ENHANCING MANUFACTURING PERFORMANCE STRATEGY WITH ERP SIMULATION MODEL

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ABSTRACT
This paper discusses and modifies the development of conceptual models that could be used in the creation of supply chain project and suggested new conceptual ERP simulation model. It will be considered the traditional supply chain simulation and modified. In addition it will show the relation between ERP as a simulation model, supply chain and business strategy. Finally, describe the impact of ERP conceptual simulation model in enhancing manufacturing performance strategy.

Keywords: *Simulation, ERP, Business strategy, supply chain.*

1. INTRODUCTION

The supply chain is often described in terms of the integration of processes and much of the literature on supply chain improvement has extolled the need for partnerships with suppliers. It is composition of four elements: suppliers, manufacture, retailers, and the consumer market [2].

Commercial supply chain software package brings many benefits to an organization, but it is extremely expensive cost. Due to cost factors, the focus of organizations is moving from operationally oriented problem solving systems to a decision oriented strategic system [14]. Further the increasing practice and experience gained from actual IS implementation coupled with the need for integrated applications sustaining the interest for development integrated ERP system simulation.

ERP is defined as an enterprise information system that is consisted of business process management and information technologies with the purpose of integrating and optimizing enterprise operations [15].

The increasing need for flexibility in market-place causes many challenges in business strategy that may challenge this tenet, partnerships may suit the supply chain of certain critical items in the production process but firms may become constrained in longer term relationships and lose the necessary degree of flexibility to source elsewhere when supply conditions are suitable [1].

The main function for the Business is to generate Cash flows, Capitalize on profitable new investment opportunities; Business is particularly attractive area for investment. In new and emerging market increasing the products is a primary goal, Business investments is dedicated to infrastructure enhancement: facilities, distribution network, sales equipment and technology, these investments are made by acquiring or forming ERP simulation strategic. The company could invest heavily in some area as a result the ERP simulation in any type has to take in the consideration the strategy plan to do the improvements in manufacturing strategy.

ERP performance simulation that involves aggregating results from multiple run of the same underlying model, ERP simulation model can be distributed to networked computing resources to achieve significant speed-up[14].

Many supply chain management researches focused on developing the exact planning, inventory planning, and replenishment are planning capabilities needed to deliver the right products to the right customers at the right time. The problems complicate the logistics problem; they need for issues relating to material handling, warehouse, transportation, and money. The ERP simulation model needs to execution of processes in a sequence way and to solve problems of integration [13, 14, 16].

The ERP Simulation is an effective way to allow partners to analyze the state of their supply chain and manufacturing activities needed to produce a product. The associated information flows required to support the manufacturing process evaluated the logistical concerns of getting the right material to the right place [14, 17]. Different models of ERP project are suggested to speed-up the business process strategy and minimize the cost, for the manufacturing enterprises and delay in supply of a component which can lead to reduced productivity and increased waste. Most of the ERP project simulation doesn't take in to consideration the direct relationship between the ERP simulation model, supply chain and manufacturing performance strategy or they take in to consideration the strategy in general. What happens if the ERP simulation model gives the best number with best time and the company doesn't have enough money to pay or doesn't have space to put the product or all material?

2. RELATED WORK

Day-to-day, ERP simulation is being accepted and becoming a part of the day-to-day of analysis, looked upon as a technique to verify solutions and providing early solutions to problems encountered in the most diverse industrial segments [14,15],

Advantages of using ERP simulation in supply chain and business strategy as a whole according to [4, 5, 6, 7] represent the capability to simulate and present the reality of anything in a clear and easy way. At the same time there are disadvantages. In [8] provided an overview of a successful integration between ERP simulation model (VinLogic) and a vehicle shipment information system (VinVision). This integration allows the simulation model to be initialized with vehicle inventory in the network. Model initialization enables the model to be used not just for measuring performance over the length of the run, such as average transit time, but also to obtain a snapshot of the system as some time in the near future. Improvements in the timeliness of event reporting to VinVision will have a significant impact on the ability to make accurate projections. Development of an ERP simulation model for evaluating the business processes and inventory control parameters of a logistics and distribution supply chain will provide solutions to problems encountered in the most divers' industrial segments [3, 9]. A generic simulation tool, rather than an ERP simulator, was developed for meeting customized needs of the effort.

In [10], proposes a hybrid approach which is a specific problem solving procedure combining analytic and simulation methods to solve production-distribution problems in supply chain. The machine capacity and distribution capacity constraints in the analytic model are considered as stochastic factors and are adjusted by the proposed specific process according to the results from an independently developed ERP simulation model which includes general production-distribution characteristics). In [11] suggests new ERP simulation software: Easy-ERP, a Java-based tool that simplifies the ERP simulation. In its current state of development, Easy-ERP is a modeling tool for assessing the pros and cons of new facility locations, resource allocations and different combinations of policies. It can be used in the modeling of small projects such as single inventory units to large-scale projects such as world-wide supply chains. This paper introduces Easy-ERP by an examination of its current software module architecture, modeling elements, basic features and simulation processes [14, 15].

3. PROPOSED CONCEPTUAL MODEL

According to the related work, simulation approaches suggested by different authors, we have seen no relation between the supply chain simulation and manufacturing performance strategy; we suggested a modification to one of the simulation suggested by [9] and looked at the difference. It is necessarily to explain in brief the model suggested in [9], the supply chain Proposed in [12], considers four stages: suppliers, manufacturers, retailers, and the consumer market. The structure for the conceptual model proposed for this type of chain is composed of hierarchical levels. The first level, the most general, is composed by the four elements and by their integration made by orders and material/products flows. At the second hierarchical level, one performs the intermediate modeling of each SC member. Detailed modeling of specific functions (intra-company) is designed at the third levels. The first version for the proposed models presents a single way to model suppliers, manufacturers, retailers and customers. Initially, the fourth level was implemented detailing even more of each supplier, retailer and manufacturer, however, it was later realized that this was redundant for the proposed model. The generic structure with three hierarchical levels has been developed for the CS considered, and is shown at Figure 1. This is the structure proposed in [2, 14, 19].

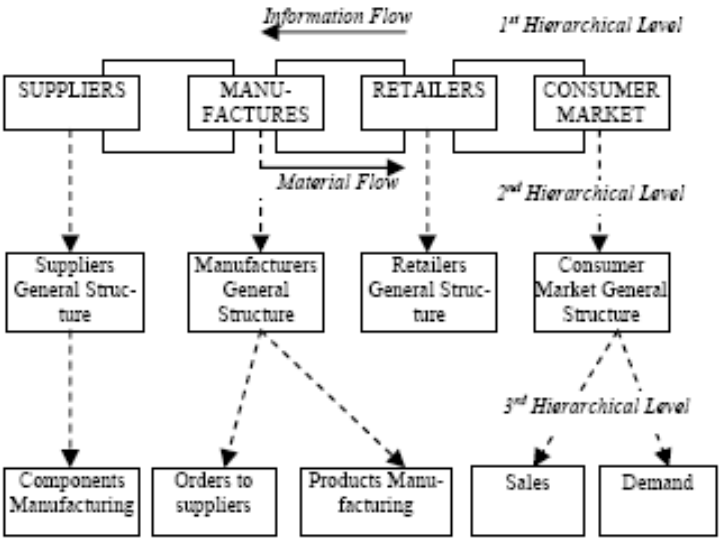

Figure 1. SC General Modeling Structure [2]

When an inventory level gets lower than a minimum specified (safety inventory level), an order for the material (component or product) purchase (or manufacturing) is placed. The optimum order size (quantity) and the safety inventory levels are given by the decision-maker. At a production facility, two types of orders exist: *purchase orders*, for the purchasing of components from suppliers, and *production orders*, for the manufacturing of products (different product types are considered, and each product is made of different combination of components). Regarding the consumer market, each retailer has demand patterns. There are different demand behaviors [2]. In [3] suggest structure in the simulation software ARENA, a set of global variables needs to be defined, all these variables are bi-dimensional, with their respective sizes represented by the variables in between brackets. In this table and on the Arena models, some of the notations used were:

Structure

Notations:	*General Variables:*
SS : safetey stock	nc: number of components
IL : inventory level	np: number of products
dnm : demand not met	ns: number of suppliers
comp : component	nm: number of manufacturers
prod : product	nr: number of retailers
qty : quantity	
sup : supplier	
mft : manufacturer	
ret : retailer	

Specific Variables:

To suppliers:	*To manufacturers:*	*To retailers:*
sup_IL_comp [ns, nc]	mft_IL_comp [nm, nc]	ret_IL_prod [nr, np]
sup_SS_comp [ns, nc]	mft_SS_comp [nm, nc]	ret_SS_prod [nr, np]
sup_dnm_comp [ns, nc]	mft_IL_prod [nm, np]	ret_dnm_prod [nr, np]
sup_prod_rate [ns, nc]	mft_SS_prod [nm, np]	ret_qty_needed_prod [nr, np]
sup_qty_needed_comp [ns, nc]	mft_qty_needed_comp [nm, nc]	
	mft_qty_needed_prod [nm, np]	
	mft_prod_rate [nm, np]	
	mft_dnm_prod [nm, np]	

Figure 2.Notations and Variables for the SC Simulation [3]

Each company, whether a start-up or a mature company should develop some form of a business plan. The plan should explain the company's objectives over a three to five year period and should quantify the financial resources and expenditures of the company. Using its known plans and statistics for its industry, the company should challenge its capitalization and determine appropriate debt and equity funding levels. Using this plan, the company should determine its needs for outside funds over the three to five year period and also determine the finance that is available and applicable to the company. The company then determines the sources available for the appropriate financing and begins making contact with the appropriate sources and other professionals who have contacts with these sources. Particularly in the start-up companies, cost control measures should be instituted from the beginning and all efforts should be made to control cash expenditures appropriately match you're financing needs with sources for that type of financing. Another critical issue is timing. It is virtually impossible to obtain financing of any type within thirty or sixty days. Those who are successful at obtaining financing know who is doing their type of financing and plan far in advance to begin educating those financing sources as to their company and their industry. Those who succeed have a formal business plan that well demonstrates their managerial, abilities and the viability and marketability of their products. Implemented the ERP simulation at a business will be part of the strategy and affect by and from business strategy Figure 3.

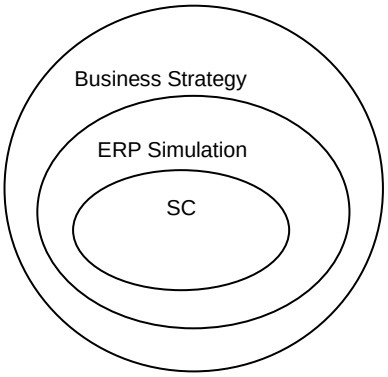

Figure 3.ERP simulation at a manufacturing will be part of the strategy and affect by and from strategy

Four elements compose the first hierarchical level in the proposed ERP system simulation conceptual model: suppliers, manufacturers, retailers, and the consumer market. The integration is simplified by information and material (components or products) flows. This is illustrated at Figure 4. The letter in circles is used to detail the models in the following descriptions.

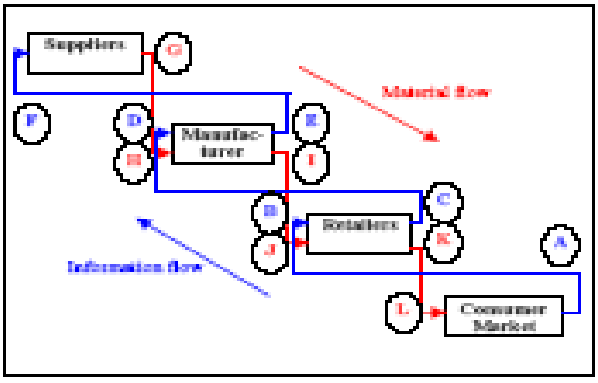

Figure 4. First levels in the proposed conceptual model hierarchy

The different between figure [3] and figure [4] that strategy in figure [4] has checked after each activity in the ERP simulation to see whether the result for the simulation accepted by strategy if not, the strategy has to have action to modify the result for the simulation according to the strategy action and not to best number of the simulation.

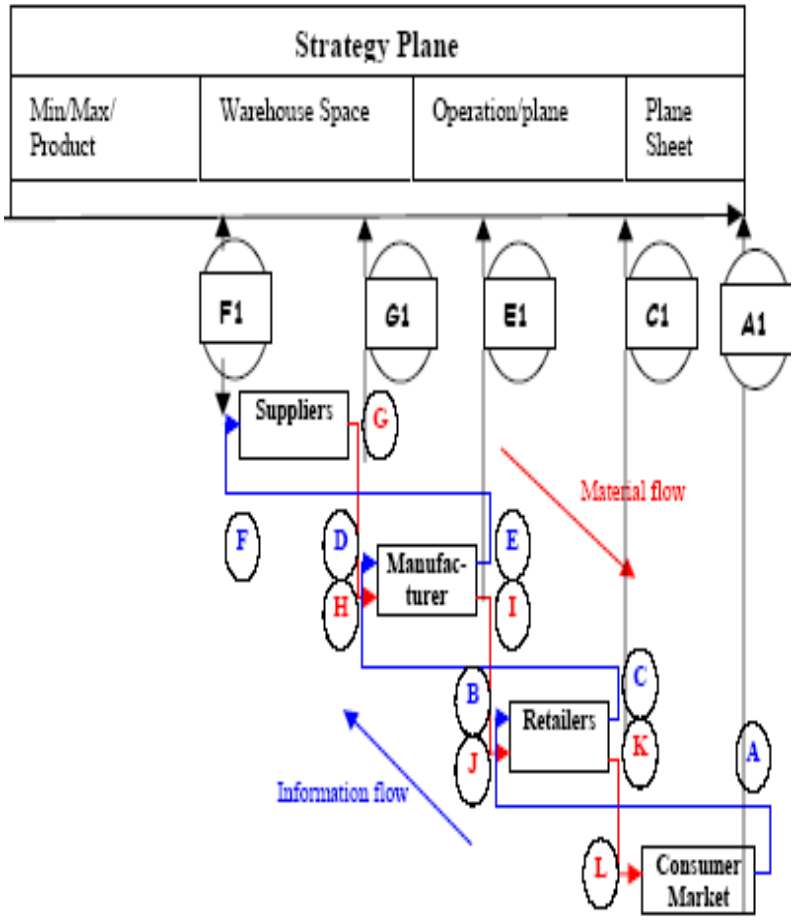

Figure 5. Conceptual Model [2].

This activity has to do it each time within four elements, Consumer, Retailers, Manufacture, and Suppliers. Each one of these members will assume that the demand for the next time period will be equal to the last demand. In figure 5, starting studying the consumer marketing (A) and compared with strategy plan that (A) to (A1) TO (A). If the strategy plan agrees it goes to (B) if not changed the simulation input according to the strategy and input to (B), from the Retailers output (C) to (C1) To (C) if the strategy plan agrees it goes (D) if not changed the simulation input and input to (D), take output (E) To (E1) again To (E) if the strategy plan agrees it goes and input to (F) if not changed the simulation input (F), from the Suppliers take output (G) To (G1) back to (G) if the strategy plan agrees to input to (F) if not changed the simulation input (F) ,take the output (G) To (G1) back to (G) if the strategy plan agrees with output (G) goes to (H) if not changed the simulation input according to the strategy and further to input (H) , from this point the simulation could work.

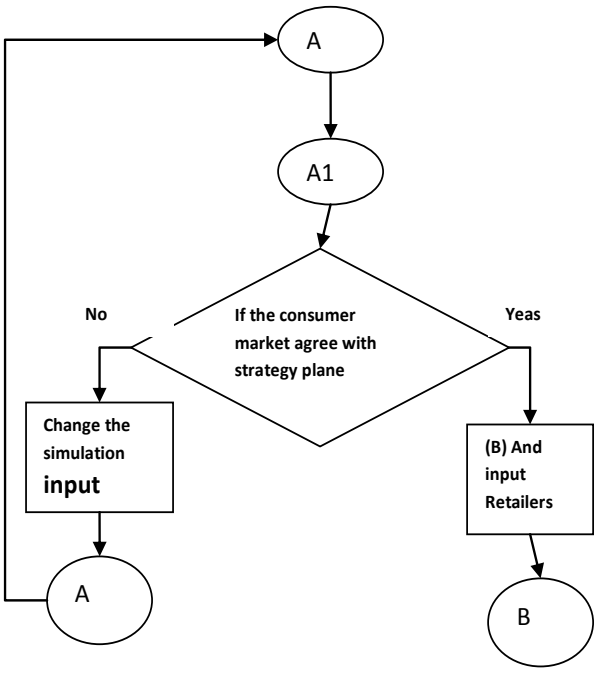

Figure 6.Proposed Modified Conceptual Model.

4. CONCLUSIONS

Clearly, there is a strong relationship between the ERP system simulation and manufacturing performance strategy. The ERP simulation model needs to check with manufacturing strategy plan to have a correct suggestion from simulation. The business has limitations with, products, capital, and warehouse. This research is theoretical and needs further work to test and improve the proposed modified ERP conceptual simulation model before going to practice.

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