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**The Systems Integrating Firm:
Entrepreneurship, Innovation, and Vision**

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Abstract

This paper illustrates the successful story of a SME that exemplifies the case of the systems integrating firm. A series of strategic and courageous decisions enabled Tecnomatic to rapidly evolve along the value chain: from a mere special machine tools supplier to partner of leading European and US automotive firms. As from the 1980s, cost cutting strategies and a more competent supplier base have pushed and enabled manufacturers to extensively believe in outsourcing. More recently, first-tier suppliers (both component manufacturers and machine tools suppliers) have also adopted such strategy. By pursuing outsourcing strategies, both manufacturers and first-tier suppliers have lost important design and manufacturing capabilities. Following a visionary entrepreneur, Tecnomatic started a capability acquisition process that enabled it to fill the capability gap left by manufacturers and first tier suppliers. Through a combination of focused acquisitions, training policies, and research investments in cutting edge technology, Tecnomatic has become a key partner for the development and manufacturing of automated plants of complex components for several sectors, e.g. automotive and domestic appliances

Keywords:

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1. Introduction

The pace of technological innovation increased complexity of products in the last decades. The growing interaction between different technologies made more difficult to integrate those technologies together. Firms are stuck in the middle between two different forces: keeping all the productive process in house to control the changed technologies or outsource part of it to external supplier. The second choice bears the risk of losing important capabilities and of definitely losing the control on its own final products. Actually, it looks that the second force is leading in the automotive sector: electronics parts are becoming always more important, single components are complex and capabilities required to control it are difficult to manage. Automobile makers don't manage all these capabilities in house and prefer to buy single components from specialised suppliers. This is already known. Academic journals, economic newspapers and managerial books spent thousands of words to explain this phenomenon. What it is not well known is the other side of the coin. Automotive makers outsourced their capabilities to components suppliers and the components suppliers outsource them to their specialised suppliers. As a Russian doll, smaller companies manage many of the capabilities required by the big ones to create components for the automotive markets.

Tecnomatic is one of the smaller dolls inside the big ones. This company was founded in the 1973 as machine manufacturer and, in the last 10 years, performed an interesting growth process that allowed it to collaborate with the biggest carmakers to perform products and process innovations. The core business of Tecnomatic resides in the design of production line of complex components in the automotive sector. But it is not a simple supplier of production lines but it offers to its client a complete turnkey solution to produce the required components. The paradox is that clients know what to produce but they have no idea about how to produce it. Tecnomatic have to provide everything, from the logistic of the plant to the human workplace. In some situations, Tecnomatic collaborates with its clients to develop new

products, like for the hybrid motor. Distinctive characteristic of this company is that it owns knowledge and capabilities that its clients decided to externalise and that has been lost.

The following situation is meaningful: the R&D departments of the biggest automotive makers of the world are working to develop the hybrid electric vehicle, a car that combines internal combustion engines with electric motors. This represents the new technological frontier to decrease exhaust emissions from cars. Toyota's "Prius" is the first hybrid vehicle, with a production volume of 2,000 units/month, arrived in showrooms at the end of 1997. In 2005 also Honda, Lexus, Chrysler and Ford started selling their hybrid vehicles. In North America the development of hybrid vehicles is promoted by the pollution control policy sustained by the Government and American Companies like GM are promoting this product even in Europe. In this race to create the engine of the future, also Tecnomatic is involved. Three years ago they started a R&D program cooperating with American and European Organizations, where, the application of their alternator stator winding know-how, allowed them to develop a winding technology called "by areas", which is the same as the one applied to the hybrid electric motor.

The present work aims to analyse the success of this small company, examining the strategic decision that allowed Tecnomatic to reach the present position. The remaining of the paper is organised as follows. The next section reviews Tecnomatic story; it offers a short analysis of the key events happened to company since its foundation, analysis that aim to introduce the reader into the growth process and into the main problems that has been faced by Tecnomatic management. An analysis of five strategic decisions that enabled the growth process follows. These decisions allowed the company to develop and exploit its internal resources. The aim of the present work is to show a successful case of growth process. Tecnomatic growth is not relevant from a revenues point of view but it is particular interesting from a capabilities point of view. In fact, Tecnomatic growth focused in a constant and continuous process of capabilities acquisition and retention. The main characteristic of the path pursued by the Italian company is the organic coherence. This allowed Tecnomatic to become a system integrator in the

automotive sector, managing the capabilities externalised by its clients. This position allows Tecnomatic to change its position from second tier supplier to first tier supplier (or something more?). This process is structured around 5 fundamental strategic aspects of the company. In fact, Tecnomatic managed its growth process taking into account the role of (1) suppliers, internal resources -through (2) new capabilities acquisition and (3) internal organization-, and clients -through (4) territorial expansion and (5) strategic acquisition of Asatech-.

2. Tecnomatic

Tecnomatic was established in the 1973 as manufacturing company. When was founded, Tecnomatic business consisted in the production of automatic machinery for the production line of Eurocarbo, its only client and most important stakeholder. After some years, Tecnomatic decided to enlarge its business serving other clients within the same sector. Despite of the top management thoughts, this strategy was very difficult to follow because the targeted clients were diffident about Tecnomatic. In fact, Eurocarbo competitors were convinced that, for its close relationship with Eurocarbo, Tecnomatic will provide the best technology to it. Due to those difficulties, the management of Tecnomatic decided to move to another sector and started its collaboration with Magneti Marelli, company leader in design and production of high-tech components systems in the automotive sector. This relationship allowed Tecnomatic acquiring new capabilities required to operate in the automotive sector. The collaboration was successful and, to better concentrate on the new core business, in the 1978, Tecnomatic ended its collaboration with Eurocarbo. This year is the first milestone in Tecnomatic story.

In the 1998, 25 years after its foundation and 20 years after the end of the relationship with Eurocarbo, more then 20 people, sons and nephew of the founders owned Tecnomatic. The company experienced a period of crisis, due to difficulties in organise such fragmented management and, in the same year, Tecnomatic was acquired under new management. This is the second

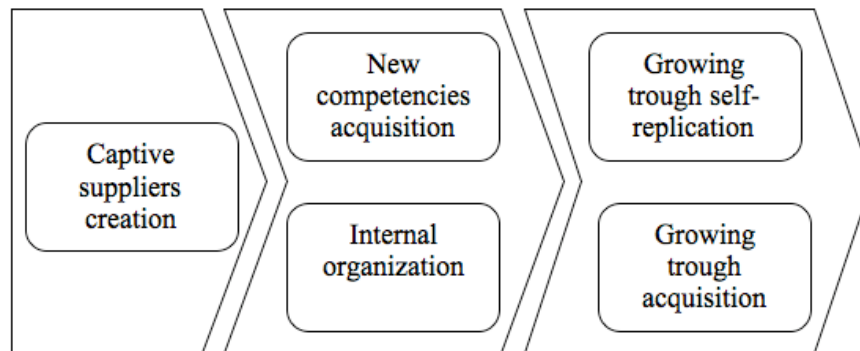
milestone. The acquisition changed not only the proprietary assets of Tecnomatic but also strategic focus of the business. Until the acquisition, Tecnomatic was specialised in few types of machines. After the acquisition, Tecnomatic focused on assembling entire production lines rather than single machines. Nowadays, Tecnomatic offers a large variety of products and manages the complete automation process. The current trend is toward an increasing de-specialization and diversification, an enlargement of the range of products and an expansion of the capabilities related to automation.

Analysing the most important changes in Tecnomatic production activity, we notice an increasing tendency in acting as systems integrator. Until the 1985, the production activity was organised as follows: Tecnomatic produced machinery on the basis of projects designed by other companies. The process of production changed a lot since the 1985. Tecnomatic involvement in the design phase increased constantly. In fact, in the following 6 years, production lines started to be produced on the basis of projects prepared jointly with clients and, in the 1992, Tecnomatic started to design production lines by itself, using only technical requirement provided by clients. In the 1998, as results of the capability acquisition process, Tecnomatic had adequate skills to set technical requirement by itself and the only client's involvement was the approval of the final project. The role of Tecnomatic in the design phase was constantly increasing, due to its ability to integrate different technologies.

A coherent planning process characterizes the growth process of Tecnomatic. In the remaining of the section, the expansion process is analysed focusing on 5 key strategic decisions that allowed Tecnomatic to achieve the interesting growth that we have analysed in the introduction. These 5 key strategic decisions are: (1) "captive" suppliers' creation, (2) new capabilities acquisition, (3) internal organization, (4) territorial expansion, (5) Asatech strategic acquisition.

The different strategic decisions have impacts at different stages of the value chain and the whole productive process is involved in the growth process. In fact, while the creation of suppliers impacted at the beginning of the value chain because changed the traditional relationship with the suppliers, Asatech strategic acquisition, which rationale was the possibility of acquire new clients,

impacted at the end of the value chain. The balance between the different operations, allowed Tecnomatic to obtain a balanced and harmonised growth.



1. “Captive” suppliers’ creation.

Tecnomatic core business resides in the creation of assembling lines. This productive process requires complex and numerous capabilities. Moreover, the changing and dynamic environment in which Tecnomatic is operating requires a flexible structure. The model of a Chandlerian corporation was not adequate for the scope. A vertical integrated company is not flexible and, according to the view of Loris Ferrone, top management in Tecnomatic, maintain a good level of flexibility is the key of the success.

Achieve flexibility of productive process was a primary goal for Tecnomatic management and outsourcing part of the productive process represents one possible way. Anyway, find adequate suppliers able to satisfy Tecnomatic request was not simple. In the 1998, there were not many specialized suppliers near Tecnomatic plant location. Geographical proximity is an important factor to achieve a collaboration-based relationship, and these collaborations are crucial for Tecnomatic due to the specific nature of its products. In mass produced goods, suppliers can be located very far as long as technical requirements of products are standardized. The situation is radically different in highly customized goods, such as Tecnomatic products. In this case relationships with suppliers should be strong and level of interaction very high. Because components production is based on Tecnomatic design, a continue interaction is important and geographical proximity make it easier.

So, the outsourcing process needed specialized and close companies. To solve this problem, Tecnomatic enabled a process of new firms' creation and helped many start up companies providing them financial aids, capitals and, in some cases, buying machinery to them. Tecnomatic helped the new established companies also in acquiring the required capabilities. This process was so successful that many of the actual suppliers have been created at the end of the '90s in such way. Nowadays, "captive" suppliers provide to Tecnomatic important subsystems of mechanic components and, some of them, services such as mechanic design and software design. Their main client is still Tecnomatic but they have other clients (approximately 20% of their revenues).

Tecnomatic relationship with suppliers is a two-way relationship: suppliers have the opportunity to learn from Tecnomatic and Tecnomatic has the possibility to decentralize capabilities and still manage them. Suppliers can be involved in large project, learn and develop new capabilities. Without this collaboration, this would not have been possible. With such suppliers network, Tecnomatic can be defined an open system; working with so many suppliers, it has the possibility to obtain specific know-how from the supplier and increase its own capabilities and knowledge. According to Loris Ferrone, in this way Tecnomatic can act as a "catalyst of capabilities".

2. New capabilities acquisition.

Due to increasing pace in technological innovations, products are increasing in complexity. The biggest difficulties reside in combining different technologies. This trend can be observed in many industrial goods and, of course, in Tecnomatic products. Empirical evidence supports this thesis: analysing Tecnomatic outputs, in the '80s, electronics parts were not present in the final product; in the '90s, the percentage of electronic components is 10%. After the 2000, more then 30% of the final product is composed by electronic components. Tecnomatic operates in an industry traditionally dominated by mechanic technology and the increasing importance of electronic components set a new challenge for Tecnomatic. The first response to the new challenge is visible analysing the trend in employees' composition. To increase its capabilities in electronics, Tecnomatic hired electronic

engineers: in the 1998, only 4 out of 57 engineers employees were electronic engineers (the remaining 53 were mechanical engineers) while, in the 2004, the electronic engineers employees were 12 out of 93 total engineers. In 6 years, the percentage of electronic engineers raised from 7% to 11%.

Hiring skilled people was not sufficient to face the new challenge. In fact, the main problem was not having people able to deal with electronics while have capabilities to integrate and use electronic and mechanic technologies together. So, the process of new capabilities acquisition did not simply enlarge the percentage of electronic engineers employed but it went much further. Tecnomatic top management understood that a new professionalism was emerging: the so called "*mechatronic*". As defined by Giuseppe Ranalli, CEO of Tecnomatic, a "*mechatronic*" is an engineer that knows about different technologies: mechanics and electronics. So *mechatronics* have capabilities of electronics and mechanics. Most of them are mechanical engineers skilled in electronics. The existent market labour did not offer such professionalism and, to overcome this obstacle, Tecnomatic started an internal training process. The training activities were so successful that Tecnomatic opened a school to train "mechatronics". The aim of this school is to provide knowledge and capabilities required to deal with the two technologies and integrate them together. People that attend this school are not only Tecnomatic employees but also employees from other companies, interested in acquire new capabilities. This school plays a central role in Tecnomatic process of capabilities retention and acquisition.

Tecnomatic organised also some course of the traditional training activities (English, sales techniques, business games, new technologies ...); the novelty is that also suppliers and clients were involved. All these activities increased internal sets of capabilities and knowledge. As managerial literature shows, ability to evaluate and utilize external knowledge is function of the level of prior related knowledge. The abilities to exploit external knowledge, to understand and use a new technology are called "absorptive capabilities" by Cohen and Levinthal (1990). These abilities are very important to operate in an industry that evolves quickly. Tecnomatic management that devoted much effort for capabilities development process has understood this.

3. Internal organization: the creation of a project based organization

As described in the introduction, the second milestone in Tecnomatic story is represented by acquisition under new management and consequent changes in the relationships with clients imposed by the new management. In fact, before the acquisition, the production lines were created on the basis of technical requirement provided by clients; after the 1998, the process changed and Tecnomatic started to set technical requirement without the collaboration of clients; the clients show the final product and Tecnomatic have to design and produce the entire production line.

The changed approach with the client implied an internal reorganization of Tecnomatic organizational structure. To be able to design and produce the entire production line “from scratch”, a complete understanding of client needs is required. In similar situations a project based organization is more adequate. Project based organizations are more flexible and, because each client has a team dedicated, the relationship is closer and it is easier for the company to understand and solve any problem. For this reason, the new management organised the firm in project teams. Because of the specific nature of the work, people that work with client cannot change. In fact, they know all the peculiarity of the client, its needs, and its request. Leaders of these work forces have been identified in two people, chosen for their experience, knowledge and appropriate skills to play this role. The problem was that the chosen project leaders were proper technicians, very expert but not able to decentralize their works. They had the tendency to centralize everything. After a while, they were so full of work that becoming bottlenecks for their teams. For them was not possible to manage more than one project in once. So, a middle management class was created. The two leaders have been set free from any issue like logistics or operative tasks; doing so, they can now focus in core activities.

Now the project based organization structure works properly: teams are composed by four people: a project manager, a designer, a software/electronic expert and a mechatronic. The task of the team is to integrate different technologies: software, laser, mechanics... if the production line is not completely automatic and human work is still required, teams have

to study also the workplace to make it ergonomic, increase productivity and minimize errors.

Project manager at the very beginning of the project is completely dedicated to one client but after a while, the level of involvement decrease and other team members acquire capabilities to deal with the client. Possibility of team members to interface with client increases during the running of the project; to avoid bottlenecks, clients trust in all the members of the team and each team member is in contact with the client.

4. Growing trough self-replication.

The first milestone in Tecnomatic history is in the 1978, when Tecnomatic ended the relationship with Eurocarbo and the begun the collaboration with Magneti Marelli. After its first years of activity, Tecnomatic started working with multinational companies. Because of the nature of his clients, the well known outsourcing process and plants migration towards places of the world where the cost of the labour is cheaper, forced Tecnomatic to deal with request of installation of its machinery all around the globe.

Two different necessities emerged: (1) to concentrate all the operation in one plant to control every single step and (2) to split the productive process into more countries to be closer to clients. Geographical proximity as a condition for an efficient relationship is important again, this time Tecnomatic is the supplier that have to be close to its clients. A similar process to the “captive suppliers” creation is required. This time Tecnomatic did not create different firms able to match its need but started a process of self-replication all around the world. The “Tecnomatic-model” has been exported outside Europe and new company has been founded. Tecnomatic opened new firms in Brazil, China, US, Romania, India. To be able to manage companies located in such distant countries, Tecnomatic developed a strong network with several local partners. These partners are mainly suppliers and the relationship is very close. 2 people, one mechanical and one electronic engineer compose the local divisions. To be able to perform its job, the division works in collaboration with local suppliers. These two people act as supervisors for local teams. It is very frequent the creation of joint venture with local firms.

Where has not been possible to open local division, Tecnomatic works with sales agent. This is happening in Eastern Europe, an emerging market where many multinational companies moved their plants some years ago. Nowadays, the cost of labour is rising and automation is becoming always more important; assemblation cannot be done manually anymore. Tecnomatic has one sales agent in Germany and one agency for Austria and east Europe.

5. Growing trough acquisition.

As pointed out by Penrose (1959), there are 2 methods of expansion open to individual firms: build new plant and create new markets or acquire plants and markets of existing firms. The firm will choose the second one only if acquisition is considered cheaper than internal expansion. This is the case of the strategic acquisition of Asatech, completed by Tecnomatic in the 2001. Asatech was a firm localised in Tuscany and specialised in assembling lines. Asatech acquisition's decision was an answer to a growth issues. The management of Tecnomatic was struggling to understand which path should be followed to growth in the market of production line assembling. According to Tecnomatic management point of view, to win in this market, the company needed to be more structured and the growth processes should be performed without losing the peculiarity of the company: a strong relationship with the client. The decision of Asatech acquisition has been done to ensure a new set of clients, new markets for its plants. At the moment of the acquisition, Asatech had financial problems but a large number of clients. This was the characteristic that convinced Tecnomatic management to acquire it. To retain all the clients, Tecnomatic implemented a new offer: it stopped just installing machines and it started providing a higher percentage of the total production line (from 50% to 90%). Tecnomatic started developing post sales and customer care capabilities: the scope was to change its role: from "make to print" to "providers of technology".

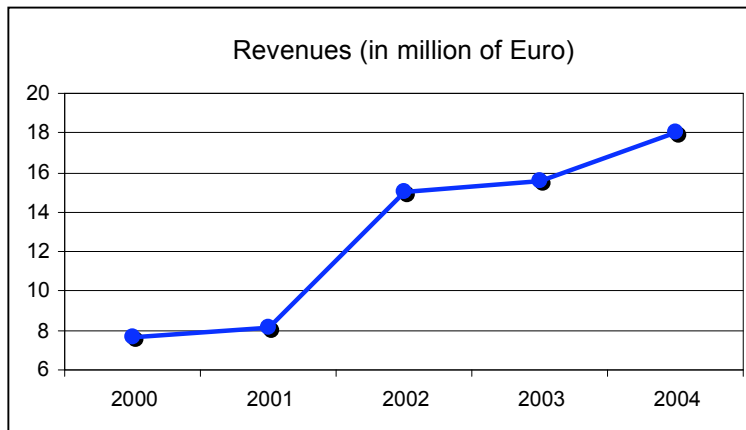
At the moment of acquisition, Tecnomatic and Asatech had same core business but operated in a slightly different market. Asatech assembled production line with high productivity, Tecnomatic worked on production lines for complex outputs, such as electric engines, turbo etc. Now the activities of the two firms are converging; differences are becoming slighter. For logistics

reason, often activities are developed by one firm in place of the other. So the capabilities of the two firms are very similar. In Asatech work 25 people, but more than 100 people are involved in the productive process through a large network of partners. These firms work as suppliers for Asatech and manage parts of the outsourced productive process. Firms involved are mainly local and the dimension is small.

When Asatech was acquired, his work mainly focuses on the design phase; in fact the production was outsourced to a large network of suppliers. Asatech main task was to manage the large suppliers network. This characteristic is similar to the network structure that Tecnomatic developed creating “captive” suppliers. So the strategic acquisition was successful also because both firms were characterized by similar routines and similar organizational capabilities.

3. Conclusions

In the present work an analysis of the growth process performed by Tecnomatic has been offered. Tecnomatic is a manufacturing company specialised in design, production and delivering of production line. The growth process has been analysed focusing around 5 key strategic factors that allowed Tecnomatic to achieve the actual level of expertise and importance in the automotive sector. The process of capabilities acquisition and retention allowed Tecnomatic to become, from mere special machine tools supplier to partner of leading European and US automotive firms. The aim of the present work was to explain the growth process, stressing in particular the organic and holistic approach that has been followed by Tecnomatic. This path is the result of the vision of its CEO. This path was finalized not to increase revenues or number of clients but to increase resources and capabilities managed by the firms. As a consequence of this capabilities enrichment process, Tecnomatic achieved an interesting expansion process and tripled its revenues becoming an important partner for its clients providing not just machinery but all range of services related to the creation of production lines.



As explained in the introduction, Tecnomatic represents the other side of the coin in the outsourcing process performed by multinational companies in the last decade. The increasing complexity of products and the increasing number of technologies that have to be integrated together required an extension of the set of capabilities managed. Many multinationals decided to outsource part of these capabilities to their suppliers. Tecnomatic is one of those. Tecnomatic is a SME that collaborate with multinational company and manage many capabilities that its clients lost. Such capabilities are strategic for its clients, such as the ability to design the production line for its final output. In other word, the “small” Tecnomatic explain to its “giant” clients how to produce what they have to produce. This article explains how this position has been reached.

Tecnomatic has been able to grow without losing its flexibility. This has been possible creating a large suppliers network. Tecnomatic enabled the process of new firms establishment and the “captive” suppliers created are currently the main suppliers of Tecnomatic. Trust, geographical proximity and highly specialisation are the characteristics that make these suppliers fundamental for Tecnomatic but not essential. Tecnomatic is the systems integrator, the catalyst of capabilities that is able to combine together different resources.

The reason why Tecnomatic sought growing without losing its flexibility is because flexibility is central to be able to use in its products the latest technology. The path dependency of what has been already implemented and of what has been already produced is a dangerous trap for companies such as Tecnomatic. Tecnomatic avoided this pitfall with continuous investments in

increasing its set of capabilities. This allowed Tecnomatic to absorb technologies from outside its company and from other sectors and use it in implementing and studying the solutions for its clients. This has been achieved with massive investments in education and training course for its employees. Tecnomatic employees are highly specialised and courses has been directed to every level of hierarchy. In this way the capabilities increasing process involved every person that works in Tecnomatic, not only the top management.

The focus of Tecnomatic activity is its clients and, more specifically, its clients' requirements. The solutions studied by Tecnomatic are tailored made and the relationship with the clients plays a central role. To give to the client this role, to put him in the centre of the organization, Tecnomatic changed its organizational structure implementing a project-based organization.

Once that Tecnomatic developed a suppliers network, adequate capabilities and a project based organization, was important to increase also the possibility to follow its clients all around the globe and to increase its potential to follow a major number of projects. So Tecnomatic decided to grow increasing its presence in different countries and acquiring Asatech.

This double strategy allowed Tecnomatic to grow being able to reach new markets previously too far (self replication strategy) and controlled by another company (acquisition strategy). The new market creation allowed Tecnomatic to export capabilities developed. Because it was able to follow its clients around the globe, it became a central partner for many multinational companies.

Tecnomatic used to compete with other machines suppliers in different plants of the same multinational companies. Not being the only suppliers allowed Tecnomatic to show the peculiarity of its offer and, due to this close competition, has been preferred over others. Its clients devoted it increasing trust and Tecnomatic role in the value chain changed: it moved from a second tier supplier position to partner in the development of new technologies, such the hybrid motor technology.