International Journal of Accounting Research

OPEN ACCESS Freely available online

Review Article

Towards Agile Manufacturing: Accounting Techniques Perspectives

Mohamed Elbaz*

Department of Accounting Management, Faculty of Tourism and Hotels,University of Sadat City, Egypt

INTRODUCTION

World-class performance and continuing competitive pressures have led to changing the measures which needed to remain in the competition. As such, the critical factors in determining manufacturer success have not been depended only on cost-effectively production, but it also extended to other substantial elements such as flexibility, versatility, and on-time delivery. Therefore, agile manufacturing (AM) has emerged to represent the continuing development of the manufacturing system which faces the continuing competitive pressures. According to, Vinodh to continuity under these competitive pressures, the company needs to be agile. Furthermore, AM as a new operational strategy refers to make a company has immunity against unexpected changes which results from diversifying customer needs, accelerating technological changes, shortening the product life cycle, and intensive competition [1-5]. This immunity comes from the characteristics of AM which are responsiveness, flexibility, and innovation [6,1].

In this context, a range of publications about agility has been conducted, due to the vital role of this concept in the contemporary manufacturing environment [3,4,7-9].

Although researchers were carrying out their studies in agility to define and explain this concept in different ways, there is a scarcity in the literature that addresses the role of accounting techniques to help a company to be agile. Thus, this paper is addressed towards finding adequate answers to the following research questions:

RQ 1: What are the main characteristics and requirements of AM? And what are the differences between it and other manufacturing systems?

RQ 2: What is the impact of target costing in implementing the requirements of AM?

RQ 3: What is the impact of the theory of constraints in implementing the requirements of AM?

Accordingly, The main objective of this paper is to extend prior studies on agility by developing a theoretical framework clarifying the importance of the role of accounting tools to yield the requirements of AM to meet the fluctuation of contemporary markets.

The study of the role of accounting tools in fulfilling AM is of significance for stating practical procedures that cope with the AM to put it into practice. Referring to, AM application is not an end in itself as much as it is a long-term journey, so it is important to rely on accounting techniques that achieve continuity of application [1].

The remainder of this paper is organized as follows. Section 2 reviews the literature on AM and proposed accounting techniques (target costing and theory of constraints). Section 3 discusses the theoretical framework. Section 4 provides a conclusion of the study.

LITERATURE REVIEW

Agile Manufacturing (AM)

Referring to the linguistic meaning of the term " Agile" means that "able to move quickly and easily". From this conception, several researchers have argued that AM is an initiative that carries specific characteristics of responsiveness, flexibility, and competence [10,6, 1].

AM was first introduced in the publication of Iaccoca Institute of Lehigh University back in 1991 to describe the practices observed as significant manufacturing aspects [7,11].

stated that the main driving force behind the emergence of agility conception is change. Therefore, he has defined AM as "the successful exploration of competitive bases (speed, flexibility, innovation proactivity, quality, and profitability) through the integration of reconfigurable resources and best practices in a knowledge-rich environment to provide customer-driven products and services in a fast-changing market environment" [10]. In this vein, The crucial point is the need to master change through transparent by adding value to current products and customers as a means of overcoming market uncertainty [8].

defined agility as "simultaneous emphasis on a wide range of competitive capabilities" [12]. Therefore, AM's adoption aims to improve manufacturing capabilities to simultaneously meet a wide range of competitive objectives including cost, quality, speed, flexibility, and cutting-edge technology products. Consequently, AM is considered as vital for market-oriented companies, as it is an approach to responding to market turbulence and complexity [11].

regarded that AM helps an organization to design its processes and

***Correspondence to:** Mohamed Elbaz,Department of Accounting Management, Faculty of Tourism and Hotels,University of Sadat City, Egypt, E-mail: m.m.elbaz@bus.asu.edu.eg

Received: April 26, 2021; **Accepted:** September 15, 2021; **Published:** September 28, 2021

Citation: Elbaz M (2021). Towards Agile Manufacturing: Accounting Techniques Perspectives. Int J Account Res 9:222. doi: 10.35248/2472-114X.21.9.222

internal structure to respond rapidly to customer needs while still controlling cost and quality [3].

Identified that AM enables the company to be flexible enough to adapt quickly to the dynamic demands of the customers and to produce many varieties of products with innovative features [13]. In this context, regarded the key characteristic of AM paradigm is introducing a new product as quickly as possible [14]. Besides, considered the key to agility being in highly skilled and knowledgeable people as well as advanced computer-based technologies [1].

Explained that agility addresses new ways of running companies to meet competitive pressures factors by not only relying on responsiveness and flexibility but also on the cost and quality of products provided to customers [6].

Regarded that AM was formulated in response to constantly changing to sustain under global competitiveness. Therefore, they considered agility is a measure of the manufacturer's ability to react to sudden, unpredictable changes in customer demand for its products and make a profit. In this regard, argued that AM company needs to be more creative and innovative in finding ways to address a volatile market [15,16].

Stated that AM " is not about continuous improvement but about the fundamental re-design of capabilities, systems, and processes as a means of advancing simultaneously on a wide range of competitive objectives without significant trade-offs" [8].

Emphasized the role of AM as a holistic concept to improve quality, delivery, and flexibility performance in responding to the contemporary dynamic and competitive environment [9].

Target Costing (TC)

Target costing (TC) has received great attention among researchers because of its various advantageous traits that support a cost-efficient product development process in line with the contemporary business environment which is characterized by high competitiveness.

TC is originated by TOYOTA, Japanese automotive company, at the beginning of the 1960s, and it has been adopted since that period by Japanese companies and worldwide ones as well [17].

Defined TC as a cost management tool for reducing the overall cost of a product over its entire life cycle with the cooperation of different departments in a company [18].

Stated that TC allows companies to "prevent costs during design rather than reducing costs after the fact" [19].

Defined TC as "a systematic process of managing product costs during the design stage of a new product as well as reducing the overall cost of the products over their life cycle while still controlling the acceptable level of quality for customers" [20].

Stated TC is considered as a cost management technique to manage product features, cost, quality, and functionality to meet the rapid changes in customer's expectations and the diversity of products [17].

Defined TC as " a set of techniques and methods for calculating the target cost of the product at the design stage". Its calculation is based on the product's functional features identified from the point of view of the customer [21].

Argued that the main characteristics of TC are market orientation, early cost management, and cooperative efforts of the value chain entities [22].

Revealed that TC refers to the cost of product that derived from the market price; the main idea of TC is based on delivering products with competitive prices with reasonable costs that met customer's expectation [23].

Argued that the main idea of TC is the determination of the maximum limit of allowable cost which should not be exceeded; this limit is measured as the surplus of target price after deduction the target profit [24].

Although TC has been studied extensively, its vital role in enhancing AM implementation is still under-investigated, to the best of our knowledge. Hence, the authors aimed to fill this gap by putting our perception on how can TC enhance the implementation of AM paradigm?

Theory of Constraints (TOC)

Theory of constraint (TOC) was first introduced by Eli Goldratt in 1984 through his book entitled " The Goal" [25]. TOC aims at improving the weakest rings, which is called constraints, of a chain in order to enhance the performance of the system as a whole. Therefore, Constraints are defined as anything that limits a system's performance in fulfilling its goals [26].

Moreover, Each system has at least one constraint that hinders it from yielding its strategic goals, and in order to make meaningful progress towards these objectives, it is important to concentrate on enhancing a constraint rather than the entire system.

In this aspect, there is a distinction between two types of constraints. The first is a bottleneck which refers to a resource whose capacity is less than or equal to the market demand. Secondly, is a capacity-constrained resource (CCR) which indicates a resource that is not a constraint, but will become a constraint unless scheduled carefully hence then damage due date performance. As a result, managing bottlenecks or CCRs in an effective way will enhance the whole throughput of the system (Panizzolo and Garengo, 2013).

Further, the constraints can be divided in terms of its source into internal or external. The former is inside the production that means the demand is higher than the available capacity and the latter means it is in the market, which means a company has an available capacity higher than the demand .

Consequently, to address these issues, embracing TOC methodology refers to a systematic approach that contains five focusing steps (5FS) that offer the knowhow of successfully pursuing ongoing improvement to effectively manage the throughput of a system. These steps are identifying the constraints, deciding how to exploit the constraint, subordinating everything else to the above decision, elevate the constraint, and if the constraint is eliminated, go back to start from the beginning .

TOC, also, has many techniques that aligned with 5FS, one is the Drum-Buffer-Rope (DBR) mechanism. Furthermore, the DBR mechanism comprises three components. The drum which is the start point in the method refers to bottleneck or CCR and determines the pace of production based on the capacity of the constraint. The buffer is a means for protecting the system from any fluctuations, the protection is expressed in time units, rather than work-in-process or finished units. The rope is a mechanism to force all parts of the system to work up to the pace dictated by the drum.

DBR mechanism operates by developing a schedule for the system's primary constraint . Moreover, the main objective of DBR is to synchronize the entire production process according to the slowest ring in the system. Therefore, the adoption of DBR methodology points out that TOC helps the system to produce a greater number of units as well as reducing lead-time.

By the year 2000, Schragenheim and Dettmer have proposed an evolving model for DBR which is called The Simplified Drum-Buffer-Rope (S-DBR), as it based on that the main constraint comes from the markets And so, what distinguishes S-DBR from traditional DBR mainly is S-DBR's focuses on the market demand as the major system constraint while traditional DBR usually focuses on the internal capacity constraints .

As shown before, there are several studies have concerned with explaining TOC philosophy and its techniques, but there is no much, to the best of the authors' knowledge, which focused on how it can be utilized to enhance AM application. For this reason, this study aims to provide adequate clarification regarding this issue.

THEORETICAL FRAMEWORK

Our theoretical framework for demonstrating the vital role of both TC and TOC in the implementation AM, depending on sub-tools such as value engineering (VE), quality-function deployment (QFD), and S-DBR. As it appears in Figure 1.

Agile manufacturing(AM)

Am Definition: Today's marketplace is customer-driven which characterized by turbulence with continuous changes in customer requirements with a tendency to deliver products at better quality, higher reliability, and faster delivery to meet the pressure of competitiveness. In this light, there are several studies indicated that AM is focused on responsiveness, flexibility, and quickness. Responsiveness refers to the ability to respond to rapid changes whether in technological changes, government policies, customer specifications. Flexibility indicates the ability of a company to adapt to the changes in the inputs, It comprises flexibility in volume production, product variety, and working staff. Quickness means the ability to perform the operation rapidly, such quickness in new product design .

However, Yusuf argued the scope of agility should not be equated just with speed response or flexibility as this is considered a narrow understanding of what constitutes agility. Such, agility is a synthesized use of the developed and well-known technologies and methods of manufacturing.

Further, agile companies have the ability to think out of the box. That means those companies have fast thinking ability with a clever method which leads to delivering innovative products with diversified features and functions without compromising cost and quality . In this context, Hai asserted that R&D has a significant role in innovation and gaining continued competitive advantages against competitors. Consequently, AM methodology enhances the ability of a company to apply a proactive approach by delivering distinctive products exceeding the expectation of its customers .

It is noteworthy that in order to achieve the value of adopting AM paradigm in confronting fierce competition, it is essential to build an agile supply chain based on the cooperative with trustful suppliers to overcome limited resources, whether human or technological, and hence yield the objectives of responsiveness, quickness, and flexibility . In this context, Adeleye emphasized that a company be agile when embracing a set of principles, such as

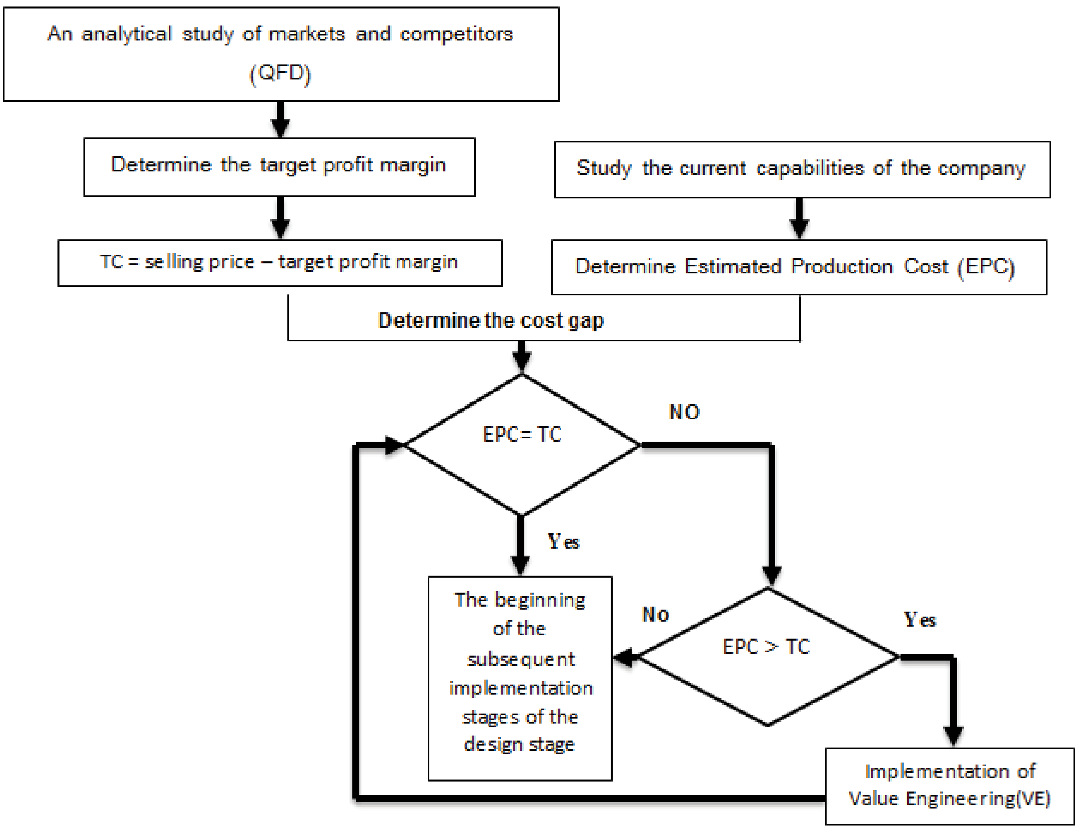

Figure 1: Research model.

extended enterprise, parallel organization, and flexible automation.

From the preceding, this study states a comprehensive point of view for AM system based on two dimensions, that is, strategic and operational, where the former is considered as the external dimension which reflects the ability of companies to absorb unexpected market turbulence and controlled it through the investigation and precise tracking of continuous changes in customer desires and its impact on the flexibility of the design, and the latter as an internal dimension that reflects the diversified capabilities that a company has, whether of working force or technological resources which are necessary to adjust internal processes and activities in alignment with market volatility.

Within this context, This shows the AM concept is comprehensive and that is not only focused on the internal development of the company but also requires building a flexible strategy to follow-up any unprecedented changes in markets for achieving its strategical goals.

Am Enablers: Several existing literature had stated a set of enablers which AM based .

Customer – Focus: The constant pursuit of customer satisfaction is by reducing waiting times and delivering products that meet the customer's desires with high quality and competitive cost. Also, continuity in communicating with customers to closely monitor changes in tastes and the company's ability to absorb these changes to translate them into real opportunities to increase its market share and achieve high-profit rates. In addition, Provision of after-sale service such as conducting repairs, installing upgrades, and performing the inspection.

Human Resources: Raising the efficiency of workers through continuous training, which prepares them for efficient mental interaction with the competitive pressures experienced by the company. Besides, the necessity of applying the principle of delegating authority to workers according to their responsibilities, and Motivating creative teamwork, especially in the stage of designing new products or developing existing products by introducing new features.

Advanced Technology: The ability to adopt all that is new in information technology, due to its positive impact on all manufacturing stages, ranging from the receipt of the customer's order to the delivery of products. Furthermore, Building integrated information systems and dynamic lines of communication between independent economic entities in different geographical locations to activate the principle Visual Enterprise (VE) for exchanging experiences, skills, and information which reflects on the speed of responding to the consumers' wishes.

Concurrent Engineering: It aims to implement all functionality activities that add value to the customer in parallel by relying on a multidisciplinary team of work and expertise to deliver new products to the markets in the shortest possible time. In other words, It also aims to adhere to the planned times of design and manufacturing activities, by eliminating all activities that do not add value, whether in the design phase or the following executive stages.

AM and lean manufacturing (LM): Based on the literature, both of LM methodology and the AM methodology are manufacturing strategies aimed at improving performance rate. Also, they are depending on the mechanism of Cellular manufacturing that divides the company into dynamic value streams.

Even though explained that adopting the LM contributes to achieving the cost-effective leadership strategy, while AM is not a strategy to rationalize costs as much as it is for differentiation strategy. On the other hand,has reached that there is a significant relationship between AM and cost-leadership strategy.

Besides, LM focuses more on the factory floor, while AM has a strategic view of the whole company. According to, Gunasekaran LM offers product families that reflect a group of related products, while AM offers a wide range of diversified products to every customer at a low price. In other words, AM adopts the concept of mass customization which requires more alliance and flexibility.

Soltan and Mostafa examined the main components of each initiative. They found each paradigm comprise of the same components which are market responsiveness and waste removal but it is different regarding the weight of each component. In more detail, LM has waste removal as the mainly weighted component and market responsiveness as a complementary weighted component. On the contrary, AM has market responsiveness as the mainly weighted component and waste removal as a complementary weighted component. In this context, Ifandoudas and Chapman asserted that "agility is focused on rapid responsiveness and mastering the market turbulence and requires specific capabilities above and beyond those that can be achieved using lean production".

Briefly, based on literature, although each lean and agile manufacturing keeping the core features that distinguished each other, it is evident that there is an overlap between their practices. Therefore, the literature indicates chronological between these initiatives, as agile manufacturing is considered as the next logical paradigm following lean manufacturing .

Strategic AM and Target Costing (TC): Most existing literature indicates that the main TC's characteristics comprise market orientation, early cost management during the design stage, and cooperative efforts through cross-functional team involvement. As a result, the key point of TC is to identify the product's cost under the expectations of customers regarding the trading - off between cost, quality, and functionality requirements. In other words, a company has to consider which features are preferred by customers to give its product an edge over competitors' products when determining its target cost. Thus, TC emphasizes understanding the markets by focusing on customer's specifications in terms of quality, functionality, delivery, and prices. In this regard, applying the quality-function deployment (QFD), the Japanese method to transform the voice of the customer into engineering characteristics for a product, is a necessary condition to achieve the accurate determination of the customer preferences.

According to the literature which demonstrated the procedural steps to apply TC It is evident that there is consensus on the essence and content of the stages of TC application, despite the difference between them on the number of those stages in Figure 2.

The cost gap – as shown in Figure 2 is determined by the comparison between the TC and the estimated production cost (EPC), but the indication of that gap differs in each of the following two cases:

- **TC < EPC**: In this case, it is permitted to move to the following executive stages of the product design stage, because this means that the current capabilities of the company will enable it to produce the products that customers desire in light of target costing.

- **TC > EPC:** It is not allowed to start the manufacturing steps of the product, because the company's possibilities do not qualify it to adhere to the maximum allowed cost limits, then it may expose it to be excluded from the competitive race. Therefore, the target costing team starts examining and studying all possible ways to eliminate this negative gap and stick to the target cost by applying the value engineering (VE) method. It is worth noting that the value engineering (VE) has emerged mainly to search for available ways on how to optimize the use of resources in meeting the desired functional characteristics of customers to provide markets with products while reducing costs, increasing productivity and enhancing quality.
- Furthermore, there is an overlap in the relationship between TC and VE. in other words, TC determines the amount of target cost, while VE is committed to achieving the target cost that was determined to maintain the target profitability rates achieved. Thus, the importance of VE method lies in eliminating the negative cost gap between EPC and TC by analyzing the product functions that achieve value from the customer's perspective and trying to implement those functions in innovative ways without compromising the level of quality required.

Undoubtedly, it follows from above that the key driver of enhancing the implementation of AM paradigm by utilizing TC is the common ground between them, which is focusing on customer's preferences without compromising the competitiveness of cost and on-time delivery. Moreover, the following features report that TC is characterized with some dimensions of competence which guarantee the success applying of strategic AM:

TC adopts a proactive approach which is based on specifying both the functional characteristics and the allowable cost for manufacturing a specific product before starting the executive stages of the manufacturing process in light of the requirements of customers and competitive markets.

Using TC as one of the strategic costing tools leads to effectively manage costs for both current products and new ones in the light of cost management competitively which is in line with the strategic AM requirements.

Applying TC improves product quality and eliminates all activities that do not add value from the customer's point of view.

TC leads to reduce delivery lead time for customers by considering time-to-market which reflects responsiveness to customers' preferences.

TC fosters competitive advantages based on innovation and differentiation strategy (Figure 2).

Operational AM and Theory of Constraints (TOC):TOC has been emerging as a well-known methodology for the optimization of the manufacturing system by increasing throughput of the system through identifying those processes that are constraining the. Furthermore, TOC is considered as a management philosophy includes practice techniques that can be adopted by any company, one of these techniques is Drum- Buffer- Rope (DBR) which aims to manage production by scheduling the flow of its operations in regards with the rate of the weakest ring in the chain, which called the capacity-constrained resource (CCR) or bottleneck.

Adopting DBR technique, which consistent with the TOC's Five-Focusing-Steps(5FS), indicates that TOC provides the manufacturing system with the capability to produce more products in high quality while reducing lead-time. Therefore, TOC has an impetus that makes a company rethink what it can do to obtain the most of the current constraint without committing any further investment. In this aspect, Ifandoudas and Chapman argued that TOC has an ability to reutilize the excess capacity in non-constraint resources in response to enhancing the characteristics of responsiveness and flexibility which required in agile companies.

Furthermore, the DBR technique consists of three basic assumptions which are:

- The Master Production Scheduled (MPS) should be developed. So that is consistent with the constraints of the system (Drum).
- The throughput of the system must be protected from any fluctuation through time buffer at critical points of the system (Buffer).
- The production should be tied to the drumbeat to force all parts of the system to work at the pace dictated by the constraint or CCR (Rope).

As there are two types of constraints: external such as market constraints and internal like "management philosophy, labor skills, inflexible work rules and limited capacity at various resources,

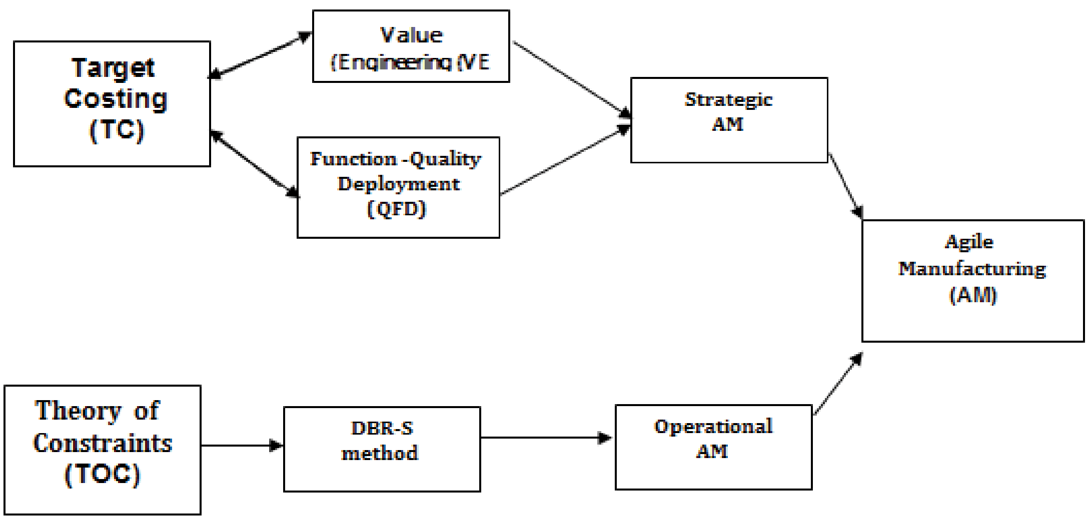

Figure 2: Target Costing implementation.

there are two versions of DBR techniques, Traditional DBR and Simplified DBR (S-DBR). Although they have common concepts based on TOC, each of them has a specific goal to be attained. Traditional DBR typically focuses on obtaining the maximum exploitation of the CCR, while S-DBR is mainly focusing on achieving the highest satisfaction of the market demand.

In this context, traditional DBR assumes an internal CCR is active but this is not always the case as, in today's contemporary environment, a company's constraint mainly is in the market even if the CCR possesses sufficient protective capacity. In other words, although the domination of the market as a core constraint but this does not prevent as well the possibility of having internal resources limits the capacity of a company. Therefore, the S-DBR is seen as an evolutionary version of traditional DBR due to the contemporary customer-centric environment.

Traditional DBR works on smoothing the material flow and increasing limits of the system's capacity through the following steps The drum imposed the pace of the flow in synchronizing with the weakest ring in the chan which constitutes CCR or bottleneck.

- The buffer is created, in terms of a specific number of working hours, to protect the CCR from any fluctuation in preceding processes, hence ensuring the WIP arrives at the CCR as it is determined in a detailed Master Production Schedule (MPS). Therefore, there are three types of buffers: A shipping buffer refers to the lead-time from the CCR to the completion of the order to fulfill due-date. A CCR buffer indicates to the lead-time from raw material release to reach CCR's site to protect the detailed schedule of the CCR. An assembly buffer is an estimation of the lead-time starting from the point of raw material releasing to the point where parts that do not use CCR are assembled with parts that processed by CCR to ensure that materials do not need CCR would be released on time.
- The rope is the means for achieving the communication between the CCR and the point of releasing raw materials, to ensure that the flow of raw material is consistent with the capability of the CCR.

Schragenheim and Dettmer argued that the notion stands behind S-DBR is " the market dictates certain requirements that a company must meet. Otherwise, demand for the company's product or service will diminish and perhaps vanish completely in the future....". Furthermore, S-DBR can be applied through the following steps

1- The drum is based on firm orders, it means the constraint comes from the market.

2- The buffer only is the shipping buffer, unlike traditional DBR which consists of three buffers.

3- The rope is tied to the market, it means that the release of raw material is generated directly by firm orders received. Unlike traditional DBR, the rope is tied with the CCR schedule.

From the above, it is evident that both methods, traditional DBR and S-DBR, has the common ground which emanates from TOC's principals. However, Schragenheim and Dettmer asserted that S-DBR technique is more reliable due-dates due to maintaining a shipping buffer only rather than many buffered intermediate points in traditional DBR which makes it less effective.

Therefore, the authors argue that the change in focus from internal constraint to external constraint as well market demand become has an upper hand in how a company can utilize its resources to satisfy the customer's demand makes S-DBR suitable for AM companies that require a system that has an ability to align with a competitive environment which is characterized by fluctuations due to uncertainty and manifold customer demands. Thus, S-DBR is more harmonic with the objectives of the operational AM which focusing on how to increase the flexibility, responsiveness, and timely delivery of the system to meet the volatility in customer demands.

CONCLUSION

AM methodology is considered as a natural reaction to the developments in the contemporary business environment from the complexity of the manufacturing process and the multiplicity of customers' desires. In this context, this study seeks to find an adequate answer on how to implement AM methodology from the point of view of accounting tools, especially this notion was not distinctly documented yet, to the best of our knowledge. In other words, this paper aimed to explore which accounting tools satisfy the requirements of AM methodology.

This study revealed that TC technique has the ability to meet the requirement of the strategic dimension of AM methodology, as both of them are customer-focused by translating all customer's expectations into real products that satisfy their needs with maintaining the competitive dimensions of cost, quality, delivery on-time.

On the other hand, this study as well proposed one of the applications of TOC technique which is DBR mechanism for enhancing the flexibility and versatility of the manufacturing systems in managing its CCR effectively to increase the throughput of the system which results in fulfilling the operational dimension of AM methodology.

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Table 3: A correlation analysis: study global variables.

Variable	M	SD	1	2
SC (1)	256.59	12.19	1	.507**
FRQ (2) 132.28	6.91			

Table 4: b Hierarchical regression of societal culture, and financial reporting quality.

Model	R	R^2	Adj.R^2	SEE	$R^2\Delta$	$F\Delta$	df1	df2	Sig$F\Delta$
1	.046[a]	0.002	-0.001	6.925	0.002	0.607	1	293	0.436
2	.507[b]	0.257	0.252	5.984	0.255	99.401	1	292	0

a = predictors: (constants), sex

Table 5: Correlation analysis: dimensions of societal culture and financial reporting quality.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
Pd (1)	25.48	2.26	1	.266*	.340**	.246**	.193**	.170**	.175**	.063	.047	.238**
Ic (2)	25.48	2.86		1	.317**	.230**	.196**	.180**	.196**	.255**	.237**	.318**
Igc (3)	34.33	3.33			1	.439**	.230**	.256**	.230**	.126**	.236**	.322**
Ge (4)	30.29	2.69				1	.319**	.209**	.186**	0.079	.294**	.384**
As (5)	43.91	2.97					1	.183**	0.091	0.02	.142*	.331**
Fo (6)	26.52	2.3						1	.163*	0.075	.126*	.218**
Po (7)	26.52	2.02							1	.130*	.243*	.181**
Ua (8)	17.91	1.62								1	.163**	.145*
Ho (9)	26.35	2.09									1	.255**
Frq10	132.27	6.91										1

Table 6: Hierarchical regression model testing hypothesis 1.

Model	R	R^2	Adj.R^2	SEE	$R^2\Delta$	FΔ	df1	df2	SigFΔ
1	.046[a]	0.002	-0.001	6.91409	0.002	0.617	1	292	0.433
2	.243[b]	0.059	0.053	6.72528	0.057	17.568	1	291	0

A-predictors: (constant), sex

B-predictors: (constant), sex, power distance

Coefficients[a]

Variable	ß	SE	t	sig
Sex	-0.046	0.81	-0.785	0.433
Power distance	0.239	0.174	4.191	0

Table 7: Hierarchical regression model testing hypothesis 2.

Model	R	R^2	Adj.R^2	SEE	$R^2\Delta$	FΔ	df1	df2	SigFΔ
1	.046[a]	0.002	-0.001	6.91409	0.002	0.617	1	292	0.433
2	.327[b]	0.107	0.101	6.55187	0.105	34.065	1	291	0

A-predictors: (constant), sex

B-predictors: (constant), sex, institutional collectivism

Coefficient[a]

Variable	ß	SE	t	sig
Sex	-0.046	0.771	-1.379	0.169
Institutional collectivism	0.325	0.135	5.837	0

a. *Independent variable: financial reporting quality*

Table 8: Hierarchical regression model testing hypothesis 3.

Model Summary

Model	R	R^2	Adj.R^2	SEE	$R^2\Delta$	FΔ	df1	df2	SigFΔ
1	.046[a]	0.002	-0.001	6.91409	0.002	0.617	1	292	0.433
2	.324[b]	0.105	0.098	6.56045	0.103	33.218	1	291	0

A-predictors: (constant), sex

B-predictors: (constant), sex, in-group collectivism

Coefficient[a]

Variable	ß	SE	t	sig
Sex	-0.027	0.77	-0.479	0.637
In-group collectivism	0.321	0.115	5.764	0

a. *dependent variable: financial reporting quality*

Table 9: Hierarchical regression model testing hypothesis 4.

Model	**R**	**R^2**	**Adj.R^2**		**SEE**		**$R^2\Delta$**	**FΔ**	**df1**	**df2**	**SigFΔ**
1	.046[a]	0.002	-0.001		6.91409	0.002	0.617	1	292	0.433	
2	.385[b]	0.148	0.142		6.41088	0.146	49.471	1	291	0	
A-predictors: (constant), sex											
B-predictors: (constant), sex, gender egalitarianism											
Coefficient[a]											
Variable			ß		SE		t		sig		
Sex				-0.017		0.755		-0.305		0.761	
Gender egalitarianism		0.383		0.14		7.034		0			
Dependent variable: financial reporting quality											

Table 10: Hierarchical regression model testing hypothesis 5.

Model Summary											
Model	**R**	**R^2**	**Adj.R^2**		**SEE**		**$R^2\Delta$**	**FΔ**	**df1**	**df2**	**SigFΔ**
1	.046[a]	0.002	-0.001		6.91409	0.002	0.617	1	292	0.433	
2	.333[b]	0.111	0.105		6.53818	0.109	35.423	1	291	0	
A-predictors: (constant), sex											
B-predictors: (constant), sex, assertiveness											
Coefficient[a]											
Variable			ß		SE		t		sig		
Sex				-0.03		0.767		-0.34		0.589	
Assertiveness			0.33		0.129		5.952		0		
a. *dependent variable: financial reporting quality*											

Table 11: Hierarchical regression model testing hypothesis 6.

Model	**R**	**R²**	**Adj.R²**		**SEE**		**R²Δ**	**FΔ**	**df1**	**df2**	**SigFΔ**
1	.046[a]	0.002	-0.001		6.91409	0.002	0.617	1	292	0.433	
2	.222[b]	0.049	0.043		6.76076	0.047	14.349	1	291	0	
A-predictors: (constant), sex											
B-predictors: (constant), sex, future orientation											
Coefficient[a]											
Variable			ß		SE		t		sig		
Sex				-0.039		0.793		-0.684		0.495	
Future orientation		0.217		0.172		3.788		0			
a. *dependent variable: financial reporting quality*											

Table 12: Hierarchical regression model testing hypothesis 7.

Model	**R**	**R²**	**Adj.R²**		**SEE**		**R²Δ**	**FΔ**	**df1**	**df2**	**SigFΔ**
1	.046[a]	0.002	-0.001		6.91409	0.002	0.617	1	292	0.433	
2	.185[b]	0.034	0.028		6.81368	0.032	9.639	1	291	0.002	
A-predictors: (constant), sex											
B-predictors: (constant), sex, performance orientation											
Coefficient[a]											
Variable			ß		SE		t		sig		
Sex				-0.034		0.806		-0.686		0.994	
Performance orientation	0.179		0.614		3.105		0.002				
A. *dependent variable: financial reporting quality*											

Table 13: Hierarchical regression model testing hypotheses 8.

Model	**R**	**R^2**	**Adj.R^2**		**SEE**		**$R^2\Delta$**	**FΔ**	**df1**	**df2**	**SigFΔ**
1	.046[a]	0.002	-0.001		6.91409	0.002	0.617	1	292	0.433	
2	.149[b]	0.022	0.016		6.85566	0.02	5.981	1	291	0.015	
A-predictors: (constant), sex											
B-predictors: (constant), sex, uncertainty avoidance											
Coefficient[a]											
Variable			ß		SE		t		sig		
Sex				-0.034		0.806		-0.768		0.443	
Uncertainty avoidance	0.142		0.249		2.446		0.015				

a. dependent variable: financial reporting quality

Table 14: Hierarchical regression model testing hypothesis 9.

Model	**R**	**R^2**	**Adj.R^2**		**SEE**		**$R^2\Delta$**	**FΔ**	**df1**	**df2**	**SigFΔ**
1	.046[a]	0.002	-0.001		6.91409	0.002	0.617	1	292	0.433	
2	.258[b]	0.067	0.06		6.69771	0.065	20.106	1	291	0	
A-predictors: (constant), sex											
B-predictors: (constant), sex, humane orientation											
Coefficient[a]											
Variable			**ß**		**SE**		**t**		**sig**		
Sex				-0.044		0.785		-0.768		0.443	

a. dependent variable: financial reporting quality