rate} = \frac{\textbf{Surplus}}{\textbf{Production in process value + Total other costs (at the level of the project or department)}}$$

It has been suggested to develop the return of the previous surplus rates at the level of the different performance departments and at the level of the different performance-based individuals, and here many developments appeared. A distinction has been made between two categories of performers. The first category is those who work on machines or resources that represent choke points, and these surplus measures are designed for them on the basis of working to reduce or eliminate the cost of production in operation as well as other cost elements, which is the matter,which in turn encourages and gives the surplus rate a more vital role in terms of its importance in providing different data on the project costs in the form that suits the implementation of the goal of cost reduction and even indicates the relative development that can be made in the process of cost reduction as a result of each sub-activity separately.

As for the workers on machines or resources that are not scarce, the surplus rate for them has been redesigned so that it is designed in a way that pushes them to submit to production within the set point. Adherence to schedule with the need to bring about a continuous reduction in implementation times, indicating their high efficiency, and not encouraging them to increase their production during times of reducing implementation times, and giving them some additional training programs, or relying on the functional diversity characteristic of workers in immediate production facilities, to take advantage of them in other additional works in order to strengthen their ability to improve the quality of products, in the work of quality control or in the efforts of promotion and advertising, etc. The previous ideas helped and become importance of the accounting entrance for JIT/agile production in reducing cost.

According to the foregoing, the system of accounting for the JIT flow of production in the short term indicates that the direct materials component is the only variable cost component, while the rest of the cost components are fixed cost components (Garaison et al., 1994). To clarify this, in order to show the impact of the throughput accounting approach on the immediate flow of production in the evaluation and development of performance, **it is noted that the surplus is a function consisting of four sub-variables, including (Tanaka et al., 1996, Kinlaw,1992):**

i. Sale price.
ii. Raw material purchase price.
iii. Raw material utilization rate.
iv. The amount of surplus generated.

The inclusion of the surplus as a dependent variable and an independent variable in the same function is of particular importance when taking into account the cumulative effects of the surplus from previous years on the surplus number for this year, which strengthens the use of the function in the various stages of accounting forecasting and avoids many statistical problems that face estimating parameters (values) for this function.

In order to expand the use of the concept of throughput accounting in order to expand sales and to rationalize the use of direct materials, which ultimately helps in the expansion of production, to the extent that does not result in the presence of a large stockpile, keeping pace with the goals of immediate production projects, it is necessary to start reviewing the factors that represent some constraints on the surplus, **which can be summarized in the following (Ehrhardt 1997):**

i. Uncompetitive selling prices.
ii. The need to distribute goods to specific consumers at a specific time.
iii. There is a scarcity of high-quality goods.

iv. Supplier delays in delivering raw materials and irregular supply
v. There is a shortage of productive resources for the project.

The importance of the concept of throughput accounting for JIT/agile production stems from its focus on the extent of the facility's ability to meet the final demand of the consumer. However, despite all of the above, the main weakness in its use is to limit the direct materials cost component as the only variable cost component and to consider the rest of the cost components as fixed cost components, which encouraged us to advocate the need to maintain the use of activity-based costing and time-driven activity-based costing systems next to the throughput accounting systems, or perhaps consider the latter system as a complement to the Back-flush costing system, which is concerned with tracking the transfer cost (including direct labor and additional costs) in sub-optimization. The effect of partial optimization on the profitability of the project is shown in Figure (2).

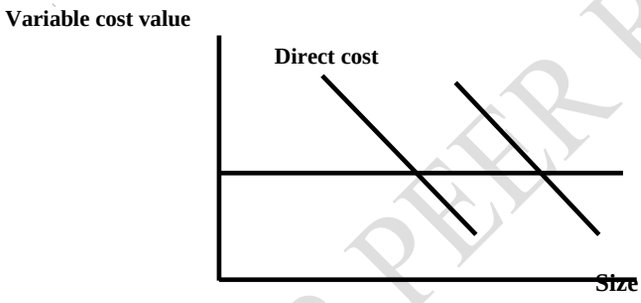

Figure (2) Maximizing the Profitability of Production (The Surplus Production)

The previous figure indicates that only the cost of direct materials is deducted from the selling price before determining the amount of the surplus, considering that the rest of the cost elements (transfer costs) are fixed, although it confirms the nature of the JIT/agile firms, which transformed most of their cost elements that were considered as an additional fixed cost in traditional firms, and its nature changed under immediate projects and became direct cost elements, such as the cost of handling raw materials, the cost of issuing supply orders, depreciation of machinery ..... etc, which stressed the need for more than one cost approach, which is the same result that was reached, of the need to take advantage of the advantages of both the Back-flush costing system and the surplus flow accounting system.

In order to resolve more controversy in this part, we can, after the previous presentation, confirm that there are many aspects of integration between the Back-flush costing system and the surplus flow accounting system.

4- The proposed model for rooting the integration between the two costing systems (Back-flush and the Throughput accounting system)for JIT/Agile production:

It is noticed from the analytical study that it was carried out with the aim of rooting for both of the previous developers, the existence of complementarity between them in each of the procedures, and the goal and concept of each of them.

In terms of procedures, the procedures of each of the previous two systems (i.e., the Back-flush costing and the throughput accounting) are almost integrated with each other and similar at the same time. The procedures of each of them aim to simplify the process of recording cost elements and not follow complex registration stages, which impede the achievement of the goal of JIT/agile production firms, and to provide cost information as quickly as possible.

In the meantime, it has been noticed that high-automated firms require the application of the above-mentioned suggestions and are including both the features of the JIT and agile systems from one side and the resilient systems from the other. **The new features here in our suggested model are:**

1. We assumed that our model was applied in a state of uncertainty.
2. The comprehensive feature of our model is that it includes the effects of the endogenous variables, measured through the application of the JIT/agile systems, and also the effects of the exogenous variables, measured through the application of the resilient systems.
3. The formation of this model should try to present and affect the results of the measurement and the intersection features of both systems, a matter that will ensure the accuracy of our model's results and the high rate of goodness of fit of this model.

2. Measuring the exogenous variables facing the new automated firm will support the application of the new intelligent green supply chain between the different production firms.

3. The concept of the green supply chain claimed by Hariyani et al. (2022) was considered here with more focus on the environmental variables in an uncertain state of the art, depending upon the intensive usage of resilient systems.

4. The current used new model has pointed to more additional advantages, as it can without any doubt pick up the intangible effects resulting from the existence of some differences between different parties of the game, either in terms of different systems used or different accounting approaches applied, or finally, the different partners of the intelligent supply chain supposed .

In terms of the concept, both the Back-flush costing system and the throughput accounting system, or what I called super-variable costing (Balakrishman, 1991), both seek to not recognize the existence of commodity stocks and also to try to simplify the accounting performance as one of the activities that do not add productive value to the JIT/agile production firms. In this regard, the system of accounting for the throughput is complementary to the system for determining the cost of the Back-flush. Back flush costing represents one of the aspects of interest in the accounting system for the immediate flow of production. This stems from the fact that the latter system gives special attention to calculating an average of the accounting surplus at the level of each of the controlling resources, and accordingly, it can be referred to the development in the time of delivery and in the number of times the materials are handled.

In addition to all of the above, both the Back-flush costing system and the throughput accounting system have helped to address many of the criticisms leveled at the application of the activity-based costing system, which indicated the importance of its partial application to some private activities and not to all the firm's activities, in order to avoid many problems that emerged from the application, the most important of which is the high cost of implementing the system and the return achieved from the application not exceeding the cost resulting from it. All of the foregoing has been formulated in an integrated form, which helps the JIT/agile production firms obtain the expected output from each of the previous systems in a way that supports their orientation towards reducing costs and achieving considerations of continuous improvement.

At the same time, an appropriate basis has been reached for both the Back-flush costing system and the throughput accounting system, to support the cost accounting library, which gives scientific importance to this research, and at the same time opens the door for other researchers to further work in these topics, with the aim of completing the study of the requirements of the JIT/agile production firms, which have a tangible presence in the market , and it requires more studies and research, with the aim of strengthening the scientific justification for its presence, and to emphasize the economic feasibility of investing in it, and perhaps finally to find modern systems suitable for application in it, so that it can practice the activities entrusted to it, in a way that achieves its objectives and helps implement the established philosophy.

As we have already mentioned, the results of the Back-flush costing system, although they provide quick cost information at a low cost and help in taking many decisions, are not suitable for the process of performance evaluation during the various project pillars or the performance evaluation of the various production cells. Here came the system of accounting for the throughput accounting and helped to calculate the surplus rate at the level of the different production cells and at the level of the various controlling resources, which eventually helped to solve the problem of perfor-

mance evaluation and to reach objective and appropriate methods, which prompted us to emphasize the unity and integration of the analysis (i.e., the unity of the ultimate goal of the application).

In addition to the foregoing, the Back-flush costing system and the throughput accounting system represent short-term costing systems that are suitable for taking appropriate decisions in these circumstances, which indicated the importance of their integration with the activity-based costing system to complete the need for long-term decisions. MacArthur (1993), Estrin et al. (1994), although both the Back-flush costing system and the throughput accounting system recognize an approach that approximates the variable costing approach, with some elements considered fixed in the short term. However, in the long term, all cost elements are considered variables, which support the application of the previous systems in addition to the application of the activity-based cost system on certain activities characterized by their high cost, justifying the resulting return from the measurement cost that is incurred when applying this cost system. Hence, it can be noted that the previous application will help to switch to the application of the comprehensive download approach, which in turn helps, in the end, to take strategic decisions for the firm and support the trend towards taking into account the considerations of continuous improvement.

In order to develop the benefit from the previous clarification, it was suggested to use a model that reduces the cost and confronts the multiple bottlenecks facing the project, meaning working to maximize the benefit represented by increasing the surplus while facing several constraints that control the firm's performance, and the programs available here are determined to achieve the previous goal. For example, in linear programming systems, among these programs, it was proposed to use a proportional function that takes into account the satisfactory allocation of the additional cost elements, taking into account all aspects of negotiation and the multi-effects of both the endogenous and the exogenous variables that the JIT/agile production firm faces, whether at the level of rationalizing the use of available scarce resources or at the level of choosing between different decisions. The application led us to prefer the use of game theory, highlighting the importance of the multiplicity of parties to the game, which complicates the decision-making strategy and makes it compatible with what is known in practice, all in the form of a proportional hommollifier function that takes in its folds the positive effects of the Elgibaly function (2021), as well as the negotiating effects of the decisions and the various parties dealing with the game to maximize the firm's goal. All of the foregoing has led to the formulation of the functions of the previous model, (for more details about the formation of the model, refer to Elgibaly, 2022).

$$\textbf{Max: } U = G\,[X - C\,(y) - S\,(X, Y)]$$

Whereas G [X - C (y)] represents the net return of the firm's probability of making a certain decision (here we can consider it as the revenue from the sale of the commodity, which takes the

form of probability in its amount and on the date of its realization as an endogenous variable among other estimated variables), and S (x, y) represents the cost of direct materials. The cost elements were considered the only variable, and here they take the form of a function affected by the quantity used and the quality of the direct material as well as the level of its quality. ... etc., and with the passage of time and the high productivity of the immediate production firm, using the surplus rate model, which makes the model more inclined to represent the firm's situation in the long run instead of the short run, we can use (ri), which gives an indication of the high productivity of the raw material used (the only variable cost component). **According to this case, the surplus maximization model takes the following form:**

Max.

$$\underset{a.,\, y.,\, S\,(X,\, Y)}{} \{\sum_{1=1}^{2} f\,(r_1).\ [\sum_{1=1}^{2} G\,(X_1 - c\,(Y1) - S\,(x1,\, Y_1)\ f\,(x1\ \{a.,\, Y.,\, r...)\}$$

Subject to:

$$\sum_{1=1}^{2} F\,(r_1).\ \{F\,(s\,(X_1,\, Y_1).\ f\,(X1\ I\ a.,\, Y.,\, r,) - V\,(a) = F$$

$$A,\ \underset{a.\ A}{Eargmax}\ (\sum_{1=1}^{2} F\ (\ s\ (X_1,\, Y_1)\ .\ f\ (X_1\ I\ a.,\, Y.,\, r,)\ V\ (a)$$

However, for the development of the previous mathematical form and taking into account the multiplicity of available resources (some of them are scarce and some of them are not mostly exogenous variables, etc.), and the occurrence of different negotiations and deliberations regarding the choice between the different decisions facing the firm from making, buying, or accepting or not accepting certain additional orders exogenous, It is followed as a development of the foregoing, taking into account the effect of the re-adjusted Hommolifier values (Elgibaly, 2021) function on the distribution of the surplus as a result of allocating the available (controlling) resources in the firm with its plurality, as well as the occurrence of multiple trade-offs and negotiations between the parties to internal decision-making, which may result in most cases choosing a specific assortment or plan of resources. **The steps for preparing the previous model go through the following stages (Elgibaly, 2021):**

1. Assuming that each of the scarce resources works for the benefit of a number of production cells and that there are a number of alternative uses that can allow a mixture of exploitation or benefit bundle of usage, which gives a surplus or return represented by the function (V).
2. There are a number of production cells that can be allied together (M) in a cooperative game, which is at the same time a part of all the production cells of the firm (N), with the condition of free exchange of information between the previous production cells, and the need for each cell to know the scarce resources of each of the other cells (which represents the main features of the intelligent supply chain).
3. When a negotiation takes place between two cells to achieve a mutual benefit between them, this negotiation must result in the occurrence of a specific alliance, which takes the form {i,d}, indicating that the negotiation has come to a positive conclusion.
4. To indicate the importance of the passage of time and the succession of periods, the parameter (d) is used to find the present value in period 0 for future periods. From here, the surplus realized for center (i) as a result of the alliance process with other centers, according to the cost borne by this center, represented by the symbol rti, during the succession of periods, **can be expressed by the following relationship:**

$$\cap 1 = \Sigma I = a\,([1 - d)\,K\,(Mt1) - E_{tv}]\,d_t$$

Whereas Mit is the operational capability of the control elements of the production cell (i), which represents a part of the operating capability of the firm as a whole. From here, the model has acquired a long-term character after using the discount coefficient.

From all of the foregoing, it is noted that the return is entered or presented to each production cell, which has an operational capacity of M in case q, and can be obtained by the following:

$$S(M, q) = \Sigma_{A \subset q} \frac{(U(A) - 1)!\,(U(N) - U(A)\,\{\bar{V}(A) - \bar{V}(A/M)\}}{U(N)!}$$

Whereas U (A) is the number of elements and relationships that lie on q, as well as:

$$\bar{V}(X) = V(U, \Sigma C^{a})$$

$$C \Sigma q$$

$$M \Sigma q$$

A represents the value of the assignment between the different centers of the outcome of the negotiation.

From the above, different attempts were made in other works until they reached the following modified form for fair allocation, including the different effects of some alternative constraints, negotiations, and objectives (Elgibaly, 2021).

$$S(i,N) = \sum_{M \subset N} \frac{C|M| - 1|M|)!\, V|N|M|(t)}{|N|!}$$

Whereas $|N|, |M|$ It is the measured quantitative value, Cardinal numerically expressed or scaled for groups $|N|, |M|$.

To complement this descriptive function, this complement must be used:

$$V: 2^N \quad IR^+$$

Whereas:

$$V(M) - V(N) - V(V/M)$$

$$M \Sigma N$$

A research has done, (Charnes et al, 1978) by introducing a standard value of the proportionality in the previous value relations, we can call it the hommollifier function as follows:

$$h|M| = \frac{|M|}{|N|} V|M| + \frac{|N| - |M|}{|N|}$$

Here, the boundary of the equilibrium of utilities limits of the equilibrium for a match between different production cells grows to the value determined by our scale by overlapping the proportional function in cooperative games.

In fact, the model in this formulation has achieved what has been proposed since the beginning, with the existence of a desire to measure the endogenous and exogenous variables that illustrate the existence of agile and resilient systems in a single multi-function (closed loop) supply chain.

Some of the assumptions of this previous model have been used in other places (Elgibaly 2021) and proved their effectiveness in the process of allocating additional costs between the different performance centers, and we found that it is appropriate to expand its application in formulating the objective function of the JIT/agile production facility with the multiple restrictions controlling its performance, with the aim of maximizing the surplus.

A game has been made between the proposed model to be used and the research objectives represented in working to reduce the cost, and it was clear from the above that the comprehensiveness characteristic of the model and taking all the explicit elements of the cost into consideration, whose direct impact on achieving the surplus, as well as all other elements, can be observed. The non-explicit, resulting from the negotiation processes between the previous production cells, indicates more precisely the possibility of reaching a more acceptable plan to reduce the cost, the effect of which extends to the future, which leads to the acquisition of both the Back-flush costing system and the throughput accounting system, a feature that assists in the achievement of the goals in the long term without limiting them to the short term.

In addition to the foregoing, adding the effect of negotiations to the function of maximizing the realized surplus has made the model dynamic and removed it from the cycle of static that characterizes traditional surplus maximization models, especially linear programming models, etc., which gives an additional advantage to this work and is inherently suited to the environment around JIT/agile production firms, which makes the model more feasible.

This model also refers to another more advanced dimension, which is related to the development of performance appraisal methods in JIT/agile production firms. In addition to the validity of the model in maximizing the surplus in light of a set of constraints on the controlling resources, in a form characterized by movement and change, it did not distribute the result of the surplus game among production cells equally, as is the case in the traditional Shapley model (Gibbons, 1992), but it was characterized by fairness and realism in distribution and allocation, as it took into account that the surplus distribution plan (the result of the match) goes in light of the operational capacity of each production cell.

5-Empirical Analysis

To further confirm the effectiveness of the proposed model, we applied the model to a hypothetical case inspired by a similar case that was applied to Elgibaly (2021), after several developments were made to it and the computer program used in the application, assuming that the final surplus expected from the use of one of the controlling resources is 4000 surplus units, which were expected to be distributed between the different partners of the supply chain. . As a result of the initial use of the computer program, the following alliances were reached between the different partners:

(M1, M2, M3, M4)	3840
(M1, M2, M4, M5)	3760
(M1, M3, M4, M6)	3680
(M2, M4, M5, M6)	3560
(M2, M3, M5, M6)	3320
(M3, M4, M5, M6)	2800
(M1, M2, M3, M4, M5, M6)	4000
V { I, J }|	1800
V { I }	0
I # J	
IΣN	
MΣN	
S (I,J)	
VΣ2 – IR+	

Based on the foregoing, the objective function has been formulated as follows:

Mini, α

Subject to:

M1 + M2 + M3 + M4	+α >3840
M1 + M2 M4 + M5	+α >3760
M1 + M3 + M4 + M6	+α >3680
M2 + M4 + M5 + M6	+α >3560
M2 + M3 + M2 + M6	+α >3320
M3 + M4 + M5 + M6	+α >2800
I + J +	α >1800
I+	α >0
M1 + M2 + M3 + M4 + M5 + M6	α = 4000

The solution sequence in the previous model resulted in a satisfactory allocation of the surplus among the different supply chain partners, which appears in the following proportional allocation function:V (M) = {1060, 940, 640, 560, 420, 380}

The following table summarizes the result of the negotiations that took place between the different parties and partners of the supply chain.

Table 1 : Summarizes the result of the negotiations

Compromises between cells	Allocated surplus	Available energy	Possible alliances	Excess demand	Competed partner
380	1060	3840	M1,M2,M3,M4	1440	M1
220	940	3760	M1, M2, M4, M5	1160	M2
180	640	3680	M1, M3, M4, M6	850	M3
150	560	3560	M2,M3,M5,M6	710	M4
120	420	3320	M3,M4,M5,M6	540	M5

100	**380**	**2800**	**M3,M4,M5,M6**	**480**	**M6**

It is noted that the previous results came from a hypothetical case in order to ensure the validity of the proposed model and its applicability in practical life, and in the near future, availability of additional data will confirm the over mentioned result

6-Summary and Conclusions

During the current work, a whole picture was drawn, including the effect of the intelligent supply chain and how rationally directing and managing this chain could affect the whole cost management system, especially in large firms and organizations. Back-flush costing and throughput accounting has organized and analyzed the performance in JIT/agile. This application has given a better chance to understand how to make the intelligent supply chain in favor of the new automated companies with the concern of both endogenous and exogenous variables.

From all of the foregoing, the researcher can be certain and point out that what was possible to achieve during this research represents a good basis for both the systems of determining cost by Back-flush and accounting for the just-in-time/agile flow of production.

The most important results of the current model's application can be summarized in the following points:

1. The model has confirmed its validity in cases of continuous bargaining between the different parties in the supply chain.
2. The application has produced objective and most acceptable results due to the goodness of fit of the model and the realization of the different powers and weaknesses of each partner.
3. The model can be considered a way of distributing the capabilities of each partner as well as the level of organization of the deal as competitive or cooperative between the different competing parties of the supply chain.
4. Further studies are still required to maximize the application and further realize the different states of uncertainty.

References

Baiman, S. and Demski, J.S., 1980. Economically optimal performance evaluation and control systems. *Journal of Accounting Research*, pp.184-220.

Calvasina, R.V., Calvasina, E.J. and Calvasina, G.E., 1989. Beware the new accounting myths. *Strategic Finance*, *71*(6), p.41-45.

Carvajal-Arango, D., Bahamón-Jaramillo, S., Aristizábal-Monsalve, P., Vásquez-Hernández, A. and Botero, L.F.B., 2019. Relationships between lean and sustainable construction: Positive impacts of lean practices over sustainability during construction phase. *Journal of cleaner Production*, *234*, pp.1322-1337.

Chhikara, N. and Gahlyan, A., 2017. Kaizen implementation for improving productivity and quality in manufacturing industry: A case study. *International Journal of R&D in Engineering, Science and Management*, *6*(3), pp.1-14.

Cooper, R, and Kaplan, R S., 1991.The Design of Cost Management Systems, Prentice-Hall International, Inc. New Jersey.

Cooper, R., 1989. The rise of activity-based costing-part three: how many cost drivers do you need, and how do you select them?. *Cost Management*,pp. 34-16

Cooper, R., 1996. When do I Need an Activity-Based Cost System?. *Journal of Cost Management*, pp. 41-48

Demartini, M., Pinna, C., Aliakbarian, B., Tonelli, F. and Terzi, S., 2018. Soft drink supply chain sustainability: A case based approach to identify and explain best practices and key performance indicators. *Sustainability*, *10*(10), p.3540.

Dhavale, D.G., 1989. Product Costing in Flexible Manufacturing Systems. *Journal of Management Accounting Research*, *1*, pp. 66-89

Dubey, R. and Gunasekaran, A., 2015. Agile manufacturing: framework and its empirical validation. *The International Journal of Advanced Manufacturing Technology*, *76*, pp.2147-2157.

Dyckman, TR., Bierman, H., and Morse, DC., 1994. Cost Accounting, Second Edition, South-Western Publishing Co., Ohio, USA.

Elgibaly, M. M., 1997. Studying costs of activities during the product life cycle, to achieve the objectives of costs strategic planning and the continuous improvement of technologically advanced systems. *Journal of Financial and Commercial Studies*, Cairo University, Faculty of Commerce.

Elgibaly, M. M., 2021. A modified model for the allocation of general industrial costs in the light of the agency alliances theory and moral hazards - A theoretical and practical study. *IJISET*, 8(4), , pp. 6-72.

Elgibaly,M.M.,2022,A proposed model for studying and determining the negotiated transfer pricing, with the e4xistence of random bargaining behaviors of the internal performance agents, Journal of Business and Management, Volume 24, Issue 5 Ser.II,PP,13-36 May, DOI: 10.9790/487X-2405021336 , ***www.iosrjournals.org***

Epureanu, B.I., Li, X., Nassehi, A. and Koren, Y., 2021. An agile production network enabled by reconfigurable manufacturing systems. *CIRP Annals*, *70*(1), pp.403-406.

García, J.L., Rivera, D.G. and Iniesta, A.A., 2013. Critical success factors for Kaizen implementation in manufacturing industries in Mexico. *The International Journal of Advanced Manufacturing Technology*, *68*, pp.537-545.

Garrison, R.H., and Noreen, EW. 1994. Managerial Accounts: Concepts for Planning, Control, Decision Making, IRWIN, USA. Seventh Edition

Gligor, D.M., Esmark, C.L. and Holcomb, M.C., 2015. Performance outcomes of supply chain agility: when should you be agile?. *Journal of operations management*, *33*, pp.71-82.

Gunasekaran, A. and Yusuf, Y.Y., 2002. Agile manufacturing: a taxonomy of strategic and technological imperatives. *International Journal of Production Research*, *40*(6), pp.1357-1385.

Handfield, R., 2019. Supply Market Intelligence: A handbook for managers, Auerback Publications. New York, NY.

Hansen, DR., and Mowen, MM. 1997. Management Accounting, Fourth Edition, South-Western College Publishing, Ohio.

Hariyani, D. and Mishra, S., 2022. Barriers to the adoption of integrated sustainable-green-lean-six sigma-agile manufacturing system (ISGLSAMS): a literature review. *Benchmarking: An International Journal*, *30*(9), pp.3590-3636.

Hicks, D.T. 1992. Activity-based costing for small and mid-sized businesses: an implementation guide, John Wiley & Sons Inc.

Horngren CT., Foster, G., and Datar, S. 1994. Cost Accounting: A Managerial Emphasis, Prentice Hall International, Eights Edition.

Inman, R.A., Sale, R.S., Green Jr, K.W. and Whitten, D., 2011. Agile manufacturing: relation to JIT, operational performance and firm performance. *Journal of operations management*, *29*(4), pp.343-355.

Janjić, V., Bogićević, J. and Krstić, B., 2019. Kaizen as a global business philosophy for continuous improvement of business performance. *ekonomika*, *65*(2), pp.13-25.

Jarial, S.K., 2012. Performance improvements of sheet metal industry using kaizen a case study. *International Journal of Current Engineering and Technology*, *2*(1), pp.227-230.

Kaplan, R.S. and Norton, D.P., 1992. *The balanced scorecard: measures that drive performance* (Vol. 70, pp. 71-79). US: Harvard Business Review.

Kinlaw, D.C., 1992. Continuous improvement and measurement for total quality: A team-based approach. Homewood, Illinois.

Lee, H.L., So, K.C. and Tang, C.S., 2000. The value of information sharing in a two-level supply chain. *Management science*, *46*(5), pp.626-643.

Lyu, Z., Lin, P., Guo, D. and Huang, G.Q., 2020. Towards zero-warehousing smart manufacturing from zero-inventory just-in-time production. *Robotics and Computer-Integrated Manufacturing*, *64*, p.101932.

Mackelprang, A.W. and Nair, A., 2010. Relationship between just-in-time manufacturing practices and performance: A meta-analytic investigation. *Journal of Operations Management*, *28*(4), pp.283-302.

Magee, R P. 1988. Advanced Management Accounting, Harper and Row, Publishers, New York.

Maletič, M., Maletič, D., Dahlgaard, J.J., Dahlgaard-Park, S.M. and Gomišček, B., 2016. Effect of sustainability-oriented innovation practices on the overall organisational performance: An empirical examination. *Total Quality Management & Business Excellence*, *27*(9-10), pp.1171-1190.

Masudin, I. and Kamara, M.S., 2018. Impact of just-in-time, total quality management and supply chain management on organizational performance: A review perspective. *Jurnal Teknik Industri*, *19*(1), pp.11-20.

Medne, A. and Lapina, I., 2019. Sustainability and continuous improvement of organization: Review of process-oriented performance indicators. *Journal of Open Innovation: Technology, Market, and Complexity*, *5*(3), p.49.

Narasimhan, R., Swink, M. and Kim, S.W., 2006. Disentangling leanness and agility: an empirical investigation. *Journal of operations management*, *24*(5), pp.440-457.

Nestra, D., Srikanth, ML., and Kane, M. 1996. Measuring Operational Performance in a gughput World. *Management Accounting*, pp. 41-47

Nigri, G. and Del Baldo, M., 2018. Sustainability reporting and performance measurement systems: How do small-and medium-sized benefit corporations manage integration?. *Sustainability*, *10*(12), p.4499.

Orazalin, N., 2020. Do board sustainability committees contribute to corporate environmental and social performance? The mediating role of corporate social responsibility strategy. *Business Strategy and the Environment*, *29*(1), pp.140-153.

Ostrenga, M. R. 1990. Continuous Improvement, John Wiley & Sons.

Ostrenga, M. R., Ozan, TR., Mellhatton R. D., and Harwood, MD. 1992. Total Cost Management, John Wiley & Sons

Potdar, P.K., Routroy, S. and Behera, A., 2017. Agile manufacturing: a systematic review of literature and implications for future research. *Benchmarking: An International Journal*, *24*(7), pp.2022-2048.

Qamar, A., Hall, M.A. and Collinson, S., 2018. Lean versus agile production: flexibility trade-offs within the automotive supply chain. *International journal of production research*, *56*(11), pp.3974-3993.

Roša, A. and Lace, N., 2018. The open innovation model of coaching interaction in organisations for sustainable performance within the life cycle. *Sustainability*, *10*(10), p.3516.

Sharma, V., Raut, R.D., Mangla, S.K., Narkhede, B.E., Luthra, S. and Gokhale, R., 2021. A systematic literature review to integrate lean, agile, resilient, green and sustainable paradigms in the supply chain management. *Business Strategy and the Environment*, *30*(2), pp.1191-1212.

Staubus, G.J., 1990. Activity costing: twenty years on. *Management Accounting Research*, *1*(4), pp.249-264.

Sundar, R., Balaji, A.N. and Kumar, R.S., 2014. A review on lean manufacturing implementation techniques. *Procedia Engineering*, *97*, pp.1875-1885.

Thilak, V.M.M., Devadasan, S.R. and Sivaram, N.M., 2015. A literature review on the progression of agile manufacturing paradigm and its scope of application in pump industry. *The Scientific World Journal*, 1, pp. 1-9.

Varsei, M., Soosay, C., Fahimnia, B. and Sarkis, J., 2014. Framing sustainability performance of supply chains with multidimensional indicators. *Supply Chain Management: An International Journal*, *19*(3), pp.242-257.

Vento, M.O., Alcaraz, J.L.G., Macías, A.A.M. and Loya, V.M., 2016. The impact of managerial commitment and Kaizen benefits on companies. *Journal of Manufacturing Technology Management*, *27*(5), pp.692-712.

Vesna Janji, Jasmina Bogićevi and Bojan Krsti, 2019. Kaizen as a global business philosophy for continuous improvement of business performance. *ekonomika*, *65*(2), pp.13-25.

Xu, X., Han, M., Nagarajan, S.M. and Anandhan, P., 2020. Industrial Internet of Things for smart manufacturing applications using hierarchical trustful resource assignment. *Computer communications*, *160*, pp.423-430.

Yang, J., Xie, H., Yu, G. and Liu, M., 2021. Achieving a just–in–time supply chain: The role of supply chain intelligence. *International journal of production economics*, *231*, p.107878.

Yun, J.J. and Yigitcanlar, T., 2017. Open innovation in value chain for sustainability of firms. *Sustainability*, *9*(5), p.811.

Zhai, Y., Zhong, R.Y. and Huang, G.Q., 2018. Buffer space hedging and coordination in prefabricated construction supply chain management. *International Journal of Production Economics*, *200*, pp.192-206.

Zhai, Y., Zhong, R.Y., Li, Z. and Huang, G., 2017. Production lead-time hedging and coordination in prefabricated construction supply chain management. *International Journal of Production Research*, *55*(14), pp.3984-4002.

Zhang, D.Z., 2011. Towards theory building in agile manufacturing strategies—Case studies of an agility taxonomy. *International Journal of Production Economics*, *131*(1), pp.303-312.

Zhang, M., Qi, Y., Wang, Z., Pawar, K.S. and Zhao, X., 2018. How does intellectual capital affect product innovation performance? Evidence from China and India. *International Journal of Operations & Production Management*, *38*(3), pp.895-914.