Failure in Market Survey and Production Control and Planning affect the Network of Companies in the Automobile Industry

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Abstract: This paper deals with a failure in the market survey that led to a downstream planning error that jeopardized the network of companies (logistics operator (OPL), material suppliers and clients). On the other hand, a new justification arises that affirms that Production Control and Planning plans a network of companies and a model was elaborated based on this presupposition.
The automobile production company being studied specifically has the presence of the Logistics Operator (OPL) at its plant, which requires the contracting company to plan ahead in terms of the quantities to be produced during a specific period of time. The suppliers in turn depend on the material needs to feed production and the clients request just-in-time products and services.
The players involved in the context of a dependent company network would be the auto segment company with the Marketing and Production Control and Planning departments; the OPL, considered an integrating agent for the company network; the suppliers, and; the clients.
Besides these contexts, the intention is to demonstrate that Production Control and Planning (PCP) for an automobile industry plans a company network simultaneously, requiring just-in-time delivery of products and services. For such, an unsuccessful case will be demonstrated to show both these issues and a proposal for a new Network PCP architecture, referring to the modular consortium.
This case study also draws attention to the contractual process in the complex relationship between contractor and OPL and the need to implement detailed performance indicators that accurately reflect the failures to seek and implement corrective actions. This article has been possible to verify the failure initiated by a market research that was approved by the board and ordered the lineup for PCP downstream of the materials needed for the projection expected.

Keywords: PCP, Production Control and Planning, automobile industry and Logistics

I. Introduction

According to Aaker (2004), large companies conduct market surveys for product innovation through the marketing area with the objective of offering information that helps detect problems and opportunities to, if necessary, find out enough for making decisions. Marketing researchers generally focus on tendencies that affect the demand for products and services in order to develop a master plan for production based on the survey's reliability.
Once the aggregate plan is defined, it must be broken down to elaborate the Master Production Schedule (MPS). This means the aggregate plan for a given family of products is transformed into an MPS for each of the items that comprise the referred to family. [15]
Production Control and Planning (PCP) at an auto industry has time and production capacity as essential factors. It generally processes its products and services counting on an exact production capacity, from people to assembly platforms, where it is impossible to work simultaneously with two assembly lines. That is why when a new product is launched others are taken off the line.
In this paper, the automobile production company being studied specifically has the presence of the Logistics Operator (OPL) at its plant, which requires the contracting company to plan ahead in terms of the quantities to be produced during a specific period of time. The suppliers in turn depend on the material needs to feed production and the clients request just-in-time products and services.
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II. Teoretical Conceptualization Production Control and Planning

Planning means to anticipate and it aims at eliminating surprises in the future. “It means understanding how the joint consideration of a current situation and a vision of the future influences present day decisions in order to achieve specific objectives in the future” (Corrêa et. Al[9]).
According to Certo and Peter [5], control can be defined in an orderly manner. First, goals are established in strategic planning. Then, it is necessary to compare what was achieved with these goals and finally decide whether to maintain or apply corrective actions.

According to Tubino [21], through production, companies transform inputs (raw materials) into useful outputs (products) for clients. This is called a production system and it must be thought of in terms of periods of time in which plans are made and actions are carried out based on these plans, so that after these periods of time have elapsed, the events planned by the companies become reality.
Tubino [21] also states that production systems must set up a production plan aimed at visualizing the production capacity the system must work at to satisfy its clients, based on long-term sales projections.
Production Control and Planning (PCP) activities involve a series of decisions with the objective of defining what, how much and when to produce and buy, as well as the resources to be used, say Correa et.al. [7].
It is fundamental to understand the production system, that is, how the production flow achieves certain objectives.
The production system responds to demand in different ways, with different supply lead times. Some companies produce for stock, others assemble to order, others are made-to-order and still others elaborate projects to order.
Regardless of how the company schedules the flow of materials, the PCP is of utmost importance in the organization's competitive advantage and it must be in tune with client needs.
Sacomano (2007) idealizes that today we can say the decision process has taken on new dimensions in business organizations. The responsiveness, agility and product customization, accompanied by an increasingly more sensitive market in terms of cost, quality, delivery time and flexibility, make it necessary to adopt a new position in face of the decision process, which must also be more agile and responsive than in PCP's previous phase.

Company networks

"Inter-organizational networks can be defined as complex structures comprised of companies that consciously admit to structural, financial and competitive limitations that restrict conditions for collective survival and development."[2].
In Figure 1, a supply network is presented that according to Harrison and Hoek [14] must be seen as a system. "All of the processes in the network must be understood in terms of how they interact with other processes. No organization is an island: their inputs and outputs are affected by the behavior of other network participants. A powerful participant can make life very difficult for all the others"[14].
Fusco and Sacomano [11] present a more encompassing proposition called a robust network that considers globalization and outsourcing issues, among others. It also provides greater knowledge of competencies present in the network. This would not only permit all partners to assess their relative position, but also to develop a way to evolve, creating shared competitive advantage for both.

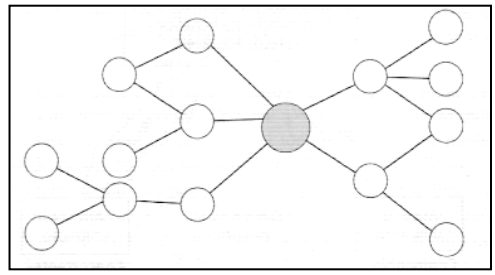

Figure 1 Supply Network. (Source: [7])

Fusco [12] proposes the model of simultaneous networks, comprised of a physical network that refers to the movement of goods and services between deliveries in contact between supplier and client, the value network that involves all companies and their activities aimed at creating value for the final consumer, and finally, the business network that permits companies to penetrate in new markets, researching the material, technological and financial feasibilities.
Christopher (2007) points out that organizations in networks are part of the evolution of and tendency towards outsourcing, which also involves several risks, especially the potential loss of control. Disruptions in supply can generally be attributed to failure in one of the links and in one of the links of the chain, and by definition, the more complex the supply network, the more links there will be, and therefore, the greater the risk for failure.
Thus the conceptualization of company networks came about to improve integration between the links in the supply chain and to know the knots in the system, attributing more attention to them. Besides proposing the elaboration of long-lasting, formal and flexible partnership contracts that could change according to demand, each company acts interdependently in the vertical process, from receiving raw materials to delivery to the client. This cooperation between company, client and supplier provides greater maximization of competencies by involving the exchange of technical knowledge and technology between them in the search for economic results.

Production Control and Planning in Company Networks

According to Chopra and Mendl [6] and the dissertation by Oliveira Neto [17], contemporary strategic thinking in operations is to focus on essential competencies and to outsource support activities. Support activities for company production are located in material and logistics areas. These concepts are explored in Oliveira Neto [17] and Santos [20].
PCP must program the production flow, which also has outsourced agents and the Logistics Operator gains room in the companies because he is a specialist in support activities.
Another fundamental factor for PCP involves material suppliers, which in reality are fundamental for the organization's competitive advantage. The promotion of partnerships and strategic alliances is vital for just-in-time supplying.

PCP's planning scenario or horizon changes at every moment, thus besides programming and controlling the internal flow it is necessary to also program and control the suppliers and Logistics Operator. The result of this complex programming and control is the servicing of several dependent companies called clients.

Organizations detain the specifications for their own business. Each company presents its mission, its values, its common objectives and its strategic vision. Management by process is fundamental for operational strategy and must be formulated with an emphasis on the organization's global strategy.

Management by process is successful when a preliminary analysis is carried out and robust operational strategies are laid out [19]. The company must know how to achieve the objectives and it must know the critical points for failure, as well as implement performance indicators for process control [17].

Rotondaro [19] defines process as a "sequence of organized activities that transform supplier inputs into outputs for clients, with added value generated by the unit." Rontondaro [19] also affirms that to manage by process means the optimal of all will prevail over the optimal of some since the most important is the process' result and not only the individual task.

Rotondaro [19] adds that process management attributes a vision of commitment to the entire supply chain through the interrelationship and simultaneity in orienting clients, in cooperation between teams, in sociocracy, in self-managed teams and in the propagation of learning. Characteristics of management by process:

- have performance indicators for internal and external clients;
- simplified procedures and reduced bureaucracy;
- establishment of a consensus in vision, direction and priorities of processes;
- breaking of barriers and regularity in information flow.

Dornier et al.[10] ensure that important logistics indicators for providing services are key tools for the control system, permitting coherent actions and decisions, guided towards the strategy.

Caixeta-Filho and Martins [4] affirm the performance indicators enable making assessments based on facts, data and quantitative information, which confers greater reliability to the conclusions.

Before implementing the performance indicators, Ballou [1] adds, the company must control the logistics effort because the parameters established over a period of time must be monitored. Control means administering by execution, that is, while the logistics system is producing the cost and service levels as planned, no action is necessary to adjust activities. The moment to act is determined by comparing measured performance with pre-established standards or goals.

Innovating state of the art, PCP is the heart of the company that programs the entire flow of products and services.

Figure 2 presents a proposal for a new Production Control and Planning in Networks architecture, referring to the modular consortium.

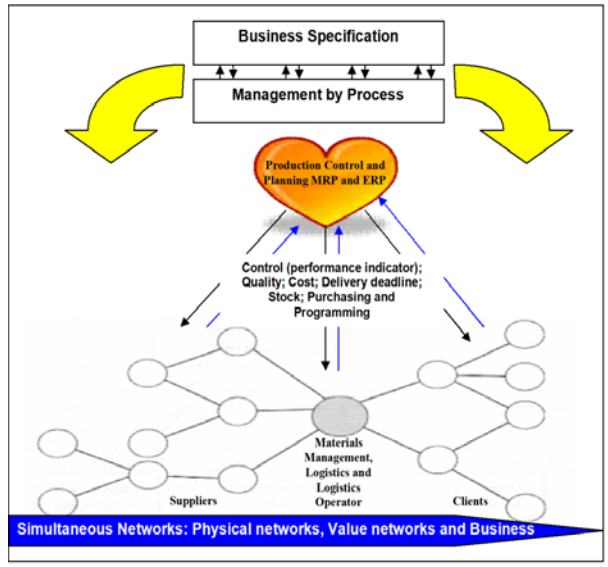

Figure 2 - Production Control and Planning in Company Networks (elaborated by the authors)

A fundamental element in manufacturing involves systems integrated by computer (MRP-Material Requirement Planning and ERP- Enterprise Resources Planning) and Just in Time (JIT) philosophies. According to Norman[16], the essence of MRP is to work with demand (the client) to determine materials and other requirements. As computer technology advanced, the growing potential for applying this broad-based planning concept began to appear, going from MRP to MRPII, and in the 1990s to ERP, which configures the era of integrated management systems.

At the Company PCP must meet the business' specifications and process products and services through management by process, optimizing aggregate planning. According to Gaither and Frazier [13], in this planning, operations managers must be in tune with the company's global strategy to develop long, mid and short term master production plans. These plans specify the quantity of labor, outsourcing, material needs from suppliers and the organization of an integrated logistics cycle to satisfy the production master plan.

In this article we call attention to the contemporary evolution over PCP practices in company Networks. Some topics justify this affirmation and corroborate the Production Planning in Manufacturing cited by Gaither and Faizer [13]:

- PCP programs the need for purchasing products and services from suppliers through long-term capacity planning where executives, such as the vice-president of operations, plan installations, plans for large partner suppliers and processing plans, constantly innovating in how the production system is organized, and researching new technologies.
- the PCP programs the Logistics Operator in the modular consortium, through operations managers, makes mid-term

plans to verify the quantity of labor needed to meet the master production plan, the quantity and value of stock and the modifications of installations and they sign material supply contracts and outsource integrating partners in the factory itself in case of need.

- PCP programs the resources needed to make a specific product model: for example, work hours, materials and components and production capacities. Factory operations managers thus develop the following timetables: production need, material purchase needs, machine preparation needs and lot movements and work force numbers.
- PCP programs material management for more traditional companies, making the links responsible for their delivery tasks, but without synchrony with the pushed-through production system generating high stock levels;
- PCP programs the more modern companies' integrated Logistics with integrated links and the single responsibility to "serve the client just-in-time" with small lots using the pulled-through production system for the client;
- PCP must comply with the production master plan and for such performance indicators are implemented that measure the service provided the client.

Ballou [1] stresses that it is necessary to measure the logistics performance offered the client to constitute a key element in developing logistics strategies to measure the order cycle from the moment it is requested to delivery in perfect conditions to the clients, generating statistics on order speed and reliability.

For Bowersox [3], basic service providing capacity is necessary through three fundamental service factors for the client:

Availability: corresponds to the capacity of having the product in stock when it is requested by the client, operational performance: which consists of logistics competence within the scope of the activity cycle in Material Management and reliability: maintain stock availability levels and planned operational performance.

PCP that is only limited in its internal borders in control, quality, cost, delivery deadline, stock, purchases and programming has a known output, and it can be seen in Figure 3 (traditional PCP).

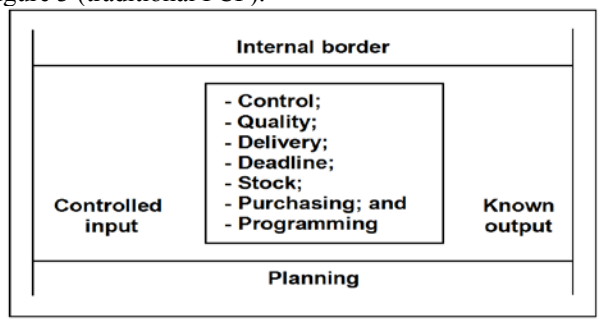

Figure 3 Traditional Production Control and Planning, limited to its internal borders (elaborated by the author).

Nowadays, companies are outsourcing support activities and obliging PCP to program and control company networks. Besides that, the focus is on the supply chain in an integrated manner, intensely concerned with the clients and in strategic partnerships with suppliers and OPL.

III. CASE STUDY

An on-site interview was made with the person responsible for Operational Logistics (OL) at a national vehicle industry located in the interior of São Paulo with 60 years of experience in the market. The company has 6800 employees and more than 720 outsourced employees (OPL) in production. The general objective is to investigate whether Production Control and Planning currently plans a company network and specifically report on the OPL as an integrating agent.

As soon as a schedule is established, the quantities to be produced are measured and a structure is created to meet the supposed demand that involves production capacity to produce the new product.

Planning is made by top management and the Operational Logistics team must get ready to carry out its functions. The greatest difficulty is when the two products meet, as shown in Figure 4. This intersection point proves two bodies cannot occupy the same space. It would be difficult to store the volume of parts and produce in single production platforms.

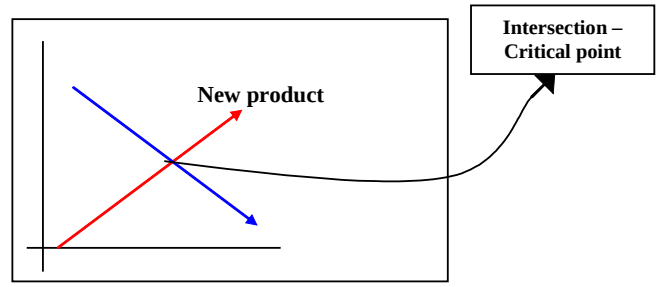

Figure 4 Planning the entry of a new product and the critical point for OL

At the transition moment, including the launch of a new product, the company develops a plan geared towards market surveys and product acceptance which is generally between the launch of the new product and the removal of the old product from the line. Based on these data and on prior experience, with the same characteristics, company expectations were for everything to work out as planned, but that did not happen.

The projection for August 2008 had to be extended to December 2008, and so the company had to produce two types of products until the extended date to meet just-in-time demand, focused on the space to put the number of needed parts for assembling these pieces.

Vollman and Cordon (1998) apud Pires [18] suggest other measures such as time to market, product obsolescence, final consumer complaints, damaged items, chain flexibility to meet changes in demand, return on assets, lost sales, transaction processing times, environmental variables, among others.

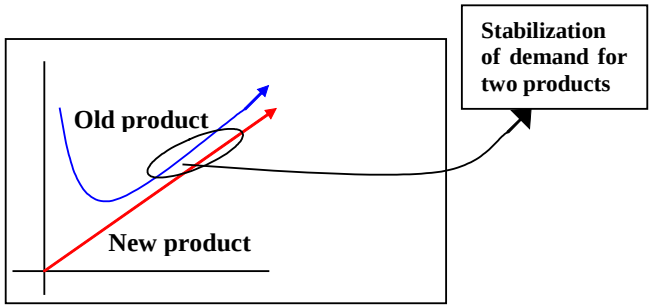

Figure 5 Stabilization of demand for both products

Pires [18] states it is necessary to observe the particularities of indicators to not make mistakes in assessing and measuring data. At present, chain flexibility to meet demand must be present in contracts between OPL and the contracting party.

The effects of such planning failures affect the entire network of companies that belong to the same supply chain, as well as the OPL, which was responsible for meeting the demand for products and services as planned when introducing the new product. Affected functions were:

- inventory control saw a 50% increase in stock value and there were consequently difficulties in storing parts due to a lack of space.
- PCP presented difficulty in programming a mix of 1200 automobiles per day;
- in the material arrangement sector, it became increasingly difficult every day to pull the supplier's parts and have them ready at the right moment, leading to part shortages on the production line. This occurred because the supplier first processed delivery schedules and then emergency schedules;
- the Operational Logistics area had no room for allocating parts after receiving. This jeopardized the organization of the work environment in production.

Another problem is that Operational Logistics lost control of OPL in programming, because there was it had a program available for a number of products that should have been processed on a single platform. The materials department arranged the items for producing an automobile that was not selling and the automobiles requested by the clients were receiving pending status. It is worth reporting that the schedule was based on marketing surveys and the market was still asking for the old automobile. This fact consecutively affected the company network's dependent clients.

The automobile manufacturer was facing a problem that jeopardized Material Management, outsourced production (OPL), all suppliers active in the network of companies and most especially the clients.

Data indicated that the greatest probability for these errors in PCP, which consequently affected suppliers and clients, was a failure in the market survey. According to Aaker (2004), it is easier to conduct a survey and generate information than understand the consequences of this information. Many companies with excellent experience in marketing research were unable to detect the real needs of consumers. For example, Coca-Cola conducted countless surveys before launching a product in the USA, New Coke. Studies revealed that the flavor of the new soft drink was better than before, but nevertheless, the launch was a failure because of strong emotional appeal, price and original brand loyalty.

This information justifies that PCP plan beyond its internal borders, program a network of companies that belong to the same supply chain with all the links concerned about serving the client just-in-time.

In the case study, this process involved meetings between the most affected areas (OL and OPL in production) that consecutively affected suppliers and clients. They realized clauses were missing in the contract signed between parties. This led to conflicts in interpretation, such as when the taking company requested a stop in schedule processing and to work on what the market requested, the OPL said it could not do so because by contract, they should make what was scheduled, 15 days in advance. Thus, they could not meet this demand because the production line had doubled and thus there was a lack of people and physical space.

Besides that, the Controller sector, whose objective is to elaborate a contract with all possible criteria so the OPL has flexibility, lacked precisely the criteria of flexibility, because up to then the automobile company had always processed in large, continuous production lots without the need for stopping the line to process two types of products.

So the clause used by the company was that the OPL had to process what was planned, 15 days in advance, and it clearly stated the OPL needed this time to keep the capacity to serve any demand.

The Controller had to develop a new contract with the criteria – flexibility in meeting demand. Implementation of this criterion is for the OPL to meet market seasonalities; however the taking company was only able to place the criterion at contract expiration.

The lack of appropriate criteria to bind the OPL in strategic decisions and market seasonalities affects the entire supply chain and jeopardizes the formation of strategic alliances in company networks.

The contracting company recognized the limitations and lack of knowledge in criteria for contracting the OPL and seeks to always "put out fires" when necessary and add amendments to new service conditions.

Pires [18] identifies that companies use the indicators erroneously as a means to diagnose problems rather than implement it as a tool at the service of strategic objectives. It also states that companies must establish internal performance indicators that consider all particularities involved in the process, including the registry of solved problems.

According to the interviewed company, the performance indicator must be reformulated because it deals with macro aspects and forgets to document causes and reasons as well as why goals were not met. Also, the interviewed company alleges much is done and little recorded, which demonstrates

the current failures in Operational Logistics (OL) for being short-term and unable to measure everything done.
A set of individual indicators is currently being tested that considers these particularities in order to measure and record all resolved occurrences with the objective of verifying whether these activities jeopardize global indicators (line supply; line permanence and transfer of bodies to another plant) and also to help assess employee performance.
Operational Logistics considers this measure of utmost importance and believes it should improve aspects related to data for measuring.
The indicators are developed using contractual criteria promoted by the Controller area.
Some problems that affect the relation between OPL and the researched company that justify development of more specific performance indicators:
a) New traffic laws: Example: OPL is able to process 400 trucks per day, so it must receive 400 trucks per day. But, due to delivery delays, especially due to new traffic laws, the plant receives 200 trucks one day and 600 the next. OPL is unable to meet this quantity. Regardless of the effort, it cannot meet this flow.
Operational Logistics has the role to make adaptation and make things happen. It must continue to receive the truck in 1.5 hour, must supply superior seasonality, cannot allow parts to be in shortage on the line, and it is charged by the whip effect that jeopardizes the entire chain.
b) Erroneous planning by management based on market survey: The Controller area is responsible for elaborating a contract that firmly binds the relation between the OPL and the auto company, but it cannot guess everything the market asks. However, top management alleges the Controller area must have a vision of the future and prepare the OPL to meet peak demand as mush as possible.
A classic example is the cost of inventory, which cannot exceed R$ 105,000,000.00 per month. The sectors involved in this goal are: PCP, layout of materials and inventory control. These sectors must align (volume X money X stock management), but what to do when there are seasonal changes in market X a projection elaborated by management? The result must be met by OLP.
As time goes by it is necessary to reformulate the contract to find the best way to bind the process so both parties know their obligations and rights.

Increase in storage costs due to the failure

According to Pozo (2008), storage cost has a very important role in global management of the organization. It is necessary to accompany possible failures in demand projections for stock maintenance so stock values do not get too high. In order to better administer stock, it is necessary to calculate which costs they affect. He adds that the factors that comprise storage costs are building costs, equipment and maintenance costs, material costs and personnel costs.
The failure of the market survey that projected an initial forecast of 50,000 cars in November 2008 to supply the dealers throughout market segmentation resulted in excess storage costs mainly because in December 2008 only 24,000 cars were sold.
The Production Master Plan executed by Production Control and Planning at the manufacturer that programs production capacity to meet demand elaborates schedules for the entire downstream supplier network, from car part suppliers to tools in general. For such, it considers several factors, including: people involved in the operation, movement equipment and cargo packaging and the physical space for processing the cars.
One aspect that deserves attention is the presence of OPL in the plant responsible for everything from receiving, stocking, separation from the assembly line to automobile production. In order to comply with the Master Plan schedule it is necessary to have more people to support demand. The contracting company met with OPL to add an amendment to the contract so the outsourced agent (OPL) commits to meeting market flexibility.
This way, the OPL, which used 680 people, added 40 more, for a total of 720 people for the logistics cycle to meet car production demand. The average salary per person is R$ 1,170.00, with benefits. According to POZO (2008), the total monthly cost for labor involved in handling, control and management, including labor contributions, reached R$ 842,400.00.
The cost of movement and lifting equipment totaled, already including R$ 350,000.00 in depreciation (10 gas-driven forklifts, average of 3 years of use, and 10 overhead cranes, average of 5 years of use). Through the Strategic Plan focused on meeting the Master Plan for production, 3 more gas-driven forklifts and 3 more overhead cranes were purchased, totaling R$ 150,000.00. Therefore, movement equipment costs totaled R$ 500,000.00.
Due to the actual market need for only 24,000 vehicles, the materials made available to meet the master plan underutilized the physical space for stock that consequently increased inventory costs.
According to Pozo (2008), inventory or material costs consist of the real value of all materials at the company, idle or being used, comprised of raw material, auxiliary material, maintenance material, office material, material in process and finished products. At the studied plant, the average for this cost was R$ 2,000,000.00/month, but after considering costs for physical space and storage, this jumped to R$ 5,000,000.00/month.
In November, the car manufacturer presented total inventory, or material, costs of R$ 125,000,000.00 - capital idle at the plant. Total storage capacity at the plant is R$ 5,000,000.00, leading to a big problem: where to put the parts equivalent to a total cost of R$ 120,000,000.00 since the space was underutilized at the car manufacturer, causing their obsolescence?
The manufacturer decided to rent 7 large tents with a total of 8,700 square meters, at a cost of R$ 10.25 per square meter, totaling R$ 89,175.00. This sum was accounted for in

building costs, which according to Pozo (2008), corresponds to the rented space for storage.

Table 1 shows the financial expenses for calculating storage cost.

Storage Costs	Normal financial expenses	Financial expenses exceeded with the failure	Total financial expenses
Cost of personnel involved	R$ 795,600.00	R$ 46,800.00	R$ 842,400.00
Cost of maintenance and equipment	R$ 350,000.00	R$ 150,000.00	R$ 500,000.00
Cost of Materials	R$ 5,000,000.00	R$ 120,000,000.00	R$ 125,000,000.00
Building costs	R$ 0	R$ 89,175.00	R$ 89,175.00
Interest rate for the period		22%	
Storage period		1 month	

Table 1 – Statement of financial expenses for calculating storage cost

According to Pozo (2008), storage cost is an important tool to assess the organization's integrated management and how much it is losing with capital idle in stock and excessive costs with personnel, equipment and buildings. The interest rate during the storage period must also be taken into account. In summary, storage cost becomes the financial cost involved in the system.

Below we show the normal storage costs and then total storage costs in order to identify the sum, in values, of the loss related to the market survey failure that jeopardized downstream storage costs.

- Normal storage costs:

CA = {[(Q: 2) P] + DF}T x i

CA = {[(5,000,000.00: 2) P] + (R$ 5,000,000.00 + R$ 46,800.00 + R$ 150,000.00)}1 x 0.22

CA= {R$ 2,500,000.00 + R$ 5,000,000.00 + R$ 46,800.00 + R$ 150,000.00}1 x 0.22

CA= R$ 7,698,800.00 x 1 x 0.22

CA = R$ 1,693,296.00

Normal storage cost for stock equals R$ 1,693,296.00.

- Total storage costs take the failure into account:

CA = {[(Q: 2) P] + DF}T x i

CA = {[(125,000,000.00: 2) P] + (R$ 125,000,000.00 + R$ 842,400.00 + R$ 500,000.00 + R$ 89,175.00)}1 x 0.22

CA= {R$ 62,500,000.00 + R$ 125,000,000.00 + R$ 842,400.00 + R$ 500,000.00 + R$ 89,175.00}1 x 0.22

CA= R$ 188,931,575.00 x 1 x 0.22

CA = R$ 41,564,947.00

Total storage costs taking the failure into account are R$ 41,564,947.00.

In Table 2 observe the difference between normal storage cost and storage cost in November 2008:

Total Storage Cost (CA) before NOV-08	Total Storage Cost (CA) in NOV-08	CA before NOV-08 (–) CA in NOV-08
CA = R$ 1,693,296.00	CA = R$ 41,564,947.00	CA = R$ 39,871,651.00

Table 2 – Comparison between CA before NOV-08 and CA in NOV-08 considering the failure in November 2008.

IV. CONCLUSION

Nowadays, with the insertion of logistics operators and dependence on material suppliers, the Production Control and Planning area does not only plan according to internal borders. A program begins a purchase need that requests the needed materials from suppliers.

Thus, a work order is issued through the production master plan for production that in this specific case processes products and services through the OPL, but that depending on the company, may be in different areas, participating in the supply chain, which has the objective of customer satisfaction.

The importance of flexibility in meeting demand is underscored. Today, PCP elaborates the production master plan and according to Gaither and Frazier [13] uses the PCP system that best satisfies its need with the objective of providing the resources needed to produce specific products.

Some traditional companies focused on material management use the push through system, other use the production system to meet market seasonality in a pull through manner, as per client needs. But it is important to underscore that a production system will be more efficient and effective when it is able to synchronize going from strategies to tactics and from tactics to production operations and sales of requested products.[21].

This case study also calls attention to the contract process in the complex relationship between the contracting company and OPL and the need to implement detailed performance indicators that precisely reflect the failures to find and implement corrective actions. This paper verified the failure initiated by a market survey that was approved by top management and sent to PCP for the downstream programming of the materials needed for the expected projection.

The result jeopardized the monetary value between normal storage cost and storage cost in November 2008 of R$ 39,871,651.00, Materials Management, OPL, suppliers and clients, but on the other hand, for this case, it justified Production Control and Planning (PCP) to strategically go beyond the company's internal borders, with the OPL and materials suppliers, thus forming a network of simultaneously interconnected companies.

References

Please contact the author to get the reference lists.