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02

General Motors Brazil service part business

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General Motors Brazil service part business

"Ok, folks, coffee break time!".

The announcement broke the silence in the audience part of the auditorium and the 30 principals and owners of 30 of the most important Brazilian GM Chevrolet dealers stood up and headed to the next room where a neatly set up finger menu table waited. That was the ten o'clock break of the first day of a series of seminars scheduled to inform and get the commitment of the dealers to the new AutoGIRO program, a revolutionary new service parts management systems which had been carefully developed by the GM Brazil team during the past 2 years. After 75 years of a well established relationship between GM Brazil and its dealers in which they were relatively independent in their management practices, GM was proposing a new system in which GM would start managing the service part inventories of the dealers and replenish items automatically. Denio Nogueira Jr., the AutoGIRO project manager had decided that before starting implementing the program, it would be necessary to gain commitment of the dealers. As one initiative, he hired a University professor to run a series of one-day seminars to go through, in the morning, the concepts of inventory management and supply chain management in a language business men could grasp; in the afternoon, revisiting points discussed in the morning, the professor and Denio himself would describe the details of the AutoGIRO logic, rationale and economic justification from the standpoint of the dealers. So far, everything seemed to be going smooth – the audience seemed very interested although the themes dealt with were somewhat technical. The professor was having his first sip when the owner of one of the largest GM dealers in São Paulo approached him and started to chat about the seminar. Denio watched the scene from a certain distance and liked what he was seeing – this seemed to be a sign of interest of one of the most important opinion leaders in the group. The businessman went on:

- Professor, this seminar has been very interesting, you are touching very relevant points, the forecast of the demand, the management of inventories…

The professor was happy to hear that, since very few questions and comments had been made during the first part of that morning: - Thank you, and please feel free to address any questions and make any comments for they will be very useful to the whole group. The entrepreneur went on: - And it was a good thing that GM decided to invite someone from the "external world" to address us… The professor was increasingly enthusiastic with the chat: - Yes, they found it would be appropriate to have someone not directly involved with any of the parties speaking about this new project. The following comment of the dealer owner showed the professor that maybe things would not be so easy as they seemed to that point. He said: - You know, whenever we are invited to a GM-sponsored seminar like this, we are always sure of two things. – And what are those?, the professor asked already hoping to hear some sort of compliment about the quality of the speech or something like that… The executive answered, with a considerable dose of sarcasm: - The first one is that we will have wonderful coffee breaks; the second is that GM will screw us up once again; by the way, since you are not part of GM, could you please tell me in advance when and how they will screw us up this time so that at least I am not taken by surprise????

The professor started to have a real grasp about the complexities of the long lasting somewhat conflicting love-hate relationship between GM Brazil and its dealers and started to understand that changing drastically the management model of that supply chain would take much more than good ideas and good information systems. Indeed the task ahead of Denio Nogueira was both challenging and difficult – and it was only starting…

GM Brazil

General Motors Brazil started operations on the 26th of January 1925 assembling 25 CKD vehicles per day, with kits imported from the USA, in rented premises. At the end of the XXth

Century, 75 tears later, GM has four large industrial complexes in Brazil producing light and light commercial vehicles: one in São Caetano do Sul, surroundings of São Paulo, one in São José dos Campos, between the cities of São Paulo and Rio one in Gravataí, in the Southern Region and one in Mogi das Cruzes, nearby the city of São Paulo, specifically producing pressed panels for the after sales market.

Year	Production (cars)	Brazilian Internal sales (cars)	Production (light commercials)	Internal sales (light commercials)
1990	164,198	140,170	35,481	27,443
1991	162,012	143,575	31,064	26,616
1992	173,333	148,293	38,273	27,025
1993	236,900	217,867	35,714	35,438
1994	250,680	234,118	36,152	33,353
1995	290,332	296,460	51,904	50,468
1996	356,711	308,710	86,104	73,780
1997	404,842	331,432	100,258	74,733
1998	336,688	284,195	75,616	56,632
1999	286,242	239,180	47,723	36,616

Table 1 – Production and internal sales (units) of light and light commercial vehicles – GM Brazil (ANFAVEA, 2000 http://www.anfavea.com.br)

The service parts business

The service parts business is increasingly important to GM on at least two accounts: firstly it is a profitable business. Although GM Brazil overall income is around US$ 3.2 billion a year of which only around US$ 250 million relating to service parts, the margins for services are much larger. The automotive market in Brazil is largely dominated by the so called "popular" compact cars, powered with 1.000 cc engines (which benefit from tax incentives from the Brazilian government) and representing 61.9% of all cars sold in Brazil in 1999. Normally they bring low contribution margins to the assemblers, among other things for the fierce competition for the Brazilian market that started in 1990 when the Brazilian government started to open up the market for both imported cars (reducing substantially the import taxes) and foreign companies who wanted to start up plants in Brazil. Before 1990 only Ford, GM, Fiat and Volkswagen were assembling large volumes of cars in Brazil. By the year 2.000, besides the 4 pioneers who had also built new plants in Brazil in the ´90s, Peugeot Citroën, Renault, Mercedes-Benz, Chrysler, Honda, Toyota, Land Rover, Audi, only to mention a few, had major manufacturing operations already established (or in late stages of completion) in the Country. More than US$ 13 billion were invested by all the automotive industry players in Brazil in the ´90s alone (see http://www.anfavea.com.br for more information on the Brazilian automotive industry).

Secondly, the service parts business has serious strategic implications for the new car business because it can affect the level of serviceability (mostly in time – speed and dependability) and price of the car maintenance during its economic life and therefore the very attractiveness of the car from the point of view of the prospective new car buyer.

Both reasons encouraged GM to rethink the way they were doing business with their main partners downstream in the supply chain: the dealers.

The GM dealership in Brazil

There are 472 GM dealers, 9 GM authorized garages and 10 GM parts distributors in Brazil summing up 491 service parts points of sale (p.o.s.). GM has 650 employees allocated to the

service part operation in Brazil, 3 distribution centers all located in the Southeastern state of São Paulo, a total of around 75,000 part numbers, being 700 high turnover parts. 20 vehicle platforms are supported by this operation.

The relationship between GM and the GM dealers have always been somewhat independent. Consistently with most supply networks, the nodes of the network were managed separetely, favoring the zero-sum game – in other words, in many situations for one business partner to gain in a negotiation, the other partner had to lose. This led to a less than cooperative relationship and the independence in the management systems led to undesirable effects such as the bullwhip effect in which small variations in demand downstream cause increasingly large variations towards the upstream portion of the network. Imagine for instance the supply network represented in Figure 1. Even if the demand downstream, given by the rate at which the end customer buys from the dealer, is reasonably stable, per item, the demand perceived by GM (the assembler) distribution center is dependent on the inventory management systems and inventory policies of the dealers. Considering each item, if reorder point policies are used, dealer systems will use EOQ-type logic to benefit from scale economies in the logistics costs between themselves and the distribution center. This means that they wait until the reorder points are reached and then they issue replenishment orders (economic order quantities). This means that the well behaved demand of the end user becomes, one tier upstream, a lumpy demand in which zero demand is perceived between replenishments and a lump of demand is perceived when replenishments are due. Now think about 483 p.o.s. with their inventory management systems issuing replenishment orders at independently defined moments, of independently defined quantities and you will soon notice that the demand that the distribution center perceives bullwhips in an almost random way. Now consider that the distribution center has its own inventory management systems with independently defined inventory policies and parameters and you will see the bullwhip effect being passed on with an amplified intensity to the suppliers, suppliers´s suppliers and so on. Because the amplified effect is random, what normally happens is players increase their safety stock levels.

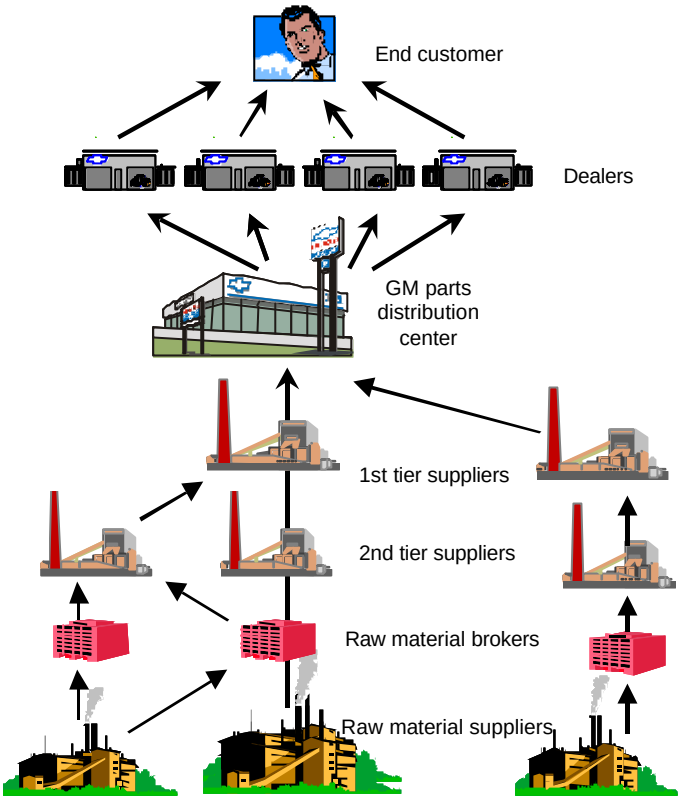


Figure 1 – Representation of the GM service parts supply chain

Slack et al. (1996) show an illustration of the bullwhip effect in a very simple manner: let us imagine that we have the following supply chain:

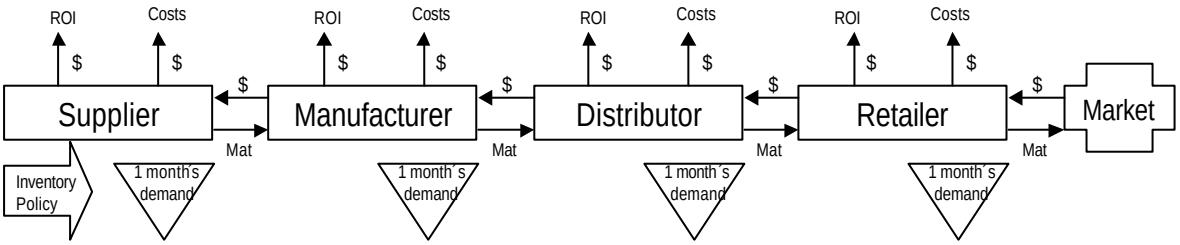


Figure 2 – An illustration of one fictitious supply chain

Quite similarly to the GM service parts supply chain, there is a flow of material moving from left to right and a flow of money flowing from right to left. Notice that each player takes some of the money they receive from the sales of the materials to pay their costs, payback the invested capital and passes on the rest, to pay the immediate supplier for the supplied material. The exception is the end customer (represented by the box "Market") who actually does not get any payment for the goods bought – therefore he/she is the sole "money feeder" of the chain. Consider for the sake of simplicity that every player who is a stockholder has an inventory policy which is to start the month with the equivalent of one month of demand in inventory. Let us also suppose that the market demand for the last months has been 100 units, stable, up to month 1. From month 2 on, there will be a slight change in the market demand which will turn 95, again monthly and stable. Follow what happens with the demand perceived by each of the players upstream in Table 2:

Month	Supplier		Manufacturer		Distributor		Retailer		Market
	Productio	Begin	Productio	Begin	Purchase	Begin	Purchase	Begin	Demand

	n	inv End inv	n	inv End inv		inv End inv		inv End inv	
1	100	100 100	100	100 100	100	100 100	100	100 100	100
2	20	100 60	60	100 80	80	100 90	90	100 95	95
3	180	60 120	120	80 100	100	90 95	95	95 95	95
4	60	120 90	90	100 95	95	95 95	95	95 95	95
5	100	90 95	95	95 95	95	95 95	95	95 95	95
6	95	95 95	95	95 95	95	95 95	95	95 95	95

Table 2 – Illustration of the bullwhip effect in one fictitious supply chain (Slack et al., 1996)

Rows in Table 1 represent months; columns represent the nodes in the supply chain. For each of the nodes and each of the months, the variation in inventory levels (beginning inventory and end inventory) resulting of the application of the inventory policies and the produced / purchased quantities are shown.

In month 1, all players are keeping one month of demand in inventory (100 units) and acquiring 100 units. When the market demand falls slightly to 95 in month 2, the retailer seeks to adjust his/her inventory to conform to his/her inventory policy – to start the month with 1 month´s demand in inventory. So he/she acquires only 90 units which is the demand perceived by the distributor in month 2. Same thinking mechanism applies and the players upstream see the amplitude of the variation growing larger and larger. Next month the opposite applies and the whip is now downwards. Graphically the effect can be seen in Figure 3. Although fictitious, the situation described in this illustration reflects what happens in reality with the GM supply chain. The result is severe instability in production programs in the companies upstream negatively affecting cost efficiencies in the chain, with plants having to work overtime when the whip goes up and having to face idleness when the whip goes down. This takes costs up which at the end of the day is paid for by the sole money feeder in the chain – the end customer. All these inefficiencies sum up (see Figure 2) to the final price of the part. No surprise to find out that an original part bought from a dealers counter sometimes cost something between 50% and 100% more than a similar part bought from the so called grey market (parts sold direct from the part manufacturer bearing its own brand name and not GM´s). This difference in price is at least partially responsible for the relatively low (estimated by GM to be around 30%) market share of GM original parts (bearing GM´s brand name) when compared to the overall market for GM service parts.

Needless to say that dealers complain tremendously at least in two accounts: firstly they consider that GM original parts are not price-competitive. And second, they complain that to become minimally competitive, they are forced to work with very low margins what jeopardizes their return on investment.

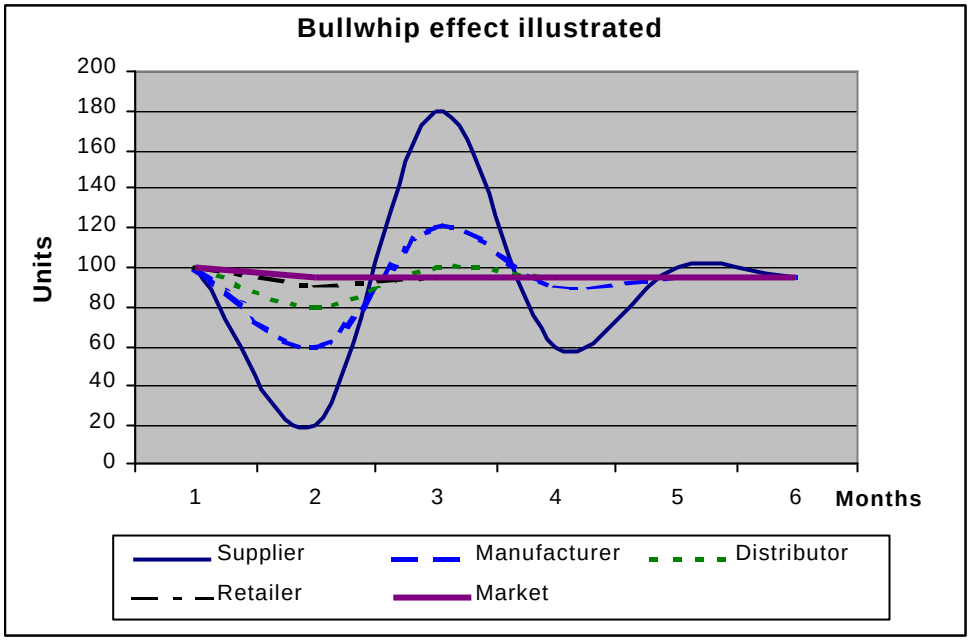


Figure 3 – Graphical illustration of the bullwhip effect in one fictitious supply chain

To make the problem even worse, another effect of the zero-sum relationship can be seen in another aspect of the commercial relationship GM – dealers. GM commercial department set monthly purchase targets for the dealers based on past purchases. This means that the dealer, based on past history has to purchase a certain amount of dollar volume in order to be entitled to a bonus – cash paid in the dealers current account. The following situation is then usual: by end of the month, GM sales executives start phoning dealers to remind them that they are still to achieve the purchase target. Fearing to lose the bonus, dealers would purchase enough to achieve the quota regardless whether the purchased parts were more or less sellable. The result of this push-type relationship acting for years and years was that parts were bought, many of them not to be sold anymore: in 1999, GM considered that between 30 and 40% of the Brazilian GM dealers inventories are obsolete. That means items without any sale for more than 12 months – statistically, GM managers know that the probability that a part is sold after 12 months without any sale is very low. This means that a medium sized dealer, who holds around US$ 500 thousand in service parts inventory has something between US$ 150 thousand and US$ 200 thousand of their working capital virtually unusable, with self-evident negative implications for cash flow management. This on its turn forces GM to increase payment periods, putting financial strain on the whole chain (in an economy with the second highest interest rate in the world – Brazil in the end of the 90´s).

Changing the way GM does business in the service part market

The idea of changing the way GM did business in the service part market started in 1994 when a GM Brazil director, Steve Koch, of after sales got interested in introducing the concept of automatic replenishment in Brazil. Steve took a group of GM dealership owners who were opinion leaders (they were board members of the Brazilian association of GM Chevrolet dealers - ABRAC) to a business tour in the USA for them to see companies who were already using the concept. The director already knew the system and he was convinced that it could work in Brazil but he wanted to get the commitment of the opinion leaders who, he knew, would have a very important role in convincing the universe of dealers if the system was to be adopted. Companies visited included Saturn, a then recently launched GM division conceived, among other things, to be a GM laboratory for innovative management practices. Very successful, mainly in their first years, Saturn had innovated drastically the relationship with suppliers, with Unions, and with dealers – they implemented VMI (acronym standing for vendor managed inventory), a concept according to which the dealers inventories are managed

by the vendor (Saturn). They also implemented the concept of automatic replenishment, with frequent deliveries, in some situations, of just the right quantities of the parts sold the 3 days before. They had achieved very high levels of parts availability (94%) and customer satisfaction what impressed the visitors. However, Saturn had been built from a blank sheet of paper. A brand new set of entrepreneurs who had accepted all the rules and regulations to be granted a dealership, free of a legacy of historical love-hate relations were certainly easier to deal with than a group of almost 500 Brazilian dealers with established practices and perceptions regarding GM. One of the examples to illustrate the point was the issue of the inventory management systems. Saturn dealers had all agreed to adopt Saturn system, things worked almost as if they had Saturn inventory systems terminals in their premises – they all communicated easily. The communication infrastructure were built from scratch with state of the art equipment and links. A very different situation could be found in Brazil – more than 120 different (usually incompatible) inventory management systems among the dealers, poor communication infrastructure, a somewhat heavy legacy.

Once the visitors came back with a preliminary approval of the new initiative, GM soon noticed that the poor telecommunication infrastructure would be a millstone for the whole project. They decided to launch the Satellite project, made explicit in the 8th Partial Brand Convention (a document which regulates the relationship between GM and the dealers) – to sort out infrastructure and communications to support the project. Unfortunately, the Satellite project came to a halt some months after it was launched, to cut costs. What had already been done only allowed for the partial exchange of information between dealers and GM and this was insufficient for the VMI / AR (vendor managed inventory / automatic replenishment) idea.

It was not before March 1997 that GM Brazil started to talk about the project again. A group of GM executives realized a series of international visits to companies who adopted similar ideas between 1997 and 1998 (Nissan Infinity, GM Saturn, among others) and started to generate ideas which were consolidated in a "business case", presented to the board of directors in the mid 1998. The business case was very clear: any initiative towards VMI / AR would have to be preceded by the sorting out of two basic issues: information technology and telecommunication infrastructure and, logistics. Reliability of the intense information flows and intense material flows which would result would be a "sine qua non" condition. See Figure 4 – 491 points of sales scattered around 5 million km^2 requiring reliable deliveries, with most transportation done by roads which are not always in good condition.

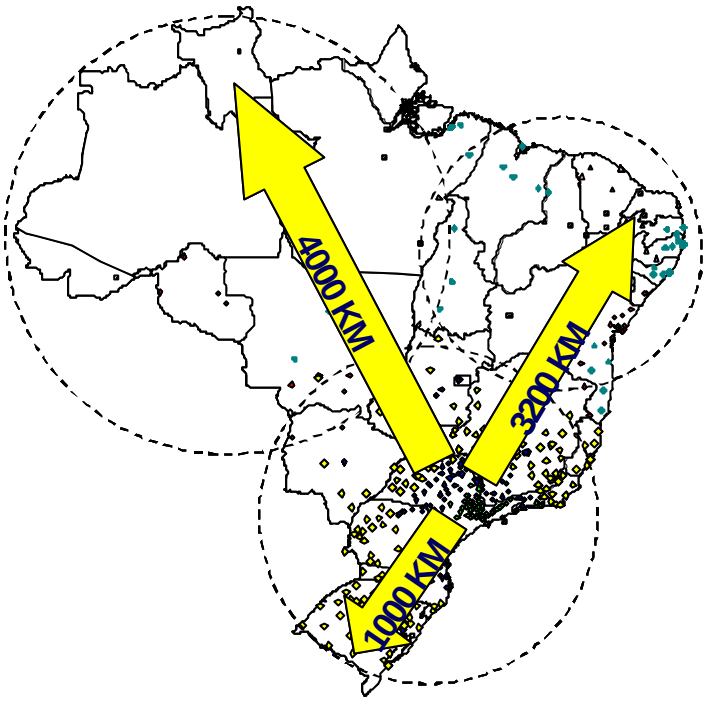


Figure 4 – 491 points of sale (dealers, distributors and authorized garages) scattered around Brazil.

For the whole project, an overall investment of US$10 million with savings of US$2 million per year for the supply network – in reduced safety stock levels (as a result of better forecast systems), reduced bullwhip effect in the plants upstream, reduced cycle stocks in the the dealers and costs in emergency transportation (as a result of more frequent replenishment and better planned inventory), reduced obsolescence costs (only parts with high probability of sales are replenished), reduced lost sales, let alone the possibility of becoming more price competitive – some of the savings mentioned previously would be passed on to end users.

The board approved the business plan, not only the part regarding IT and telecommunication infrastructure, but also the transportation logistics. The IT and Telecom initiative was called the GM Connect project. In order to fund it, GM and the Dealers' Association have created a fund . GM would pay 75% of the investment and the dealers would pay 25%.The IT and communications infrastructure was commissioned to EDS (a company formerly part of the GM group). The Emery Worldwide Global Logistics was chosen to provide the carriers management.

In parallel, from 1998 on, in the GM Corporation a movement started to gain momentum: that of using the successful Saturn experience with after sales to spread the practices of VMI / AR to other GM divisions around the world. This was part of a GM worldwide strategic move to aggregate more value to the after sale customer experience, aiming at increasing customer loyalty to the GM brand. Following this trend, besides GM Brazil, another GM division who showed explicitly interest in implementing a VMI / AR system was the Swedish SAAB. The GM information technology corporate director, aware of the interest of the two divisions and believing in the benefits of VMI / AR supported the two divisions initiative with the Corporate board in Detroit. A joint project them was born. GM Brazil and SAAB would join efforts and resources to develop a VMI / AR system. A world bid was done and 5 companies were invited to present proposals. Three out of the 5 companies presented proposals to develop the system: IBM, EDS and the French Cap Gemini (through the Swedish branch). Cap Gemini won the contract.

The development costs would be shared between GM Brazil and SAAB.

The system started to be developed in Sweden in December 1998 and it took a year. Some Engineers from SAAB and from GM Brazil took part intensively in the development process with the support of an internal consultant who had taken part in the development of the Saturn VMI / AR system.

The AutoGIRO system: VMI / AR in GM Brazil service parts supply network

The VMI / AR system to be implemented was named AutoGIRO. The logic behind it is quite simple and can be explained by some of its principles:

1. *It is a VMI system: GM assumes the responsibility for the management of inventories of the dealers.*

VMI makes sense in this situation because GM, being the common denominator of the network, is the only player in the network who can actually see the aggregated demand of the almost 500 dealers. So, on top of forecasting the demand for the specific market served by each dealer – via projections of time series accumulated of each dealers sales respecting the particulars of each region, only GM is able to identify national patterns of demand and therefore enriching the demand forecast of each dealer with these national patterns. Since demand forecast is a great part of the task of managing inventories, GM assumes the responsibility for managing the inventories too.

VMI also makes sense in this situation because GM delivers thousands of different items (each dealer has around 6,000 active inventory items, of which around 2,500 are normally purchased within any month) to a defined and stable group of dealers. This means that economies of scale in logistics can be achieved if deliveries to several dealers share the transportation costs using milk-run type of routing in which one mode of transportation makes periodic and coordinated deliveries to a group of dealers. GM is the player who can coordinate these deliveries (even if it actually happens via the use of a logistics service provider, which is actually the case, with Emery).

This means that GM will suggest when, how many and what the dealers should buy. However, given the past relationship in which GM tried to maximize sales by pushing parts downstream in the chain it would be plausible that the dealers would resist the idea of GM managing their inventories. To overcome this resistance, GM grants:

2. *Protection against part obsolescence and parts stock out*

Dealers would fear that GM would push them parts to maximize sales and that these parts would become obsolete. To avoid that, AutoGIRO grants dealers who actually accept GM suggestions for parts replenishment that any part which becomes obsolete (more than 9 months without a sale) will be subject to "buyback" by GM for the maximum between the current price and the price the dealer purchased the part. This means that if GM overestimates the purchases, it assumes the costs of the mistake. The same way, if the dealer accepts the GM suggestion for the replenishment and runs out of a part, GM will ship the part in the fast track urgent delivery with no extra cost for the dealer. Before the AutoGIRO program, obsolete parts were dealers' problem and urgent deliveries would be charged high fees.

3. *Provision of an internet-based "parts locator"*

In order for GM to be able to manage the dealers inventories and provide automatic replenishment, they need to have very frequently updated information on the stock position of each stock item of each dealer (in a further section the information flows of AutoGIRO will be explained). GM makes this information available to the dealers – this means that in case of a stock out, a dealer with an urgency to serve a customer can browse in the internet

(extranet to be precise) and search for that part availability in a dealer nearby, getting the part in the same day (depending on the dealers location, even the fast track delivery might take 2 days).

4. Replenishment done twice, 3 times or 5 times a week depending of the dealers demand volume

Present reorder point systems used by dealers tend to treat items independently. Therefore the logic used is to "dilute" logistics costs by transporting a large number of units of each item – and this tends to take cycle inventories up (the average level of inventory which builds up as a function of the replenishment cycles – the less frequent the replenishment, the higher the cycle inventory). One of the most utilized systems actually limits the replenishments to a maximum of three times a month per part. This means that in the most favorable case, the replenishment will be of a quantity equivalent to 1/3 of the monthly demand. Average cycle inventory will therefore be 1/6 of the monthly demand. In the case of AutoGIRO, in which a part is possibly delivered daily, the replenishment will be of a quantity of around 1/20 of the monthly demand and the average cycle inventory will be around 1/40 of the monthly demand. Quite a reduction, made possible because AutoGIRO considers that the transportation cost does not have to be "diluted" by a large number of units of one item, but by a small number of units of a large number of different items. The system recognizes that different items will go from the same origin to the same destination, in a joint replenishment. Therefore this makes it possible that logistics costs do not sky rocket even with small replenishment lots per item. On top of the joint replenishment economies of scale per dealer, for each region, the dealers which will receive replenishment say on Mondays, Wednesdays and Fridays will be served by a common means of transportation, in a milk-run routing logic. This consolidation of loads help in keeping logistics costs down.

5. Periodic review inventory management system

To make it possible that the economies of scale in logistics are achieved, it is necessary that the replenishment for all items in need are done at regular intervals. This means that for this type of VMI, the system which is more applicable is the so called periodic review system. This system makes sure that the possible need for replenishment for all the items of a dealer is checked in a synchronized manner, periodically (AutoGIRO does it daily). Depending on the stock position of the item at the review point, a certain quantity is replenished. This quantity is calculated as the difference between a maximum pre-established level and the stock position as indicated in Figure 5, at each review time (Rn). A replenishment order is issued and a period equivalent to the transportation lead time (LT) after, the replenishment quantity (Qn) arrives. Note that in this system, the reviews are done at fixed intervals, but the quantities replenished vary.

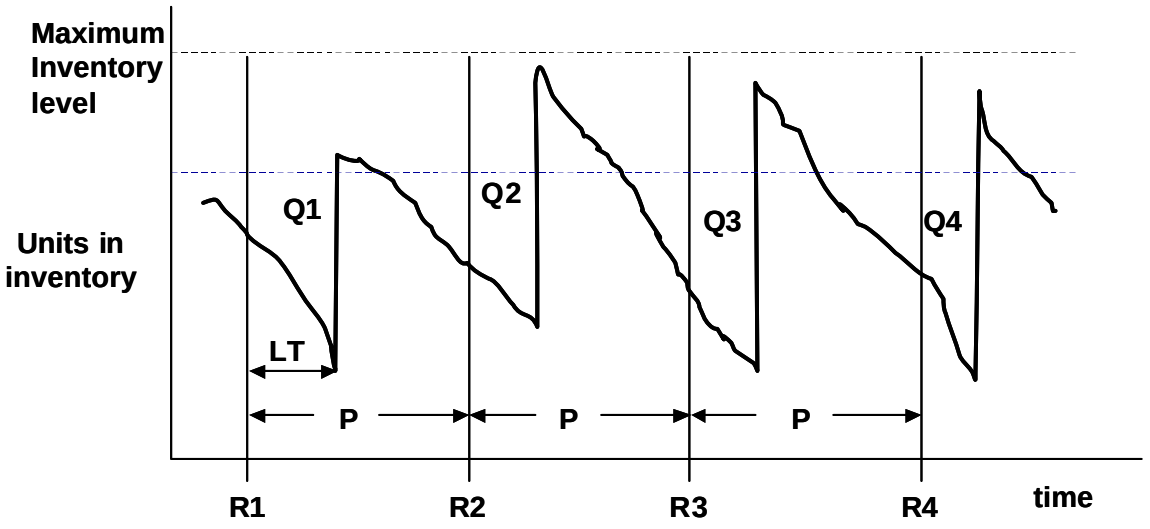


Figure 5 – Periodic review inventory management system used in the AutoGIRO system

Please see the AutoGIRO information and material flows in the diagram shown in Figure 6.

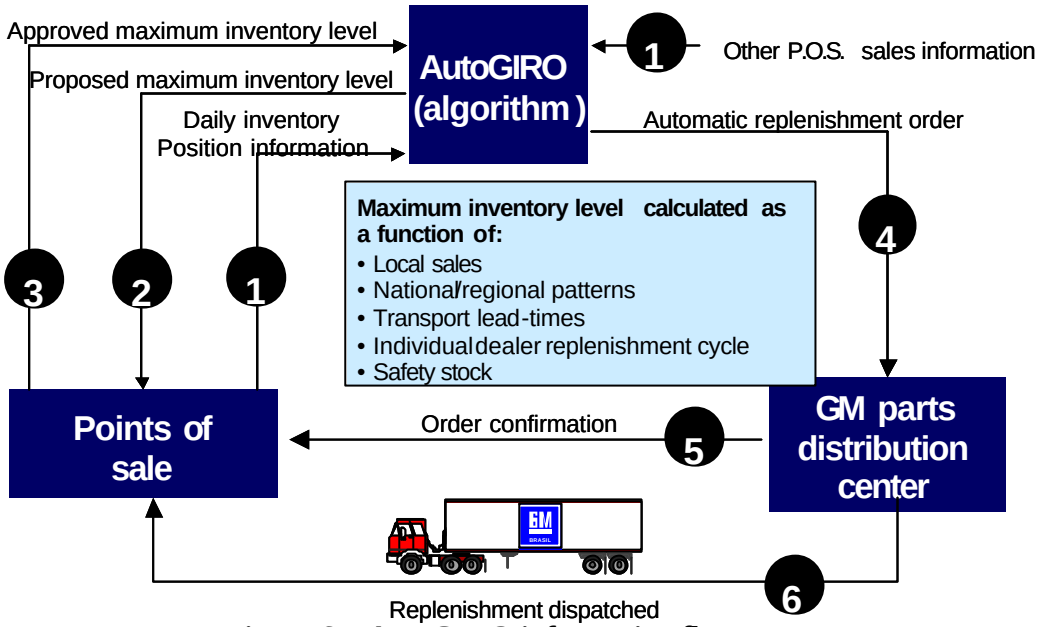


Figure 6 – AutoGIRO information flows

AutoGIRO: the mechanics of the information flow

Flow 1. Daily the points of sale have to send GM a file (via EDI – electronic data interchange) between 6PM and 10PM which contains information on: unit sales of the day per item (including lost sales because of possible stock outs, to make sure that sales potential is forecasted), inventory position at the end of the day, pending receipts of material (in transit) and allocations (parts which are in inventory but which are already reserved for, say, a next day repair of a car in the garage). The treated information will feed the time series, based on which the short term demand forecast per item per p.o.s. will be done. In parallel, GM also receives sales information of all other p.o.s. and treats this aggregated demand in order to enrich the individual SKU (stock keeping unit: associated with one particular item inventoried in one particular point of sale) demand forecast with possible national or regional patterns. Needless to say that the high quality (accuracy and timeliness) of the information generated and sent off by the dealers is an assumption of the system and is also the responsibility of the information generators. For it is impossible for the automated AutoGIRO system to control the quality of the information after receiving it. Needless also to say that the information generators (the sales clerk at the dealers counter not necessarily is someone who has the quality of the information generated as one of his/her current priority concerns. Denio Nogueira is particularly worried about this. He knows this can be a trap and bad quality data can quickly ruin the system´s credibility.

Flows 2 and 3. Once a week, normally on Monday morning, AutoGIRO re-calculates the demand forecast (for the next week) and based on the new demand forecast, re-calculates for each SKU, the (possible) new proposed Maximum level of inventory (see Figure 5). The list of

new Maximum levels of inventory for the whole set of items of each point of sale is made available in the extranet. The parts manager of each point of sale then analyses the new proposed Maximum inventory level on Monday morning and has the chance either to approve it or to alter it according to his qualitative analysis of the next week´s demand. One possible situation to illustrate this is a promotion that the parts manager intends to do. Obviously he expects an increase in demand, but this increase in demand could not be captured by the quantitative methods (a modified form of moving average) used by AutoGIRO. Once the parts manager informs AutoGIRO the approved and/or modified Maximum levels for the items, those are the Maximum inventory levels that start to be valid and which will be used by AutoGIRO to calculate the automatic replenishments daily.

Flows 1 and 4. During the week, AutoGIRO receives the inventory position daily and calculates the difference between the currently agreed Maximum level of inventory and stock position and automatically sends information to the GM distribution center informing about the quantities to dispatch to each point of sale.

Flow 5. GM distribution center sends an advance notice to the point of sale announcing that a dispatch is on its way and informing the quantities.

Flow 6. Logistics are sorted out (picking, packing, identifying) and dispatch is realized using the appropriate milk runs, according to the frequencies (twice a week, three times a week or daily) defined by the demand volume of the point of sale.

As the "Maximum levels of inventory" are actually low and the replenishment is done quite frequently, many points of sale are sent daily the amount of items sold the day before, characterizing a daily automatic replenishment system.

The expected advantages of the AutoGIRO program

General Motors Brazil expects a lot from tha AutoGIRO system.

Because it improves the demand forecast accuracy (for three reasons: better projection models are used than the current ones used by the points of sales, more careful treatment of the time series e.g. the consideration of the lost sales and, the recognition of aggregated patterns of demand, such as national or regional trends), GM expects a drastic reduction in the levels of safety stocks needed at the point of sales and in other nodes of the supply network and simultaneously expects an increase in the parts availability at the points of sale counters

Another aspect of AutoGIRO expected to help increase the availability of parts is the "parts locator". At Saturn, the parts locator is responsible for a whole extra percentage point in the availability. They have 94% immediate availability at the counter and 95% same day availability (parts located by the *parts locator*)

Because of the much higher frequency of replenishment, cycle stocks are also expected to fall drastically at the points of sale. See in Appendix 1 one result of a simulation study developed to compare the performance of two systems: one of the current ones used by dealers and AutoGIRO, dealing with the same real demand for different inventory items (Appendix 1 brings the results related to radiator fluid, a high turnover part). The graph gives a good idea of the difference in inventory level profiles at the dealer during the simulated period.

AutoGIRO coordinates supply and demand at the point of sale, reducing the bullwhip effect upstream in the network. Therefore, safety stocks in the inventory points upstream in the network are expected to fall and plants upstream in the network are

expected to have their production programs more stable, therefore with reduced costs of program changes, idleness and overtime caused previously by the whipping of the demand perceived upstream.

Because there will be a team in GM of well trained analysts dedicated to continuously improve AutoGIRO, every improvement in the algorithms, in the practices, in data treatment, etc will benefit the whole set of points of sale. There will be no need for each of the partners to keep managers updating and improving the system at their own costs. Improvement costs will be shared among the whole network.

A reduction is also expected in the high costs of sending express deliveries when stock outs occur. With a better management of the inventories at the point of sale it is expected that these costs are substantially reduced.

Before AutoGIRO, research conducted by GM showed that around 80% of the working time of a dealer parts manager was spent managing the inventory and making decisions about replenishment. With AutoGIRO automating a great part of this, GM expects that the parts managers will spend their time doing something more valuable and which can only be done by a person: developing customer relationships, searching for new market opportunities, and actually selling. The intention of GM is to actually turn the parts managers from "wholesale buyers" into "retail salespersons and marketeers". GM is already providing these professionals with training in marketing and sales in order that they can better face this new challenge in their careers. This way GM expects to increase substantially their market share in the GM service parts overall market.

Another result expected from AutoGIRO is that in the future when the newly acquired network efficiencies settle, part of the benefits can be passed on to the final customer as price reductions, to help improve tha competitiveness of GM original parts in the market place.

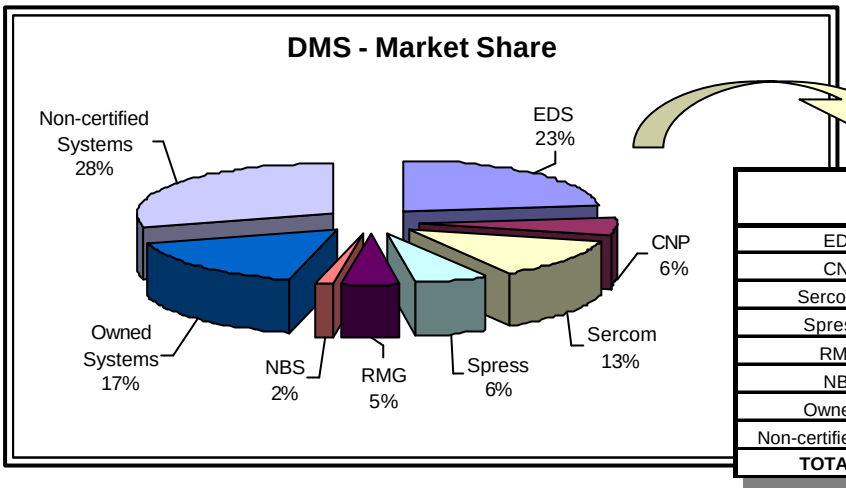
Potential pitfalls for the AutoGIRO project

Although technically the AutoGIRO project bears great similarity with the Saturn model (see "Saturn´s Supply-Chain Innovation: High Value in After-Sales Service", by Cohen, Lee and Willen, published in volume 41, number 4, Summer 2000 of the Sloan Management Review for a description of the Saturn service part management system), the two problems are actually quite different and Denio Nogueira and his team are fully aware of it. Saturn started from a blank sheet of paper and GM Brazil has a network which is 75 years old. According to Denio, "this makes the whole difference":

75 years of a conflicting arms-length relationship. There is not a culture in the network that favors cooperation between partners and for the AutoGIRO to work, cooperation is paramount. The GM team also knows that actions should be taken to make sure the cultural changes happen. But which actions? How to find out when is enough?

GM also know that a strong commitment of the dealers top managers and owners is of paramount importance for the success of the program. Will the seminars run by the invited professors be enough? What else could be done?

There are more than 120 different inventory management systems in the network, each one generating data in a different and normally non-compatible format. Figure 7 illustrates the frequency with which different systems can be found among the dealers.



	Qty	%	% Accum
EDS	105	23%	23%
CNP	27	6%	29%
Sercom	58	13%	42%
Spress	28	6%	48%
RMG	21	5%	52%
NBS	7	2%	54%
Owned	78	17%	71%
Non-certified	132	29%	100%
TOTAL	**456**		

Figure 7 – Dealers management systems market share

Owned systems are systems which were developed internally by the IT department of the dealers. What to do about it? Because of the historical independence of the partners GM cannot impose or force the dealers to adopt a specific inventory management system. What to do?

There are some dealers which lack cash to invest in the necessary IT and telecommunication infrastructure (e.g. antennas, large Windows NT server), many times because they are short of cash maybe partially caused by the high levels (30 to 40% in average) of obsolete inventory they carry in their warehouses. This is also something which is very different from the Saturn situation. What to do with the obsolete inventory in the network?

The data quality issue also concerns the GM AutoGIRO team. Preliminary research conducted with a sample of dealers showed that the levels of inventory data accuracy are very low indeed. Most dealers still use the practice of yearly inventory counts for the purpose of generating tax-related reports. As Denio remarked: "if the levels of inventory data accuracy are so low, what will happen with the accuracy of the new data which we are requesting e.g. lost sales? Will we be able to trust this data?" What can be done about it?

Another assumption of systems such as AutoGIRO is a high level of consistency in delivery lead times. How to make sure that deliveries are consistent with dealers scattered all around Brazil and how to make sure that the transportation scale economies actually happen?

The future

Plans to actually implement AutoGIRO were ambitious in August 2000. Up to the end of the year 2000, GM Brazil had the system fully operational in 48 dealers and the goal for the year 2001 was to have it implemented in 200 more dealers. "Quite an ambitious goal", agrees Denio Nogueira, while still thinking about the sarcastic comment of the dealer owner during the first seminar given to dealers to explain them the details of AutoGIRO…

Appendix 1 – Results of simulation comparing AutoGIRO and one of the current systems used by dealers.