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Master of Science in

Management, Economics and Industrial Engineering

DEVELOPMENT OF SERVICE ORIENTED BUSINESS MODELS FOR AGRICULTURAL MACHINERY MANUFACTURERS

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ABSTRACT

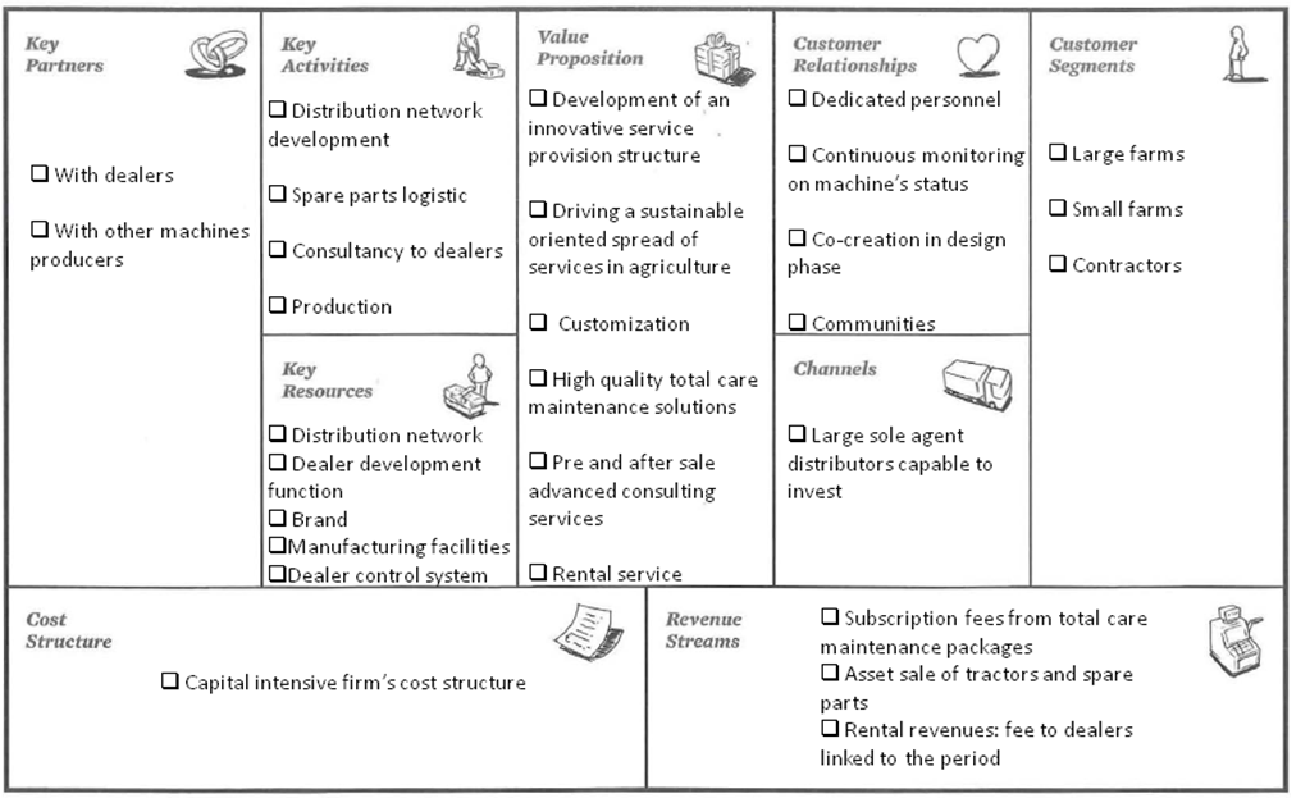
This work is to study in deep the concept of PSS and its applicability to the market of agricultural machinery. The theories on product service system are analyzed presenting the most significant researches and several examples of successful implementations. The literature analysis includes a description of theories on business models with a deeper focus on Alexander Osterwalder's work; it is presented its framework which is utilized as the analytical tool for the subsequent part of the research. The Osterwalder model has been partially modified in order to obtain a specific framework more applicable to the scope of research. The agricultural machinery market is analyzed and it is proposed a description of the state of the art with a deeper focus on the Italian territory. In order to develop service - oriented business models in the sector, 31 manufacturers, 3 dealers and 2 farms have been analyzed through questionnaires, telephone calls and case study. The selected companies were chosen basing on the standards of the services provided and individuating the best practices of the sector. It was involved in the research a manufacturer operating in a parallel market considered a world leader for the service provision. From the analysis it emerged the necessity of a more structured service provision network and the possibility to develop efficient and profitable new business models. The different dimensions and the dissimilar kinds of machinery produced lead us to identify three different segments of players and for each one it is proposed a specific service – oriented business model. The main result of this research is the development of three new business strategies that go towards a sustainable oriented innovation without neglecting the profit aspect in the Italian market of agricultural machinery.

SOMMARIO

Questo lavoro ha l'obiettivo di analizzare nel dettaglio il concetto di PSS e la sua applicabilità nel settore delle macchine agricole. Le teorie sul product-service system sono esaminate presentando le ricerche più significative e diversi esempi pratici di applicazioni di successo. L'analisi della letteratura include una descrizione della teoria sui modelli di Business privilegiando il lavoro di Alexander Osterwalder: viene presentata una struttura di analisi che verrà utilizzata nelle successive parti della ricerca. Lo strumento proposto da Osterwalder è stato parzialmente modificato allo scopo di fornire un modello specifico più adattabile al contesto dell'analisi. Viene inoltre analizzato il mercato delle macchine agricole ed è presentata una descrizione dello stato dell'arte dedicando particolare attenzione alla situazione del territorio italiano. Al fine di sviluppare modelli di business orientati al servizio in questo settore, sono stati analizzati, attraverso questionari, interviste telefoniche e casi di studio, 31 produttori, 3 distributori e 2 aziende agricole. Le aziende selezionate sono state scelte sulla base degli standard di servizio offerti individuando le *best practice* del settore. E' stato inoltre coinvolto nella ricerca un produttore che opera in un segmento di mercato parallelo e unanimemente considerato leader mondiale nell'offerta di servizi. Ciò che emerge è la necessità di una rete strutturata di erogazione di servizi e la possibilità di sviluppare nuovi e redditizi modelli di business orientati al servizio. Le differenti dimensioni dei produttori considerati e l'eterogeneità delle macchine prodotte ha portato a identificare tre segmenti diversi di produttori in questo mercato e per ognuno di loro viene proposto una specifico modello di business orientato ai servizi. Il risultato principale del lavoro è quindi lo sviluppo di 3 modelli di business applicabili al mercato delle macchine agricole che vanno in direzione di un'innovazione sostenibile senza trascurare l'aspetto del profitto.

A titolo di esempio viene qui proposto uno schema esplicativo che rappresenta la struttura del modello di business orientato ai servizi proposto per i produttori di trattrici.

The Business Model Canvas: **Tractor Manufacturers**



List of abbreviations:

PSS: Product service system

SOI: Sustainable oriented innovation

BM: business model

LCE: lifecycle engineering

CAGR: Compound annual growth rate

CAP: Common agriculture policy

DB: Database

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INTRODUCTION

In this research the concept of product-service system is investigated in deep to identify and propose possible implementable business model for the agricultural machinery production sector. PSS theories were born on the wake of the concept of servitization, giving a structure and a classification of the possible strategies to develop business models focused on service provision. The sector of agricultural machinery has been relatively neglected by previous researches on PSS; for this reason and because of a personal interest to the field, our work is specifically focused on this market.

The purpose of this work is a deep analysis of the state of the art of the sector followed by the development of detailed business models oriented to service provision adoptable by all the different players in the market. The suggested business models are presented and discussed adopting the framework proposed by Alex Osterwalder, this tool has been partially adapted and modified in order to fit it to manufacturer companies.

This study begins with a deep analysis of all the issues in question that has been treated in literature. First it was investigated the stream of research on PSS (chapter 1); particular emphasis was given to Tukker's work on classification of product-service systems and on sustainable effects arising from the adoption of these strategies. Then (chapter 2), several examples of successful implementations of PSSs have been extrapolated from previous researches and described. Finally (chapter 3), it was analyzed the literature dealing with business models with a particular attention on Osterwalder's works.

The paper continues with a market analysis on the sector of agricultural machinery producers and a brief description of the spreading trends in the agricultural field (chapter 4). Then the methods of analysis are described (chapter 5). First a questionnaire and a firm database (choosing companies with adequate service standards) were created. 162 Companies were selected and contacted and 31 out of these were available to take part to our research. Then, some of the best players of the Italian market in terms of service provision were individuated and visited to be deepened as case studies. Moreover, in order to expand the research, three dealers and two farms were interviewed in person and analyzed.

The data obtained are reported in the subsequent part of the document; the Osterwalder framework is utilized to structure the results acquired. In this section (chapter 6) it is presented a first analysis to describe every building block composing the business model and then a cross analysis to identify consistent and effective policies for the provisions of high service standards.

In the final part of this work all the pieces of information obtained from literature, questionnaires and case studies are merged together to develop the business model proposals (chapter 7). Three different kinds of players operating in agricultural machinery

market have been identified and a specific service oriented business model is proposed for each category.

Finally, in the last chapter (chapter 8), the conclusions we reached are presented together with the main results emerged and the possible future insights on the covered topics.

1. LITERATURE ANALYSIS PART 1: THEORIES ON PSS

This chapter describes the main theories on servitization, from his first definition 1988 to the evolution into advanced types of product-service system. The evolution of studies on PSS, the challenges and the barriers to the adoption of service oriented business model and finally, sustainable effects coming from the adoption of PSS. Basically we give a depth description of two big topics: the product-service system and sustainability analyzing then the cross effects arising from these schools of thought.

1.1 Servitization

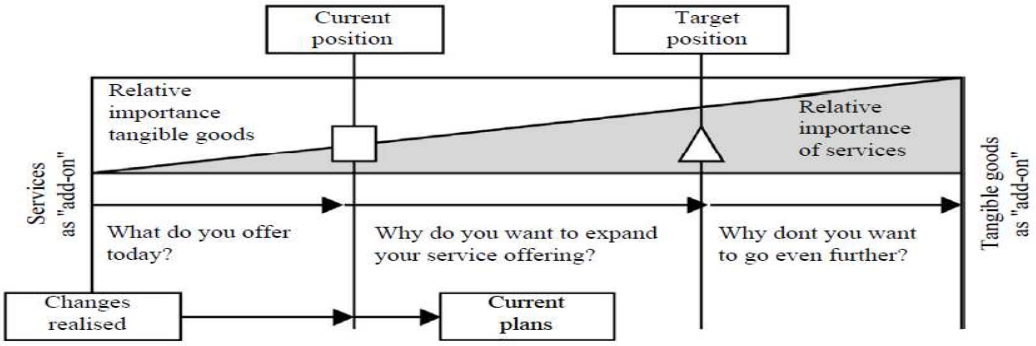
1.1.1 Definition and types of servitization:

The term “servitization” was coined by Vandermerwe and Rada, 1988; it is widely recognized as the process of creating value by adding services to products. Servitization can be defined as the innovation of an organization’s capabilities and processes to shift from selling products to selling integrated products and services to create mutual value. Since 1988 many contributors (Gebauer, Goedkoop, Mont, Neely) had written about servitization, and Wise and Baumgartner, 1999, were the first to discuss manufacturers moving downstream into more lucrative product-related services through servitization.

The growing interest about this topic by academia, business and government (Hewitt, 2002) is based on a belief that a move towards servitization is a means to create additional value for traditional manufacturers. This shift to servitization is being driven by even more complex customer needs and demands and a need to defend against product competition particularly from lower cost economies: integrated product-service offerings are distinctive, long-lived, and easier to defend from competition based in lower cost economies.

There are various forms of servitization. Companies can be positioned on a product-service continuum (see figure 1) ranging from products with services as an “add-on”, to services with tangible goods as an “add-on” and provided through a customer centric strategy to deliver desired outcomes for the customer.

Figure 1: Product-service continuum.



Source: Oliva & Kallenberg (2003)

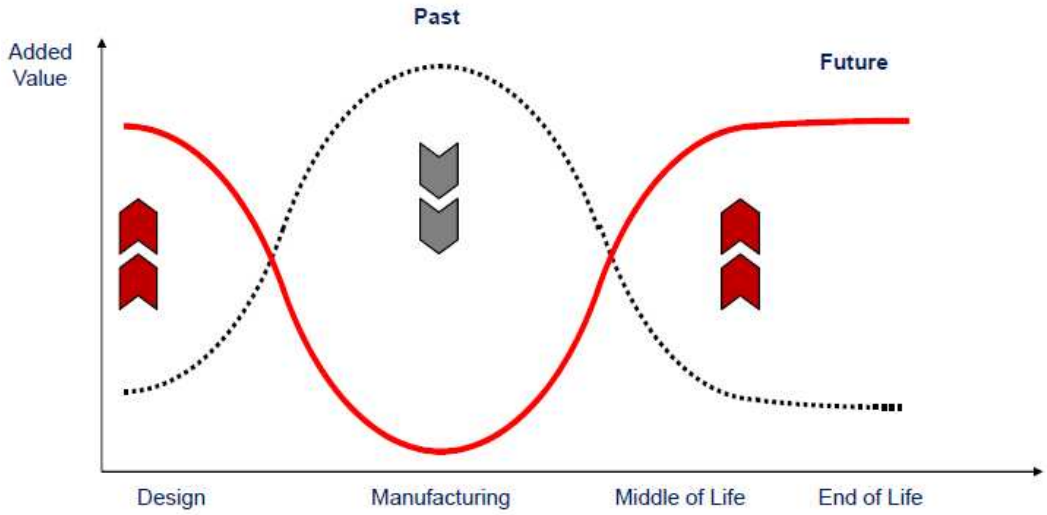
1.1.2 Factors driving companies to pursue a servitization strategy:

Servitization frequently occurs due to three types of drivers:

1. financial drivers (e.g. revenue stream and profit margin)
2. strategic drivers (e.g. competitive opportunities and advantage)
3. marketing drivers (e.g. customer relationships and product differentiation)

The main financial drivers often mentioned in the literature are higher profit margin and stability of income (Wise and Baumgartner, 1999, Gebauer and Friedli, 2005).
In some sectors, service revenues can be one or two orders of magnitude greater than new product sales. Sawhney et al., 2004, identifies companies succeed with this approach (e.g. GE, IBM and Siemens and Hewlett Packard) and achieved stable revenues from services despite significant drops in sales.
Competitive advantages achieved through services are often more sustainable since, being less visible and more labour dependent, services are more difficult to imitate. Differentiating strategies based on product innovation, technologies or low prices, are becoming difficult to maintain.
Marketing opportunities are generally considered as the use of services for selling more products (Gebauer and Friedli, 2005). Services are also claimed to create customer loyalty (Vandermerwe and Rada, 1988), to the point where the customer can become dependent on the supplier.
In the following figure 2 is shown the future servitization shift from adding value mainly through production to focusing on design and after sale services. This is one of the main factors to pursue a servitization strategy.

Figure 2: after sale services value future trends.



1.1.3 Approaches to servitization

There are a diverse range of servitization examples in the literature from aerospace, transportation, automation, machine tools, printing machinery and other capital equipment. These emphasize the potential to maintain revenue streams and improve profitability particularly in industry sectors where there is a high-installed base of products. Companies recognize that delivering services is more complex than manufacturing products and requires different approaches to product–service design, organizational strategy and organizational transformation.

Examples of leading practice in the adoption of servitization are focused on larger companies supplying high-value capital equipment such as Alston, ABB, Tales and Rolls-Royce. These demonstrate how traditionally based manufacturing companies have moved their position in the value-chain from product manufacturers to providing customers with integrated solutions that can include multi-vendor products.

Typically, cases of companies moving to exploit downstream opportunities from services fall into four categories (Wise and Baumgartner, 1999):

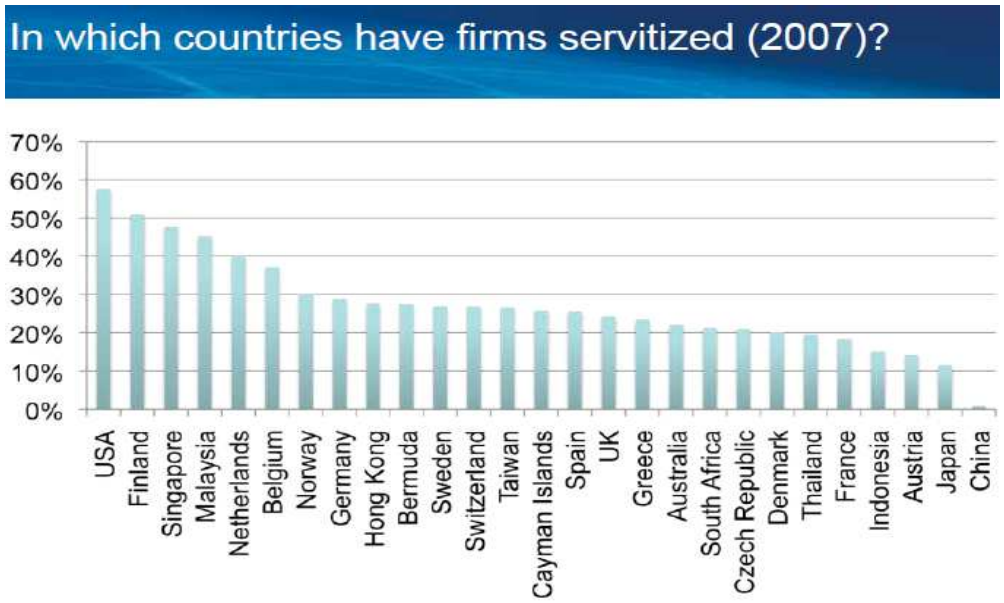
1. ***Embedded services*** which allow traditional downstream services to be built into the product (e.g. Honeywell's AIMS for in-flight monitoring of engine systems);
2. ***Comprehensive services*** such as those offered by GE around its product markets (e.g. GE capital's financing activities);

3. ***Integrated solutions*** where companies look beyond their traditional product base to assess the overall needs of customers (e.g. Nokia's move to network-infrastructure solutions);
4. ***Distribution control*** as used by Coca-Cola to take shelf space in its high-volume low-margin supermarket segment.

1.1.4 Diffusion of servitization

The research of Professor Andy Neely, 2010, about diffusion of servitization in 2007 (see figure 3), involved 13775 firms from a starting base of 46000 (Osiris database). USA is the leading country with about 60% of servitized firms; there are many north European countries on the top of the chart and good results from diffusion in some Asian nations like Malaysia and Singapore.

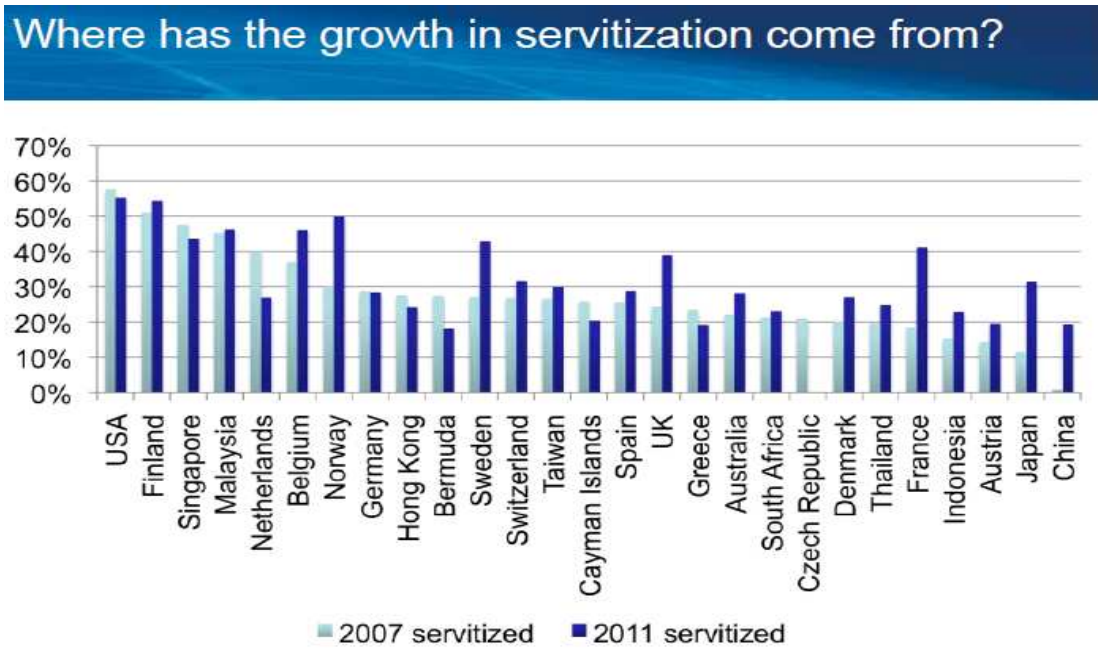
Figure 3: diffusion of servitization.



Source: Andy Neely study

China has had a good growth from 2007 to 2011 (figure 4) demonstrating that even a typically manufacturing country is now paying more attention to servitization. In the same period we can notice a big decrease of servitized firms in Czech Republic. Generally we cannot talk about an increasing diffusion of servitized companies because there is not yet a clear and general growth.

Figure 4: most growing countries for servitization.



Source: Andy Neely study

1.2 Product service systems (PSS)

Since this first definition of servitization, there has been a steady flow of research papers and many other closely related research communities; the most important one is about Product service systems (PSS), a new work evolving from servitization to a more sustainable point of view.

1.2.1 Definition of a PSS

The work on product-service systems (PSS) is strictly linked to servitization. Many of the principles are identical (Tukker and Tischner, 2006), the difference arises in the motivation and geographical origin of the research communities. PSS is a Scandinavian concept which is closely related to sustainability and the reduction of environmental impact.

The literature provides several definitions of a Product Service-System. The first formal definition of a PSS was given in 1999 (Goedkoop, M. et al. 1999): “A product service-system is a system of products, services, networks of “players” and supporting infrastructure that continuously strives to be competitive, satisfy customer needs and have a lower environmental impact than traditional business models”.

Since then, several contributors have wisely adopted this definition, many link PSS with achieving sustainability, but Manzini, in 2001, was the first to see this as the ultimate goal. Other contributors (Mont, O., 2002, Wong, M., 2004) discussed also the concept of dematerialization through a PSS business model.

Since the first paper by Goedkoop, the number of articles on PSS grew steadily. The most prolific authors have been Oksana Mont with Meijkamp; Manzini and Vezzoli; T.S. Baines with Lightfoot (2007); and Arnold Tukker (2004).

We can resume these definitions in a simple but solid one proposed by Tukker in 2004:

“A product–service system (PSS) can be defined as consisting of tangible products and intangible services designed and combined so that they jointly are capable of fulfilling specific customer needs”, (figure 5).

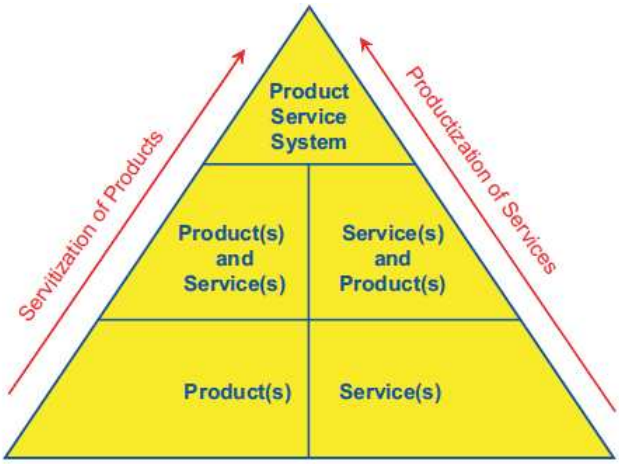


Fig. 5 Product-Service System concept

There are a wide range of benefits from a PSS; to the producer it means an offering of higher value that is more easily differentiated, to the customer it is a release from the responsibilities of asset ownership, and to society at large a more sustainable approach to business.

For traditional manufacturers, PSS is claimed to provide strategic market opportunities, an alternative to standardization and mass production and an effective way to defend themselves from competition of low cost economies. There are competitive advantages because service elements are more differentiating and not easy to copy.

There are improvements in total value for the customers through increasing service elements. A PSS is seen to provide value through more customization and higher quality.

The environment also benefits from PSS since a producer becomes more responsible for its products–services through take-back, recycling, and maintenance; reducing waste through the product’s life.

1.2.2 Classifications of PSSs

Various classifications of PSS have been proposed (Behrend, 2003; Brezet, 2001) most of them recognize a distinction between three main categories:

- The first main category is ***product-oriented services***. Here, the business model is still mainly geared towards sales of products, but some extra services are added.
- The second main category is ***use-oriented services***. Here, the traditional product still plays a central role, but the business model is not geared towards selling products. There is not a shift of ownership, the product stays in ownership with the provider, and is made available in a different form, and sometimes shared by a number of users.
- The last main category is ***result-oriented services***. Here, the client and provider in principle agree on a result, and there is no pre-determined product involved.

However, going deeper into the analysis, each category itself includes PSSs with quite different economic and environmental characteristics. Elaborating on a typology developed in a Dutch PSS manual (Tukker and van Halen, 2003), it is possible to identify the following more specific PSS types.

Product – oriented services:

- *Product-related service*. In this case, the provider not only sells a product, but also offers services that are needed during the use phase of the product. This can imply, for example, a maintenance contract, a financing scheme or the supply of consumables, but also a take-back agreement when the product reaches its end of life.
- *Advice and consultancy*. Here, in relation to the product sold, the provider gives advice on its most efficient use. This can include, for example, advice on the organizational structure of the team using the product, or optimizing the logistics in a factory where the product is used as a production unit.

Use – oriented services:

- *Product lease.* Here, the product does not shift in ownership. The provider has ownership, and is also often responsible for maintenance, repair and control. The lessee pays a regular fee for the use of the product; in this case normally he/she has unlimited and individual access to the leased product.

- *Product renting or sharing*. Here also, the product in general is owned by a provider, who is also responsible for maintenance, repair and control. The user pays for the use of the product. The main difference to product leasing is, however, that the user does not have unlimited and individual access; others can use the product at other times. The same product is sequentially used by different users.
- *Product pooling*. This greatly resembles product renting or sharing. However, here there is a simultaneous use of the product.

Result – oriented services

- *Activity management/outsourcing*. Here a part of an activity of a company is outsourced to a third party. Since most of the outsourcing contracts include performance indicators to control the quality of the outsourced service, they are grouped in this paper under result – oriented services. However, in many cases the way in which the activity is performed does not shift dramatically. This is reflected by the typical examples for this type, which include, for example, the outsourcing of catering and office cleaning that is now a commonplace in most companies.
- *Pay per service unit*. This category contains a number of other classical PSS examples. The PSS still has a fairly common product as a basis, but the user no longer buys the product, only the output of the product according to the level of use. Well known examples in this category include the pay per-print formulas now adopted by most copier producers. Following this formula, the copier producer takes over all activities that are needed to keep a copying function in an office available (i.e. paper and toner supply, maintenance, repair and replacement of the copier when appropriate).
- *Functional result*. Here, the provider agrees with the client the delivery of a result. This category is used, in contrast to activity management/outsourcing, for a functional result in rather abstract terms, which is not directly related to a specific technological system. The provider is, in principle, completely free as to how to deliver the result. Typical examples of this form of PSS are companies who offer to deliver a specified ‘pleasant climate’ in offices rather than gas or cooling equipment, or companies who promise farmers a maximum harvest loss rather than selling pesticides.

1.2.3 How to add value trough PSS:

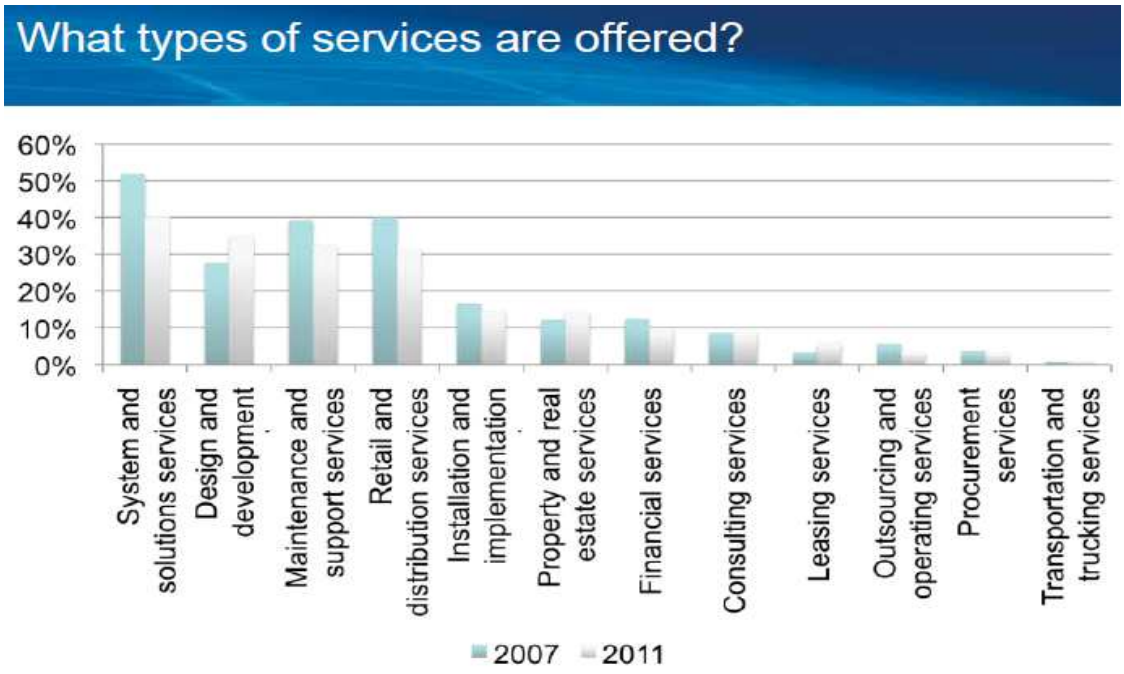
What emerges from the definition of PSS is a central role of the customer in servitized business models, so the focus of companies moves on to the value proposition offered.
A tailored and quantitative evaluation is clearly useful to evaluate whether it is a profitable business. The work of Arnold Tukker, 2004, in this direction helps us to analyze one by one the different types of PSSs and their impact on the value added offered.

- Product-related services (1) and advice and consultancy (2) usually provide some tangible value for the user by a more efficient use of materials and human resources. This is reflected in some additional material and human resource costs for the provider. A product-oriented company embarking on these types of PSS usually has to make some investments in capital and organizational transitions. There might be a benefit in terms of lower client barriers, a higher client loyalty and, due to better client contacts, some increase in the speed of innovation.
- Product lease (3) has some tangible value for the user, since various costs and activities are shifted to the provider. The provider might have to make provisions for more careless client behaviour. Since the provider remains as owner of the product, the need for capital is high. Barriers to attracting new clients are low due to low initial investment by the client. User loyalty might improve (as the product plus maintenance, etc. is provided), but the user can still easily switch to other providers. Since leasing companies use products provided by others, no influence on innovation is assumed.
- Product renting and sharing (4) in general demands a tangible sacrifice by the user. Compensation can come from the fact that he/she no longer needs to bear the capital costs of the product. It is likely that this PSS type scores low in terms of intangible value. Rental equipment in many cases does not contribute to esteem, or ‘priceless’ experiences, though there are exceptions (‘rent this BMW and be a king for a day’). The organizational system at the provider uses more input of human resources. Since the provider keeps on owning the product, capital need is high. However, due to the shared use, overall capital need in the system is considerably lower. Due to low initial costs the access barrier for new clients is low.
- Product pooling (5). The analysis is virtually the same as for renting and sharing.

- Activity management (6). Activity management shifts personnel and material costs from the user to the provider, who has to make gains by organizing the outsourced tasks more efficiently by specialized knowledge. It is important that good performance criteria can be defined, since otherwise discussion about the delivered result can arise between user and provider (risk premium issue). Since activity management is usually arranged via longer term contracts, reasonable client loyalty is ensured. The specialization might lead to a high speed of innovation.
- Pay per unit use (7). There is a clear tangible value for the user since various activities (maintenance, etc.) are outsourced to the provider. The providers' position in the value chain becomes better, in relation to direct access to clients and (enforced) client loyalty. The provider has to be able to predict the behaviour of the user, since otherwise no clear cost calculation can be made and a risk premium has to be included. Since the product stays in ownership of the provider additional capital is needed. There are low barriers for new clients, and good client contacts in principle lead to better innovation potential.
- Functional result (8). Since the same function is offered, in principle the user could give it the same tangible value. Intangible value is another matter though, and cannot be judged without defining the specific system. In principle, the provider could try to provide a solution with much lower input of human resources and materials. However, since the provider promises a result on a high level of abstraction, agreement on performance indicators, and the level of control in achieving this performance, can be an important problem (which translates to a low score on the risk premium issue). Capital costs could be low, but transition costs high. This model leaves the highest degree of freedom with regard to innovation.

Andy Neely, 2010, classified the most common services offered in servitized firms of OSIRIS database (figure 6):

Figure 6: most common services offered by firms.



Source: Andy Neely study

1.2.4 Review of engineering methods and tools for PSS

Engineering methods and tools exist which support the design, development, and production of services and aim at exploring methods and tools for the realization of PSS. A review of these methods and tools for PSS is summarized below:

(1) Service Engineering – The discipline of service engineering, which was proposed in the mid 90's in Germany and Israel (Bullinger, Fahnrich, & Meiren, 2003; Mandelbaum, 1998), is concerned with the systematic development of services using suitable models, methods, and tools. Service engineering includes methods of product service co-design (Bullinger et al., 2003), service modelling (Tomiyama et al., 2000), service CAD (Tomiyama, 2003), New Service Development (NSD) (Fitzsimmons & Fitzsimmons, 2000), etc.

- Product service co-design and service modelling claim that traditional engineering methods and tools in applied science can be borrowed for service design and development.
- Service CAD argues that computer-based tools can be used to design services and PSS, just as CAD can be used to facilitate the design of products and simulation of their behaviours under various circumstances.

- The driver for the emergence of NSD is that the product development paradigm fails to address the unique characteristics inherent in services, such as customers as a participant in the service process, intangibility, and heterogeneity of customer demand (Fitzsimmons & Fitzsimmons, 2000).

(2) Use cases and scenarios – Are software engineering approaches which can be borrowed in the design and development of PSS (Morelli, 2004).
(3) Life cycle oriented PSS design (Aurich & Fuchs, 2004) – Claims that Life Cycle Engineering (LCE) can be adopted for the design of PSS.
(4) MEPSS – Is a European Commission funded project, namely Methodology for Product Service Systems (MEPSS), which aimed to provide industry with a methodology and tools in creating new product-service offerings. All organisations, regardless of their size and market sector, can use the MEPSS methodology. However, the engineering methods and tools reviewed are mainly concerned with general service and PSS design rather than a practical implementation.
In table 1 are resumed the principles and the main features of two different development processes:

Tab 1: phases in order to develop PSS, confrontation between Aurich et al and MePSS methods

Phase IDnumber	***Industrial service design process by Aurich et al.***	***PSS design process by MePSS project***
Phase 1	**Customer demands** identification. Often accomplished by using market surveys or direct customer contacts. Concerns market potentials, feasibility, etc. Specifies a first set of objectives and requirements for a new service	**Strategic analysis** Strategic analysis will define starting position for PSS design process. It will generate common understanding of behaviour of overall system and define orientations for next actions and steps
Phase 2	**Feasibility analysis** Identification of target customers of service idea. A cost—benefit analysis is to be conducted. Necessity to perform this step results from insufficient integration of product and service design, therefore this step becomes obsolete when designing products and service in an integrated way.	**Exploring opportunities** Objective of second phase is to look at possible PSS innovation routes for future. Phase 2 stimulates creativity and invites all stakeholders into a participatory process of PSS idea creation.

Phase 3	**Concept development** Based on a selection of most promising solutions that are suited for meeting customer demands, a service can be drafted. Information requirements must be specified and a first information exchange concept is to be developed.	**PSS Idea Development** “PSS Idea Development” phase aims at developing selected PSS idea from a general description and visualization to a more precise version, and at evaluating and selecting most promising design version for further development
Phase 4	**Service modelling** Service modelling phase corresponds with classical product construction and detailing. It refers to preparing all documents that describe the design object, i.e. technical service.	**PSS Development** Main objective of this phase is detailed design of each PSS dimension (offering, system and interaction) and elaboration of specifications (specs) for PSS implementation.
Phase 5	**Realization planning** This phase covers actual planning of necessary physical and non-physical resources as specified in service model. Detailed deployment plans must be developed. Service costs must be calculated and market prices derived.	**Preparing for implementation** A new round of project management starts when company has decided to implement a PSS. In this new round, a strict and well documented project management approach should be followed
Phase 6	**Prototypical service testing** In the last phase service is tested prototypically together with key customers of enterprise. The aim thereby is to identify further improvement potentials. A start of servicing takes place at end of this phase.	

The presence of all these models and tools tells us that although PSSs are fundamental for the development of sustainable solutions, the design discipline has not yet defined an operational paradigm, i.e. a set of standard tools and methods, to design and develop PSS. The application of those tools may be different from case to case. The intrinsic complexity of some PSS requires that such tools to be used with a high degree of flexibility: ‘‘narrative’’ tools, such as scenarios and use cases should be preferred in the definition phases, whereas more ‘‘technical’’ tools are preferable for defining the structure of PSS. Furthermore different working groups may prefer narrative tools or

more technical methods according to their approach. It is worth emphasising, however, that the discussion about a methodology to design a PSS is still open and is critical for the development of sustainable solutions. A comprehensive and unique methodological approach is probably impossible in this area, where the margin of uncertainty about contextual conditions may be very high. New case studies and further applications and improvements of the proposed methods, however may contribute to define a clearer methodological approach to the design of PSS.

1.2.5 Benefits from the adoption of PSS

The PSS concept has the potential to bring about such changes in production and consumption patterns that might accelerate the shift towards more sustainable practices and societies. According to some authors, the concept might be promising for commercial companies, governments, and customers (white, A., 1999).

-For companies

Understanding PSSs provides the opportunity to see strategic new market opportunities, market trends and developments and potentially to stay competitive as patterns of production and consumption are transformed by environmental limits. The concept of a PSS facilitates innovation at a more than incremental level and has the potential to bring financial benefits. Some companies are employing elements of PSSs as a natural extension of their existing offers to customers. Others companies see it as a survival strategy where the application of PSS is seen as the centre of a new business plan. Usually such companies are forerunners and see the opportunity of being first on the market as a basis for survival.

There are different benefits of developing a PSS for manufacturing and service companies.

For manufacturing companies a service component adds/allows:

a) To attach additional value to a product, for example, financial schemes or refurbishing or upgrading.
b) To base a growth strategy on innovation in a mature industry.
c) To improve relationships with consumers because of increased contact and flow of information about consumers' preferences.
d) To improve the total value for the customer because of increased servicing and service components, which include activities and schemes that make the existing

product last longer, extend its function (upgrading and refurbishment), and make the product and its materials useful after finishing its life cycle (recycling and reuse of parts or entire product).

e) To anticipate the implications of future take-back legislation, and might have the potential to turn them into a competitive advantage.

For service companies, product components:

a) Extend and diversify the service.
b) Safeguard market share by bringing the service component into the offer that is not so easy to copy.
c) Facilitate communicating product–service information, because it is easier to convey information about more tangible products than about intangible services.
d) Safeguard a certain level of quality that is difficult to change (product quality).

-For government and society

Understanding PSSs can therefore, help to formulate policies that promote sustainable patterns of consumption and sustainable lifestyles. PSSs have the potential to offer a new way of understanding and influencing stakeholder relationships and viewing product networks, which may facilitate development of more efficient policies. At the same time, it is expected that the promotion of added services or substitutes of products and alternative schemes of product–service use can assist in the creation of new jobs. The functional economy might be more labour-intensive than an economy based on mass production and throwaway patterns of consumption. More jobs per unit of material product might be created because of such labour-intensive services as take back systems, repair, refurbishment, or disassembly. With time, however, these services might become large-scale operations that will require automatization, and which may decrease employment.

-For consumers

Consumers benefit from PSS because they receive greater diversity of choices in the market; maintenance and repair services; various payment schemes; and the prospect of different schemes of product use that suit them best in terms of ownership responsibilities. Consumers get added value through more customized offers of a higher quality (from the product/service per se and the delivery/provision). The service component, being flexible by nature, induces new combinations of products and services, better able to respond to changing needs and conditions. Consumers may be relieved from the responsibility for a product that stays under ownership of a producer for its entire life span. Through PSSs, consumers may more easily learn about

environmental features of products and how they can contribute to minimising the environmental impacts of consumption.

- For the environment

A PSS has the potential to decrease the total amount of products by introducing alternative scenarios of product use, for example, sharing/renting/leasing schemes to consumers, however, not affecting design of the products. With PSS, producers become more responsible for their product–services in case material cycles are closed. Producers are encouraged to take back their products, upgrade and refurbish them and use them again. In the end, less waste is incinerated or landfilled. The PSS approach changes the price cost systems of the present economy because "the costs of production are only a very small part of the costs involved in making a product available to the customer" (Giarini O, 1998); consumers do not pay for material goods but for intangible services. This can amplify the technical development of dematerialisation, which is already an on-going process (Hinterberger F., 1999).

1.2.6 Barriers to the adoption of PSS

The concept of PSSs is still being developed, but has already been suggested as a possible scenario of moving towards more sustainable production and consumption systems. It, is important to examine all conceivable barriers to its development, application and continuous betterment.

- It may be difficult to develop scenarios of alternative product use because they often include elements that are situated between production and consumption (sales) and several stakeholders may need to be involved in designing both the product and the service system.
- A social system or infrastructure that would accept or support the suggested product–service scenario should be found. If such a system does not exist, a completely new infrastructure or network might need to be designed that can support the environmentally benign performance of the new product.
- PSSs, require from their producer, close co-operation with suppliers and service producers or final consumers. While relationships with suppliers are addressed by rules and standards and environmentally conscious purchasing practices, downstream practices are addressed by Product Stewardship concepts. Integrated Chain

Management specifically addresses the issue of involving several actors in order to improve the environmental performance of products. There may be problems and trade-offs between co-operation and internal environmental management; the problem of choosing wrong actors who do not have the power to change or influencing events; information sharing and transparency and barriers from material flows crossing borders and a variety of regulatory frameworks in different countries.

- Although, ideally, ownerless consumption offers many advantages and hopes, it has its own problems. For instance, studies conducted reveal that the multiple use does not automatically lead to less impact on the environment (White, AL., 1999). The environmental impact depends, to a large extent, on the circumstances, schemes and conditions of use. Leasing, for example, can promote use of products which otherwise would not be affordable for customers. Without the option of leasing, the purchase could have to be postponed to a later date. On the other hand, leasing can facilitate the return of old appliances since the duration of use is monitored and they are returned after the lease has run out, if the purchase option is not executed. This could strengthen the manufacturers' interest in their own products and could improve the economic conditions for a closed cycle economy.
- Changing systems and sources of gaining profit could deter producers from employing this concept. Where point-of-sale becomes a point-of-service that operates over an extended period of time, traditional incentives can fail to reflect the real drivers of profit for the firm. A particular problem is the changeover from short term profit realization at the point-of-sale to medium and long-term amortisation periods at the point-of service. Moreover, another characteristic of PSSs that affects the usual ways of gaining profits is the possibility of raising revenue and getting profit not through sales but through efficiency provision.
- The resistance of companies to extend involvement with a product beyond point-of-sale and historical practice has been identified as a major barrier to increased manufacturer responsibility for environmental impacts of products (Giarini O., 1998). The extended involvement leads to intra-organisational and inter-organizational changes, such as closer interaction with other actors in the product–service chain. This happens partially due to inertia and fear of innovations.
- The reorientation of companies towards PSSs requires a fundamental shift in corporate culture and market engagement, which, in turn, requires time and resources to facilitate the shift. Changing the orientation of the company from product to service sale means

also changing the traditional marketing concepts. This is often met with psychological barriers in companies.

- It is quite difficult to trace the shift in service or manufacturing industries because of differences in how services are reported in national and international statistics. For example, in manufacturing companies, human resources, canteens and medical care centres for workers may be included as services or as manufacturing departments.
- Adding environmental considerations to the product development cycle is often seen as lengthening the time to market. This is even more so if the entire PSS should be designed with criteria of environmental efficiency in mind.
- Consumers might not be very enthusiastic about ownerless consumption. Numerous examples of practical applications of product–service ideas in the commercial sector did not facilitate operationalization in the private market. The successful models such as car sharing are still limited to small market niches.
- Customers' demands and purchasing behaviour appears to be potentially more complicated than expected. The assumptions that the customer is more interested in use rather than the ownership (Krutwagen B., 1999), or is looking for the use rather than the product itself does not represent current reality.

1.3 Service Paradox in manufacturing companies:

We proceed with the description of the phenomenon and later by proposing useful arrangements in order to overcome this event and to avoid it.

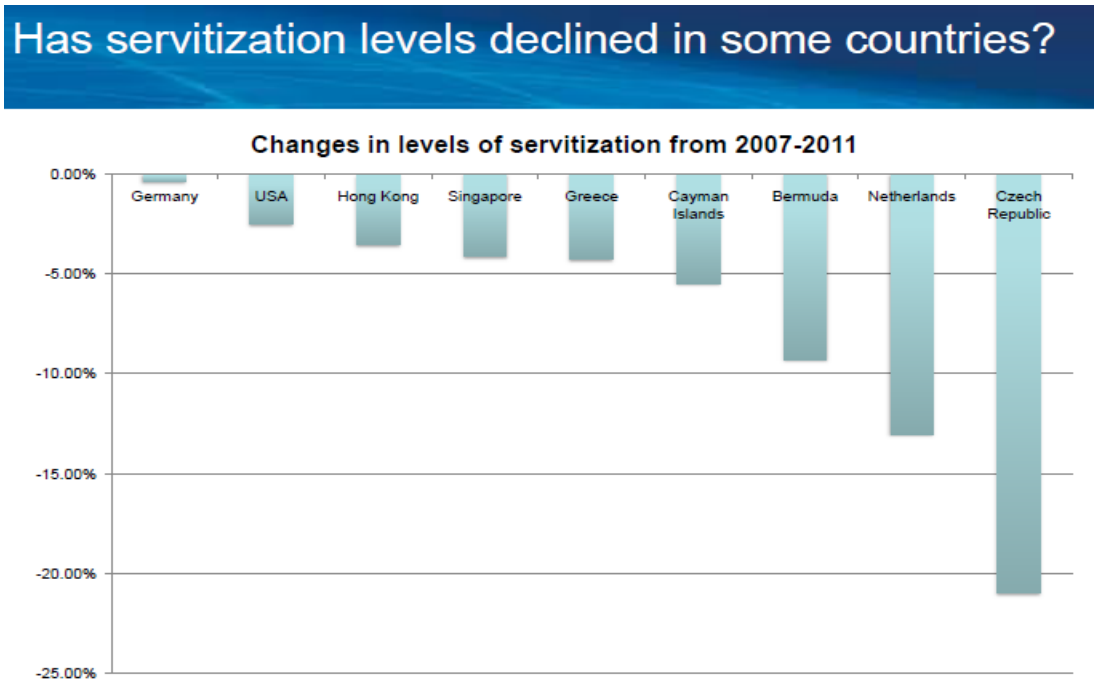
1.3.1 Definition and causes:

As stated before many manufacturing companies have extended service business to generate additional revenue and profits, but most found it very difficult to exploit successfully the financial potential of a Product–Service System. Most product manufacturers completely fail to exploit new benefits, or reach a lower share of service revenue than expected. These firms are confronted with a phenomenon called "service paradox in manufacturing companies'':

Investment in extending the service business increases service offerings and causes higher costs, but does not generate the expected higher returns (Heiko Gebauer, 2005)0.

Service paradox is generally considered as the main cause of servitization's decline in some countries (Andy Neely, 2010), figure 7:

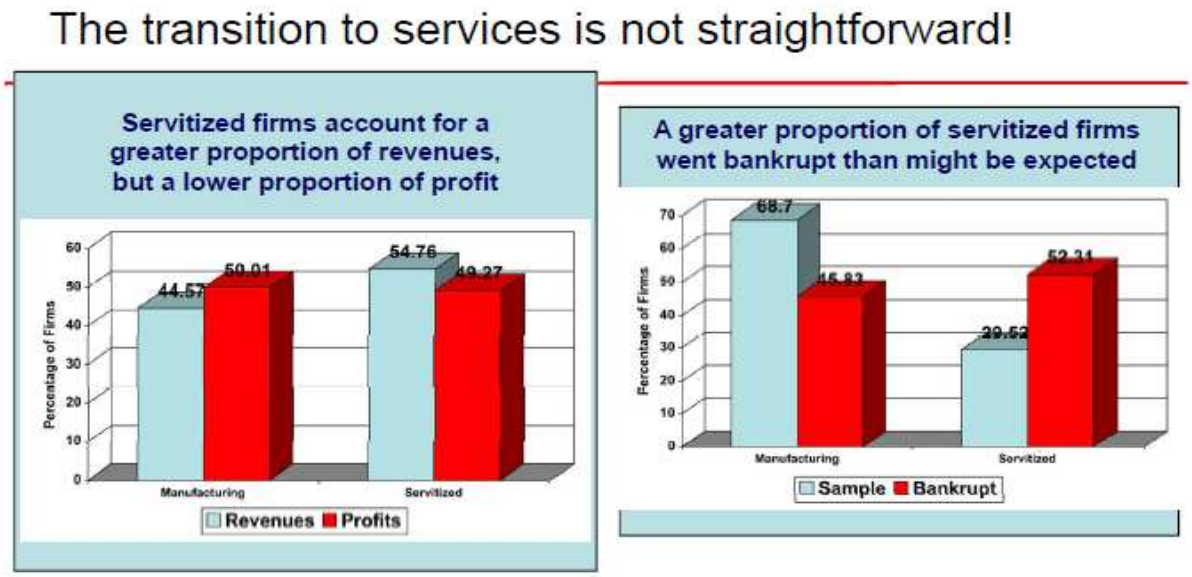
Figure 7: servitization decline.



Source: Andy Neely study

Sometimes service paradox can even lead to bankrupt (figure 8):

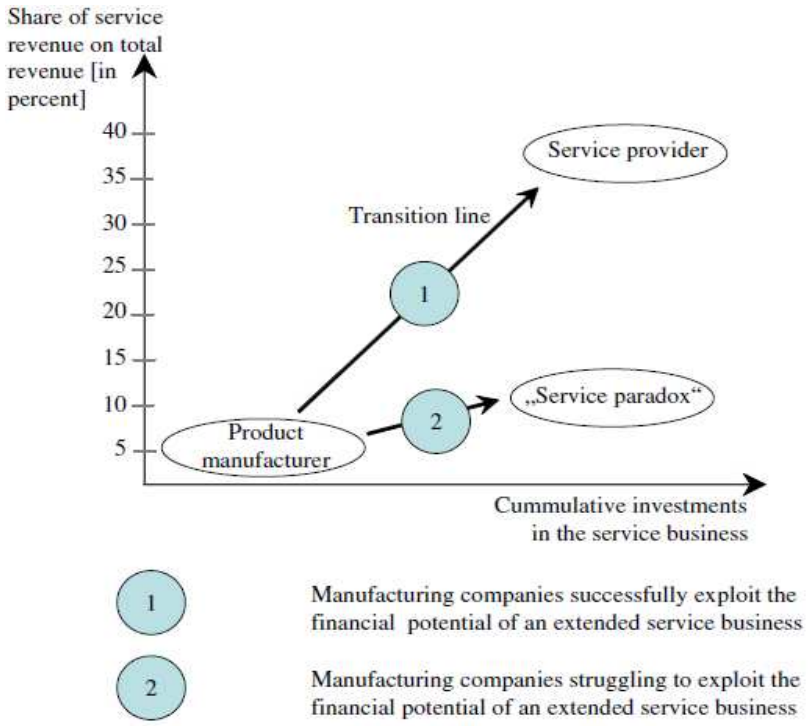
Figure 8:



While the shift to services is clear the transition to services is not straightforward – the latest research suggests that servitized manufacturers achieve lower profit margins and are more likely to go bankrupt than pure manufacturers (in the short-term).

Many product manufacturers instead of achieving a transition from products to services, leave the transition line and move into the ‘‘service paradox’’ (figure 9).

Figure 9: transition line from products to services and service paradox.



This unexpected state limits the diffusion of servitization and PSSs, and the managerial success to extend the service business.

Gebauer, Fleisch and Friedli, 2005, identified some aspects that lead companies to a “service paradox” condition:

The main factors are counterproductive cognitive processes that limit managerial motivation to extend the service business, and inadequate organizational arrangements.

The effective implementation of any change in strategy requires managerial motivation and organizational arrangements. According to the expectancy/valance theory of motivation of Vroom, 1964, managerial motivation is the product of three factors: estimation of the probability that effort will result in successful performance (expectancy),

estimation that performance will result in receiving the reward (instrumentality), and how much an individual wants a reward (valance). This means that managers are motivated to extend the service business when they place a high valance (reward) on it, perceive a high probability that their effort will result in successful performance, and believe that performance will result in receiving the reward.
Unfortunately, all three factors are limited by some cognitive phenomena:

- The first counterproductive cognitive phenomenon is an overemphasis on obvious and tangible characteristics, and this explains, for example, why managers do not place a high valance (reward) on extending the service business, limiting the investment of resources in the service area.

- The second one is the failure to recognize the economic potential of extended service business. This explains why managers seem to underestimate the probability that their efforts in the service area will result in successful performance.

- And the third and most significant cognitive process is the Risk aversion of managers in manufacturing companies. Risk aversion is a basic characteristic of human decision making and it is the main barrier to a successful service extension because managers prefer the less risky outcomes of investing resources in products. The risks in extending the service business come from two sources:
  Internal risks:
  for example, providing services that are highly customized and require a high intensity customer relationship consequently require a different set of capabilities.
  External risks:
  services often support core activities and help maximize all processes associated with the supplier's product. The supplier thus acquires an intimate knowledge of the customer's operation. A risk is incurred if customers are not willing to share this intimate knowledge with suppliers.

Other factors that may lead to a “service paradox” are related to insufficient supporting organizational arrangements. We describe these causes in the next section exposing the organizational characteristics needed to overcome the service paradox.

1.3.2 Overcoming the ‘‘service paradox’’.

The effective implementation of a service strategy and hence the overhauling of service paradox, requires not just managerial motivation, and thus change of counterproductive cognitive processes that limit it, but also supporting organizational arrangements.

There are 5 main necessary organizational aspects (Gebauer, H., 2005):

- Establishing a market-oriented and clearly defined service development process
- Focusing service offers on the value proposition to the customer
- Initiating relationship marketing
- Defining a clear service strategy
- Establishing a separate service organization
- Creating a service culture.

The following section will be focused on these issues.

1.3.2.1 Main supporting organizational arrangements:

According to Gebauer, 2005, there are five main necessary organizational arrangements to overcome and avoid the service paradox. In this section these required features will be deeply described in any aspect.

- *Establishing a market-oriented and clearly defined service development process:*

Extending the service business requires market-oriented service development. A market-orientation, particularly the identification of customer needs, constitutes an indispensable prerequisite for developing new and successful services. With a market-orientation services will be closer to the current needs of customers and more likely closer to ensure market success. Companies which succeed in extending the service business are those

which obtain comprehensive information on customer needs through different methods such as wide market research and workshops with selected customers. It is essential to understand what kind of service customers really want, otherwise services will not be accepted, and service revenues will drop dramatically.

Manufacturing companies have a clearly defined product development process, but they lack a sufficiently defined service development process as in traditional service companies. Extending the service business requires a new service-development process similar to that used in service companies. The service-development process should be defined precisely.

Successful companies divide the development process into five preliminary phases:

1. Market needs are identified
2. Based on these market needs, new service ideas are created
3. A preliminary service concept is generated
4. A pilot study is conducted
5. Services are introduced to the market.

- *Focusing service offers on the value proposition to the customer:*

The expansion of service offerings to the customer should start with product-related services. The main aim of product-related services is to ensure the proper functioning of the product and the access to it (transportation, documentation, inspection, repair, maintenance, spare parts, etc). The expansion continues with the provision of customer support services. Because of the importance of identity and reputation of providers, when evaluating new services, past success with product-related services can play an important role in reducing the risk perceived by customers in purchasing services.

Offering both product-related and customer support services enables companies to ‘‘move into the solution business”. Through offering a unique combination of product-related services and customer support services, companies are able to maximize the yield of products within the customer process. This reduces the total cost of ownership for customers. Another impact is to change the focus of customer interaction from a transaction to a relationship basis. This is directly related to the next necessary organizational arrangement: initiating relationship marketing.

- *Initiating relationship marketing:*

Because of the intangibility of service contracts, customers often use service provider identity and reputation as a proxy when evaluating service offerings. Relationship marketing provides an appropriate base for convincing more customers to buy more services and/or accept a fixed price covering all services over an agreed period. For the service provider, through relationship, established service contracts reduce the variability and unpredictability of demand over the available capacity, and allow a higher than average capacity utilization. It is important, for providers, to change firms' identity and image from selling products to offering superior services, and a new image of a highly reputable service provider helps companies convince more customers to establish a market relationship and to buy complete solutions.

The experiences of successful companies demonstrate that relationship marketing must be implemented at three different dimensions (external marketing, internal and interactive marketing). External marketing is directed very much towards making promises to customers. Internal marketing refers to ‘‘enabling promises’’ by Changing employee mind-sets, and encouraging employees to gain a better understanding of customer benefits from services. The management of continuous communication between the customer and the service organization through different interfaces is called interactive marketing.

All three dimensions (external, interactive and internal marketing) are necessary for a relationship marketing that is effectively linked to customer needs and helps convince customers to buy more services.

- *Defining a clear service strategy:*

Market-oriented service development, an extended service offering and relationship marketing must be based on a clear service strategy. All successful companies need a clearly-defined service strategy which focuses on promoting and establishing new services, and only a clear service strategy encourages companies to make the appropriate organizational arrangements and resource allocations.

When implementing a service strategy, all successful companies go through two phases (Gebauer, H., 2005). In the first phase, a service strategy can be interpreted as an

evolving strategy for manufacturing companies, because the strategy was not deliberate or explicit.

The services offered were just an add-on to the product. In the second phase there is the conscious offering of services. There is a clear intention to increase the total value creation through services and it is implemented. It constitutes a deliberate strategy.

In order to implement a successful and deliberate service strategy, there are three fundamental requirements. Firstly, a successful service strategy cannot be developed without a comprehensive understanding of the market in terms of customer needs, market potential and future service trends. Secondly, once the information which is relevant to the strategy has been collected, all areas of the company affected by service strategy are involved in the development process. All organizational components are integrated and this increases acceptance of the strategy and commitment to it. Thirdly, it is important for the entire procedure (strategy analysis, development, implementation and monitoring) to be systematic and transparent.

- *Establishing a separate service organization:*

The service organization in manufacturing companies must operate like a separate professional service organization using such performance measures as customer satisfaction, employee satisfaction and business success.

Most firms which are successful in increasing service revenue have de-centralized service organizations with profit-and-loss responsibility. The successful companies do not merely quantify targets for their service organization, they also break goals down to the level of individual employees. They link goal achievement to an incentive system. It is essential for service organizations in manufacturing companies to define goals which function consistently and in an integrated manner to meet an overall goal and also serve to motivate employees. Inappropriate goals lead to demotivated employees who fail to realize their full potential. Furthermore, a newly created service organization requires a dedicated sales force, its own service technicians, and an information system to monitor operations and achieve accounting transparency for the new service business.

- *Creating a service culture:*

Whereas typical manufacturing values often focus on efficiency, economies of scale, and the notion that variety and flexibility are costly, service-oriented values centre on innovation, customization, and the view that flexibility and variety create profits.
For companies it is difficult to change by balancing efficiency (manufacturing values) and flexibility (service oriented values), rather than by completely substituting one value set for the other. Manufacturing companies should maintain a symbiotic relationship between product and service-oriented values, and be able to overcome the typical ‘‘cultural’’ habits of product manufacturers. In some respects, these habits are counterproductive to the objective of increasing service revenue. Typical cultural habits can be found at both managerial and employee levels. Managers must be made aware of the economic potential of extended service business and should be willing to invest the necessary resources. This should be done even if the resources are invested in areas beyond the traditional core competencies of product manufacturers. Managers have to change their perception of services as an add-on, to services as ‘‘value-added’’ activities.

Previous six necessary organizational arrangements explain clearly the required organizational setting for increasing service revenue and avoiding the service paradox.

Many manufacturing companies, even though they start the organizational changes, face several unanticipated side effects during the implementation process, which may even interrupt the process.

1.3.2.2 Unanticipated side effects during the implementation process:

Here are exposed the potential subsidiary unanticipated side effects deriving from the implementation process of the organizational arrangements needful to overcome and avoid the service paradox.

- *Credibility gap:*

Managers and employees commonly underestimate the scope and difficulty of tasks. They also expect results sooner than is reasonable or realistic. When the absolute goal is set appropriately, the time allocated to reach the goal is often far too short, and this often happens especially in intangible areas such as services. In most case studies of unsuccessful service extensions, the excessively ambitious objectives were not well received. Managers must set appropriate and attainable targets, and setting appropriate goals can be achieved through participatory goal setting among managers and service workers. By so doing, employees accept goals and commit to them.

- *Service quality erosion:*

Service workers have finite resources and their time must be allocated between routine daily business and implementing new organizational arrangements. Increasing resources for organizational arrangements constrains the resources available for daily business activities, leading to less time per service order, thus eroding service quality as a short-term effect. Service quality erosion leads directly to customer complaints, lower customer satisfaction and customer loyalty. The erosion of service quality suggests that any new organizational arrangements are difficult to implement, because of the lack of resources. Managers should respond to the resource bottleneck through expanding the capacity by hiring more service workers. However, expanding capacity involves substantial time delays. Thus, managers should anticipate the resource bottleneck and hire more service workers in advance.

- *First versus second order improvements:*

First-order improvements combat symptoms in the daily service business (e.g. low customer satisfaction, etc). Second-order improvements are structural changes initiated by causes and symptoms. In order to extend the service business successfully, first-order improvements are insufficient and second-order improvements are also necessary. There are several reasons, related mainly to basic cognitive processes, why employee efforts often focus first-order rather than second-order changes. First-order

improvements which treat symptoms only, are simply more obvious and tangible than second-order causes. Concentrating on second-order improvements helps companies implement the organizational changes discussed earlier.

The credibility gap, service quality erosion and concentrating only on first-order improvements represent side effects during the implementation process of organizational arrangements. Unfortunately, managers are often unprepared for them and thus fail to reach an extended service business, and consequently their companies move into the "service paradox".

1.4 Sustainability

In this section the link between PSS and sustainability will be described, with a focus on sustainability concepts and theories. Product-Service Systems can be considered as an effective enabler for a Sustainability-Oriented Innovation (SOI). As explained later, Product-Service System (PSS) constitutes a significant approach to overcome some of the limitations of SOI and even it can spur the diffusion of SOI.

1.4.1 Origins and definition:

The idea of sustainability dates back more than 30 years, to the new mandate adopted by IUCN in 1969 speaking of 'the perpetuation and enhancement of the living world – man's natural environment – and the natural resources on which all living things depend'. And few years later it has been a key theme of the United Nations Conference on the Human Environment in Stockholm in 1972 (McCormick, J.S., 1992) The concept was coined explicitly to suggest that it was possible to achieve economic growth and industrialization without environmental damage.

Over these decades, the definition of sustainable development evolved.The Brundtland Report (Brundtland, H., 1987) defined sustainable as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. This definition cleverly captured two fundamental issues, the problem of the environmental degradation that so commonly accompanies economic growth, and yet the need for such growth to alleviate poverty.

1.4.2 The three dimensions of sustainabiliy:

The core of mainstream sustainability thinking has become the idea of three dimensions: environmental, social and economic sustainability. These have been drawn in a variety of ways, as 'pillars' (figure 10), as concentric circles (figure 11), or as interlocking circles (figure 12). The IUCN Programme 2005-8, adopted in 2005, used the interlocking circles model to demonstrate that the three objectives need to be better integrated, with action to redress the balance between dimensions of sustainability.

Figure 10: pillars of sustainability.

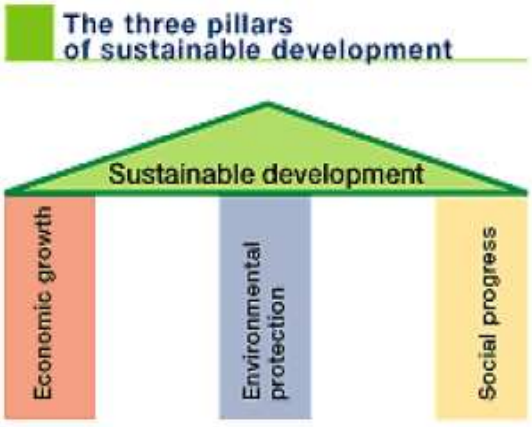


Figure 11: concentric sustainability circles.

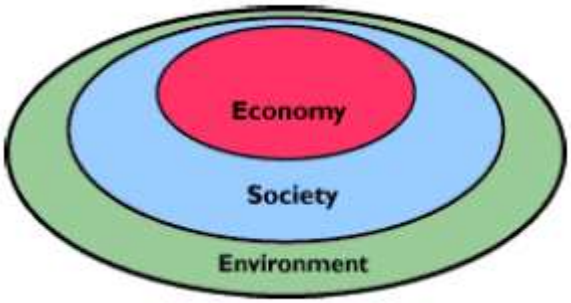
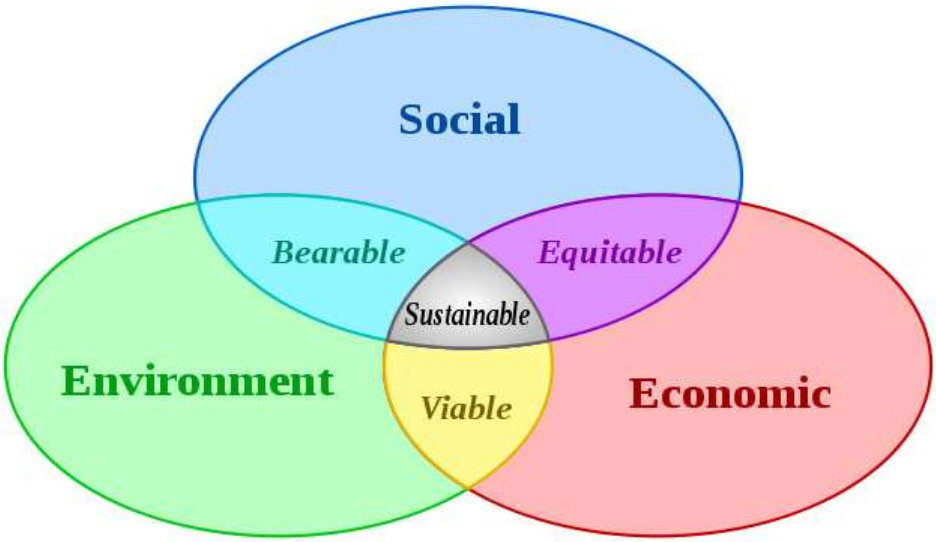


Figure 12: interlocking circles of sustainability.

The three pillars of sustainable development, from left to right, the theory, the reality and the change needed to better balance the model

The following is considered the most complete description (figure 13):

Figure 13: dimensions of sustainability.



Environmental sustainability keeps its attention mainly on four natural resources: air, water, land, mineral and energy.

Social sustainability is concerned with the company's impacts on the social systems in which it operates, as well as the company's relationship with its various stakeholders:
There are two different focuses:

Internal focus: concerns the health and well being of employees, disciplinary practices and equity and human rights aspects in employee sourcing.
External focus: concerns the impacts of the operational initiative on three different levels of society:

- Local community;
- regional;
- national level;

About economic sustainability, the relevant criteria used are:

- Financial health: the criterion entails those aspects assessing the internal financial stability of a company.

- Economic performance: the criterion assesses the company's value as perceived by shareholders, top management and government.
- Potential financial benefits: the criterion assesses financial benefits other than profits.
- Trading opportunities: the criterion assesses the vulnerability of the company's trade network as well as the risks it is exposed to by the network it is embedded in, by considering the number of national and/or international companies in the trade network.

Summarizing, sustainability can be reached only taking action on all three dimensions.

1.4.3 A new paradigm for sustainability:

Sustainability needs a new paradigm to be successfully adopted. A shift from: Maximum gain with minimum capital investment (i.e. to make profit and development from pure efficiency in the use of money) to: Maximum added value from a minimum of resources (i.e. to optimize the use of resources), (European Commission, Feb. 2009). In approaching the new millennium, industry is forced to recognize it has an obligation to society not only to create wealth but to develop sustainable production systems which minimize environmental consequences. Such objectives can only be achieved if there is the political will backed up by a coordinated R&D policy in clean and sustainable technologies (V. Chiesa et al., 1996). As society moves towards the millennium, one issue above all others is likely to dominate the development of manufacturing industry well into the 21st century, the concept of sustainable production. As a driving force sustainability will be to 21st century industry what automation was to the 20th century, and steam was to the 19th century.

Present industrial systems are not sustainable into the long term because of their demands upon the world's natural resources. Even the development of the present industrialized nations is unsustainable at current rates of consumption (V. Chiesa et al., 1996). The 1994 European Commission white paper entitled "Growth, competitiveness, employment: The challenges and ways forward into the 21st century" states that a policy for sustainable production should promote improved nature productivity of products of a

longer product lifetime, making repair and control services more attractive; some tools are (Christopher O'Brien, 1999):

- more re-use and recycling
- improved process technology
- preventive strategies
- environmental industries
- economic incentives for R&D
- fiscal incentives for R&D (tax credit schemes for research)
- efficiency in transport networks (as well as for energy)
- internalization of external costs.

Without the adoption of this new paradigm, the most important problems facing mankind in the future will be water shortages, soil erosion, collapse of fisheries, loss of forests and pollution of the atmosphere and hydrosphere (Brown, 1998).

1.4.4 Sustainability for manufacturing:

The sustainable development will be also an industrial challenge in the next years. Industries, driven by new regulations and an increasing consciousness and demand from customers and stakeholders for "greener" products and companies, require a fundamental re-think in the design of their business and of their products, to take account of all stages of a product life cycle, and a shift in manufacturing processes from cleaning technologies to clean technologies which reduce the actual level of emissions produced and the energy and other resources used during processing.

The scale of the problem is underestimated. If the objectives of sustainable production are to be achieved on a global scale, reductions in material throughput, energy use and environmental degradation of over 90% will be required by the year 2040 to meet the needs of a growing world population fairly within the planet's ecological means (Christopher O'Brien, 1999). The achievement of such ambitious objectives requires a radical re-think of many of industry's practices. Continuous improvement is not enough and a step change in environmentally related performance is required. Environmental considerations must be integrated into the corporate culture and business planning at all

levels of design, manufacturing, distribution, and disposal. The necessary reduction in production and in the demand for virgin raw materials and non-renewable resources will be more easily achieved by developing disassembly technologies, recycling and remanufacturing capabilities and product-service systems. Summarizing, some other sustainable oriented industrial principles should be (Christopher O'Brien, 1999):

- Sustainable consciousness must pervade the culture of the whole organization
- Both product and process design must address sustainable issues and incorporate them into basic design procedure
- Make maximum use and re-use of recycled components and materials
- Product life-cycle concepts must be applied to the whole manufacturing system
- Organizations must be lean as well as clean
- Re-engineering must address environmental and sustainable issues
- A company's metrics and indicators must address sustainable issues
- use of clean technologies:

As industry becomes increasingly global, and the exhaustion of the earth's natural resources and the consequences of pollution affects everyone, it is important that governments work together to develop a harmonized regulatory framework about sustainability within which all companies must operate wherever they are located and whatever the level of a country's industrial development.

1.4.5 Sustainable-Oriented Innovation through PSS:

Sustainability presents a new source of ideas and visions leading to new business opportunities and competitive advantage. The challenges of sustainability and sustainable-oriented innovation offer significant potential for product and service innovations and related business.

Two arguments support the adoption of a sustainable oriented innovation. First, new social and environmental regulations and laws increase the pressure for innovativeness ("regulatory push") (Hockerts, 2008). Second, sustainability presents new opportunities through new markets and customer segments ("market pull" or "vision pull"), (Hart, 1997).

As written before, developing products under the paradigm of SOI is risky: both the product's market success and (non-economic) sustainability effects are uncertain. Product-Service System (PSS) constitutes a significant approach to overcome some of the limitations of SOI and, additionally, it can spur the diffusion of SOI.

Approaching a SOI without a PSS model there are three main obstacles to sustainability: first, the increased aggregated resource consumption related to product manufacturing and ownership (the mere products); second, though product eco-efficiency can be strongly increased, rebound effects (Khazzoom, D., 1980) are responsible for that the overall consumption increases might exist; third, more sustainable products may be difficult to introduce and diffuse, simply because the additional environmental and social characteristics make the products too expensive for consumers.

Thus the concept of product-service systems (PSS) or servitization is one really important lever for SOI, by overcoming these obstacles.

PSS can also function as economic enabler for SOIs, and more generally, for product innovations (Manzini & Velozzi, 2002), mostly whether user or result oriented. By selling the utility of products, rather than transferring ownership, the price of using a product for the first time drops significantly, hence minimizing economic entry barriers to use products and/or services. This is extremely important in developing countries where relatively high purchasing prices constitute significant barriers to the diffusion of products. Introducing sustainability-oriented product innovations through a PSS thus can be an effective strategy to maximize positive sustainability effects.

The sustainability of a PSS model depends on whether a PSS as such is less material intensive, and whether actors in the chain feel incentives to lower impacts and material intensity even more. According to Tukker there are different mechanisms leading to impact reduction:

- Incremental/average reduction:

• Incremental efficiency improvements (e.g. by better maintenance due to a maintenance contract in a product-related service). This can lead to a more intensive use or a prolonged life of capital goods, or less use of energy and consumables in the use phase.

- High impact reductions:

• Designing products taking true life-cycle costs into account by the provider, who takes responsibility for these life cycle costs (e.g. in the case of pay per service unit). This is a strong incentive for optimizing the use of energy and consumables, and recycling of product parts and materials where possible.
• Considerably more intensive use or prolonged life of capital goods used in the system (e.g. in a product renting or sharing situation) than in a traditional product system. Intensive capital good use can also stimulate a quicker replacement by newer, more efficient models.
• Considerably less use of energy and other auxiliary materials in the use phase, (e.g. in a product pooling situation). The same use phase in energy and auxiliary material use is shared by various users.
• Use of a considerably more efficient technology made possible by a higher economy of scale (e.g. washing machines in a laundry using gas heated water rather than the electricity heated water used at home).

- Potentially very high impact reductions:

• Application of a radically different technological system with radically lower impacts (e.g. a functional result).

Each type of PSS model (Tukker, A., 2004) has a different effect on sustainability and different sustainability potential:

- Product-related service:

The majority of product-oriented PSSs do not imply any change in the technological system or how the user operates. There is no strong incentive in terms of internalizing true life cycle costs in the design process by the provider. There might be some incremental efficiency improvements due to better maintenance, or take-back provisions, although even these might be absent. The overall picture is that product-related services can lead to impact reductions, but they are quite limited.

- Advice and consultancy:

The effects here are similar to those for product-related services. Again, some kind of optimizations by the provider of PSS for using the product, which in the end can lead to incremental reductions in environmental impacts.

- Product lease:

In the case of product lease, it is not clear whether there will be impact reductions or not. In principle, the provider now also takes responsibility for maintenance, repair and control, and this could lead to incremental efficiency improvements: the product has a longer life span and might use energy and consumables more efficiently by better maintenance, repair and control. The provider may perceive an incentive to prolong the product life and may design the product accordingly. In most cases, however, lease companies buy the products they lease for third parties, and are not responsible for product design. Furthermore, the lease in general does not cover many costs in the use phase (e.g. fuel consumption in cars), so neither the lessee nor the product provider will perceive much incentive to do something about energy and consumable use in the use phase. The fact that the user no longer owns the product could even lead to negative effects, such as a careless use shortening its useful life span.

- Product renting and sharing:

Product renting and sharing implies that same product is now more intensively used. This can have high impact reductions, particularly if the life-cycle impacts are mainly related to the manufacture of the product. This PSS can have an additional bonus. In general, the user will now have to pay the integrated costs for each time he/she uses the product, unlike the case for the previous PSS types. Also, access to the product is a little more complicated. This implies that in this system the use of the product in general will be rather discouraged. This might have additional positive environmental effects, if it leads to a less-use situation, or to more frequent use of more environmental friendly alternatives (e.g. public transport as a complement to car renting or sharing).

- Product pooling:

The analysis for product pooling is similar to that for renting and sharing, with one major difference. Product pooling implies that the same product is used at the same time by more users (e.g. car pooling). This can have even more impact reductions than in the case of sharing and renting, particularly if the lifecycle impacts are related to the use of the product.

- Activity management/outsourcing:

Activity management or outsourcing usually does not imply a radical change in applied technology, organization etc. However, companies providing this PSS (financially) have to be more efficient than the company who outsourced the activity to stay in business. This can be realized by a more efficient use of capital goods and materials.

- Pay per unit use:

Two aspects concerning the pay per unit of use PSS are of relevance. First, the provider is responsible for all life cycle costs, which provides a powerful incentive to design a product that in terms of costs is optimized over all the life cycle. Second, in specific cases (e.g. pay per wash) the user will make a more conscious use of the service, though in other cases (e.g. copiers at work) this issue plays no role. A very important issue is that the provider feels an incentive to continually improve the product with life-cycle performance in mind.

- Functional result:

In principle offering a functional result has the highest potential for impact reduction. A result is promised and the provider can decide the necessary approach to deliver the result. This provider will therefore try to do so in the most effective way, searching for radical innovations.

Overall, it can be cautiously concluded that most PSSs will probably lead to some environmental improvements, or at least no worse environmental performance. The exception is formed by PSSs that make users less responsible for careful use of the product (leasing).

2. LITERATURE ANALYSIS PART 2: EXAMPLES OF PSS

In this chapter we will give several examples of PSS business models trying to explore different firms in terms of dimension, sector and proposition offered to customers. We will use the classification proposed by Tukker to clarify the type of PSS adopted, and for each case there will be a short description.

The aim of this chapter is to show business best practices of Product-Service systems, in order to demonstrate positive recorded effects derived from an effective application of PSS.

All the business found are described briefly in tab 2

Tab 2: examples given of PSS business models

Company name	Sector	Firm dimension	Geographical area	Type of PSS
Rolls-Royce	Airplane engines	Large	International	Pay per service unit
Xerox	Printing	Large	International	Pay per service unit
Osram	Lighting	Large	Local	Use-oriented Renting/sharing
Alstom	Train maintenance	Large	International	Product-oriented maintenance
Nokia	Telecommunications	Large	International	Activity management (outsourcing)
Thales	Flying simulators	Large	International	Pay per service unit
Rotterdam bike-sharing	Bike sharing	Small	Local	Use-oriented Renting/sharing

Wash-it laundry	Laundry	Small	Local	Pay per service unit
Ericsson	Telecommunications	Large	International	Activity management (outsourcing)
Virtual station	Office solutions	Medium	National	Pay per service unit
Covial	Agriculture	Large	National	Use-oriented renting/sharing
ABB	Industrial, transportation and power system	Large	International	Consultancy, outsourcing, maintenance
Autoshare	Car-sharing	Medium	Local	Use-oriented renting/sharing
WS Atkins	Integrated solutions for built environment	Large	International	Activity management (outsourcing)
Eco-lab	Cleaning solutions	Large	International	Functional result

2.1 The "Rolls-Royce" case study: Power by the hour (Ramani, A., 2007)

- Description: Rolls-Royce's "power by the hour" is an example of a successful PSS offering, probably the most successful ever recorded. PSS offers account for over 50% of Rolls-Royce's aerospace revenue. Instead of selling aircraft engines, Rolls Royce sells airline operators a guaranteed number of flying hours. The Rolls-Royce PSS offering includes use of the engine, general maintenance, and repairs anywhere around the world. For a fixed sum per flying hour, a complete engine and accessory replacement service was provided, thus allowing the operator to forecast such costs with great accuracy,

and thus relieving him of the need to purchase stocks of engines and accessories. The Total-Care Package offered to airlines by Rolls-Royce plc is an exhaustive illustration of both the business and environmental benefits of PSS. The gas turbine technology is world leading and the spares and maintenance service they offer exemplary. Furthermore, as R-R maintains direct access to the asset they can collect data on product performance and use. Such data can then enable the improvement of performance parameters (for example, maintenance schedules etc.) to improve engine efficiency, improve asset utilization, and so reduce total costs and the environmental impact.

- Sector: Airplane engines

- Firm dimension: Big (revenues >40 mln €)

- Geographical area: International

- PSS type: Pay per service unit

2.2 The Xerox case study: "Pay per copy" (TS Baines, 2007)

- Description: The Xerox Corporation defines itself as the "document company" and the knowledge company, moving away from the image of manufacturer and seller toward that of a provider of document services across all aspects of document life-cycle management from creation and manipulation to distribution, printing and storage. Xerox has a successful reverse logistic system, by realizing the re-use of parts and units of end-use products for the maintenance of other machines, and for the production of new ones. Reducing the resource use resulted in decreasing the costs of the company. In this situation, the company got interested in offering a competitively priced maintenance service together with its products (product oriented PSS). However, due to the required initial investment (purchasing copy machine), the company could lose potential consumers, and the capacity of the (bought) product is fixed for consumers. The motivation of the company was the number of products sold, and also, the economic results of the service department – which can interfere with the environmental goal of optimum lifetime and thus, the quality of machines.
Xerox changed in a more sustainable situation by a result-oriented PSS, when consumers pay per copy made, paying for the use (amount of printed document) rather than for the number of printers owned. In this case, the interest of the company is to reduce costs

considering the whole life-cycle, to optimize product lifetime, and to replace machines according to the capacity needed. This situation enhances corporate interest in reverse logistics, because at the end of the life-cycle the machine should mean resource, rather than costly waste. Xerox performs every required activity to provide its customer the capacity of printing, from the physical product (printer and consumables) to the support services (maintenance, and help to increase the efficiency in the document printing process).
In several cases, consumers do not need the copy itself, just want to archive a document, which can be performed electronically through a network. Digital copy machines have a scanner function as well as an interface for computer networks, enabling electronic data storing. Obviously, technological development made possible the formation of this result-oriented PSS, which can be considered as technology push.

- Sector: Printing

- PSS type: Pay per service unit

- Geographical area: International

- Firm dimension: Big (revenues >40 mln €)

2.3 The Osram case study: lighting Kenya (Große-Dunker, F., 2011)

- Description: In 2004, the Global Nature Fund and a local Kenyan NGO started to work on an alternative to kerosene lamps. Together with OSRAM, a leading manufacturer of lighting solutions, and SolarWorld, a manufacturer of solar panels, they developed a new solution tailored to the needs of developing countries. OSRAM manufactured portable lamps, which consisted of a rechargeable battery (O-Box) unit and a robust and waterproof energy-saving lamp (O-Lamp). Interestingly, OSRAM did not sell those lamps, but created a PSS by lending those products to local residents. In order to do so, an on-site station was established, where lamps are handed out and recharged by using solar panels installed on the rooftop of the building. This service was supported by micro loans to make it affordable to local residents. Hence, this product-based service promised cheaper, more reliable and ecologically beneficial off-grid lighting.

- Sector: Lighting

- PSS type: Renting/sharing

- Geographical area: Local

- Firm dimension: Big (revenues >40 mln €)

2.4 The Alstom case study: Train availability (Davies, A., 2007)

- Description: In the mid-1990s, Alstom Transport, a division within the Alstom group, was a product seller, which was integrated backwards into component supply. Alstom's product components were produced by two manufacturing divisions: the Passenger business unit was responsible for the design and manufacturing of rolling stock, and the Equipment business unit produced primary components including bogies, electrical, electronic and traction systems. These product components were designed and produced to meet detailed technical specifications set by Alstom's customers, the large stateowned railway companies that integrated the components and operated the railway system. At the time, Alstom's services were limited to maintenance services offered for free to clinch the product sale. Since 1995, Alstom Transport has been implementing a strategy to move from being a seller of goods to a system and service provider. This has involved moving out of low value and standardized component manufacturing. By 2001 Alstom Transport was outsourcing around 90% of the components in its rolling stock products, while continuing to design and produce critical subsystems such as traction systems. From this foothold in product component selling, Alstom has been expanding into systems integration and the provision of services to operate and maintain trains. Alstom Systems business is a pure systems integrator organization, responsible for combining components sourced from both its in-house manufacturing divisions and external suppliers. The division provides fixed infrastructure, rolling stock and signaling systems as a single integrated package. By developing its capabilities in project management, engineering and financial services combined with traditional design and build capabilities, the Systems business is able to provide customers with complete systems solutions. In 1998, a Service Business was created as a result of a strategic review of Alstom's global activities, which recognized the huge growth in the market for rolling stock maintenance services. The division offers comprehensive services to maintain rolling stock—functions previously conducted by national railway monopolies. It provides customers –the training operating companies–with complete transport solutions for ‘train availability’ during the life cycle of the product.

- Sector: Train maintenance

- PSS type: Maintenance

- Geographical area: international

- Firm dimension: Big (revenues >40 mln €)

2.5 The Nokia case study (Davies, A., et al. 2007)

- Description: For many years, Nokia was a second-tier player in cellular equipment, a market that suffers, like many technology-driven markets, from short product cycles, weak product differentiation, and rapid price erosion. Then, though, Nokia has emerged as the leading player, displacing the once-dominant Motorola, and has been able to generate healthy profits. Nokia has succeeded by looking beyond its traditional products and addressing all the equipment and service needs of the cellular carriers that are its customers. It saw, back in the mid-1990s, that carriers were facing three new challenges. First, cellular's analog technology was being replaced by digital technology, which the carriers had little expertise in. Second, the carriers were struggling to expand their networks quickly enough to meet the rapid growth in demand. Third, the numerous smaller carriers born in the wake of the U.S. government's 1995 spectrum auctions needed much more support than the phone companies that had long dominated the cellular business. Nokia responded by creating a comprehensive array of products, including handsets, transmission equipment, and switches, that could be easily deployed by carriers. Along with the products, it provided a range of services. It helped the carriers plan and manage their networks, meet zoning requirements for the construction of new transmission towers, and provide maintenance and technical support to customers. By purchasing this single set of products and services, the carriers could save considerable time and expense. Nokia's integrated-solution business model has enabled it to create tremendous customer allegiance, capture a large share of customers' high margin network-infrastructure spending, and earn recurring service and upgrade revenues. While mobile - phone handsets represent Nokia's largest share of sales, its highest margins and profits come from the associated network-development services. The company then had a net margin roughly four times that of Motorola (12% versus 3% for the years 1996-1998), and its market value has grown from $1 billion in 1990 to $65 billion in 2000, far surpassing the performance of other cellular-equipment providers.

- Sector: Telecommunications

- PSS type: Activity management (Outsourcing)

- Geographical area: International

- Firm dimension: Big (revenues >40 mln €)

2.6 The Thales case study: Flying hours (Davies, A., et al. 2007)

- Description: Thales Training and Simulation (TT&S) is part of the aerospace business of the Thales group, a large defense and electronics manufacturer. Until the mid-1990s, TT&S was one of the world's largest manufacturers of flight simulators. It supplied its defence (military air forces and departments of defence) and civil airline customers with stand-alone flight simulators and computer-based training devices. TT&S designed, manufactured and integrated key components in the final product and its customers used simulators to train pilots. By 2000, however, Thales had outsourced much of its standardized component manufacturing activities in order to focus on the core systems integration task. It is working with a network of external component suppliers to ensure that product components conform to TT&S's overall systems design and can be tailored exactly to a customer's requirements. In the defense sector, TT&S changed its strategy in the late 1990s to provide flight training services. Thales Defense is taking over responsibility for pilot training and other services previously performed by its military customers. As Vice Chairman of Thales, explained: 'Whereas a few years ago you could sell a unit and walk away, generating a profit now depends more on selling services, selling hours on simulator services'. Thales provides military customers with simulators and training services as integrated 'training solutions' by offering to train pilots over the 20– 25 year life cycle of a simulator. In civil markets for flight simulators attempts to move flight training have been frustrated by training organizations, including the airline customers (with their own in-house training facilities) and specialized independent training schools, which purchase simulators and already provide an extensive range of flight training services. As major airlines have outsourced training, it has been the training schools–rather than simulator producers–which have taken on the training tasks, despite the efforts of Thales and other producers to move into training services.

- Sector: Flying simulators

- PSS type: Pay per service unit

- Geographical area: International

- Firm dimension: Big (revenues >40 mln €)

2.7 The bike sharing case study: Moving through the city (DeMaio, P., 2009)

- Description: A bicycle sharing system is a service in which bicycles are made available for shared use to individuals who do not own them. The central concept of these systems is to provide free or affordable access to bicycles for short-distance trips in an urban area as an alternative to motorized public transportation or private vehicles, thereby reducing traffic congestion, noise, and air pollution. Bicycle sharing systems can be divided into two general categories: "Community Bike programs" organized mostly by local community groups or non-profit organizations; and "Smart Bike programs" implemented by government agencies, sometimes in a public-private partnership. Bike sharing, or public bicycle, programs have received increasing attention in recent years with initiatives to increase bike usage, better meet the demand of a more mobile public, and lessen the environmental impacts of our transport activities. Originally a concept from the revolutionary 1960s, bike sharing's growth had been slow until the development of better methods of tracking the bikes with improved technology. This development gave birth to the rapid expansion of bike sharing programs throughout Europe and now most other continents.

- Sector: Bike sharing

- PSS type: Sharing

- Geographical area: Local

- Firm dimension: Small (revenues < 7 mln €)

2.8 The laundry case study: get the job done (Mont, O., 2004)

- Description: The service provider comes and picks laundry from households and drops it back to them when it is washed and dry. When booking the subscription householders can agree a time for collection and return every week. Usually the clean and dry washing is returned two days after the collection. This is a result oriented PSS in which service providers use their own equipment and formal labour to produce valuable outcomes for householders, e.g. clean clothes and linen. In broad terms, these PSS may complement traditional household goods (e.g. washing machines used by householders), stimulate household consumption of lightweight versions of household goods as these may be used infrequently by householders if consuming a service as a complement or substitute traditional household consumption entirely.

- Sector: Laundry

- PSS type: Pay per service unit

- Geographical area: Local

- Firm dimension: Small (revenues < 7 mln €)

2.9 The Ericsson case study (Davies, A., 2007)

- Description: During the 1980s and 1990s, Ericsson evolved from a broadbased manufacturer of telecoms equipment to focus on the supply of complete mobile communications systems. In 1996, Ericsson formed two main product divisions for mobile communications: a terminal division responsible for producing mobile handsets and a systems division responsible for all the components (e.g. radio base stations, databases, operating systems and switches) integrated into mobile communication systems. At this time, services were provided by the product divisions. In 1996, Ericsson's Corporate Executive Committee completed a strategic plan, called '2005—Ericsson entering the twenty-first century', which initiated its strategy to provide mobile operators with 'solutions and services'. The report recognized the trend for mobile operators to outsource many network design, systems integration and operational activities previously performed in-house. In 1999, Ericsson combined its resources in service offerings and business consulting activities to create Ericsson Services, 'thus strengthening Ericsson's position as complete supplier, system integrator and partner'. In June 2000 Ericsson's systems integration and service

activities were brought together to form a new division called Ericsson Global Services to provide integrated solutions for mobile phone operators throughout the world. In 2001, Global Services became one of Ericsson's five business units, responsible for developing a global service portfolio and supplying staff and resources to help the front-end units design and sell solutions. The division is responsible for providing a portfolio of simplified and standardized services called 'Advise, Integrate, Manage' which are configured to meet each mobile operator's needs for customized solutions. Since the late 1990s, Ericsson has outsourced an increasing proportion of its manufacturing activities. By 2001, many of Ericsson's products (including exchange equipment, radio base stations and handsets) were outsourced and manufactured under contract by Flextronics, the specialized product seller. In 2003 Ericsson made another reorganization to support its move into integrated solutions. It formed 28 market units and created customer-facing units to deal with its largest global customer accounts. Under this organization, all activities with mobile operators from strategic engagement to solutions delivery are undertaken by the customer facing units. Ericsson's in-house product and service divisions are providers of components delivered through a global network of customer-facing units.

- Sector: Telecommunications

- PSS type: Activity management (Outsourcing)

- Geographical area: international

- Firm dimension: Big (revenues >40 mln €)

2.10 The Virtual Station case study: virtual office service system (Vezzoli, C., 2006)

- Description: Virtual Station is a Brazilian company that supplies a full range of services and infrastructure for a complete office. Clients only pay for the periods in which they use the service. Like other 'Virtual Offices', they plan spaces to provide efficiency and comfort, at a lower cost. They are equipped with computers, printers, scanners, access to internet, TV, video recorders, air conditioning, copiers and bookbinding services, and also secretarial services such as reception, personalized phone answer, phone calls, etc. More specialized services are also accessible such as support for advertising campaigns, administrative assistance and bank services. Logistic solutions include lease of rooms for meetings,

consultations or interviews with candidates, and coffee-break service. Virtual Station provides a complete turn-key office solution to its customers.

- Sector: Office solutions

- PSS type: Pay per service unit

- Geographical area: National

- Firm dimension: Medium (7 mln € < revenues < 40 mln €)

2.11 The COVIAL case study: co-operative of the biggest wine-company in Brazil (Charter, M., 2006)

- Description: The COVIAL is a co-operative established within the Vinicola Aurora Ltda, the biggest wine-company in Brazil. It has 300 employees and sales of about 50.000.000$ per year. They produce 16% of the global wine production in Brazil, quantified as 34.000.000 liters every year. Vinicola Aurora Ltda produces reds, whites, sparkling wine and grape juice. The COVIAL co-operative has 1300 associates and is the biggest wine market co-operative in Brazil. The co-operative makes use of 45.000.000 kg of grapes per year. It provides enabling platforms and a final service to its associates, supplies technical equipment to work on the vineyards and purchases seedlings from Italy, France and South Africa. It also buys dung, herbicides and various pesticides and resells these to associates. In addition, four agronomists and two technicians are at the associates' disposal training courses on vineyard management. Associates pay for services, equipment and materials when they deliver their produce, a part of their final fee (dependent on their size) is held back to cover the running costs of the co-operative. The outcome is that different wine producers have established a network and a structured service centre, to create their own self sustaining Product-Service System.

- Sector: Agriculture

- PSS type: Renting/Sharing

- Geographical area: National

- Firm dimension: Big (revenues >40 mln €)

2.12 The ABB case study: turn-key solutions (Davies, A., 2007)

- Description: ABB is a global leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. Adopting “customer centric” thinking involves gaining a detailed understanding of the activities a customer performs in using and operating a product through its lifecycle, from sale to decommissioning. ABB was among the first firms to adopt a full customer-centric approach. During the 1980s, ABB’s local customer profit centers became responsible for listening to their customers, identifying their needs for industrial, transportation and power systems, and providing solution to match with products and services from ABB’s global network of specialized suppliers.

- Sector: Industrial, transportation and power systems

- PSS type: Consultancy, outsourcing, maintenance.

- Geographical area: International

- Firm dimension: Big (revenues >40 mln €)

2.13 The AutoShare case study: car sharing service (Ulrike Huwer, 2004)

- Description: AutoShare, (Toronto, Canada), is a private corporation providing a car sharing service. It began to operate at the end of 1998 and today it has a fleet of 19 cars and a membership of approximately 260 people. Cars are stationed near member’s homes and accessible 24 hours a day via a telephone reservation system. Members can use the car for as little as one hour, or as long as they like. To obtain these benefits, members pay a small subscription fee to AutoShare to contribute to the fixed costs of the company, and are then charged only for the hours that they use the car. Essentially a member pays for the mobility they use (rather than needing to outlay a large amount of money for something that will spend most of its time immobile). All AutoShare cars are stationed at, or very near, a transit stop of the public transport system of Toronto, which consists of subway trains, streetcars and buses. AutoShare currently has a partnership with a local car rental agency where it obtains nearly new cars from the agency for short-term leases, and in return, sends the agency the longer-term rental business which Autoshare cannot accommodate. Initially the motive for starting this service was as a means to alleviate the parking congestion in

Toronto's 'downtown', later it became apparent that large scale car sharing could also have a positive impact on traffic congestion and air quality in the city, and at the same time add a new component to the currently available transport options. The business is now attempting to establish a Canadawide car sharing association with cross use agreements. For example, allowing a member to fly from Toronto to Montreal and use a car from another car-sharing business. AutoShare is also involved in a joint promotion scheme with the Transport Authority in Toronto, where people who buy annual metro-passes from the Transport Authority are given a substantial discount option on their subscription to AutoShare.

- Sector: Car-sharing

- PSS type: Sharing

- Geographical area: Local

- Firm dimension: Medium (7 mln € < revenues < 40 mln €)

2.14 The WS Atkins case study: infrastructure and the built environment (Davies, A., et al. 2007)

- Description: In the mid-1990s, Atkins was a seller of services such as project management, technical consultancy and support services across sectors as diverse as transport, property management, defense and public health. Atkins implemented a strategy in 1998 to reorganize the firm to meet customer demand in the public and private sectors for longer-term contracts involving the provision of an increasing range of services. The firm's objective was to become the world's first choice supplier for technical services and integrated solutions for the built environment. Since 1999, Atkins has continued to develop its portfolio of services by acquiring firms offering specialized services such as facilities management and property services. Atkins is today a systems integrator and service provider, with no in-house manufacturing capabilities. Atkins designs and project manages the integration of systems supplied large product suppliers across different industries. For example, Atkins Rail buys and integrates equipment from railway manufacturers (e.g. Alstom, Siemens and Bombardier). By offering multi-vendor solutions to its customers, Atkins Rail can compete with systems sellers to perform the role of systems integrator on major contracts.

- Sector: Technical services and integrated solutions for the built environment

- PSS type: Activity management (Outsourcing)

- Geographical area: International

- Firm dimension: Big (revenues >40 mln €)

2.15 The Eco Lab case study (Ecolab, 2011)

Ecolab is a fast growing and global provider of commercial cleaning, sanitation and service solution. In every market segment, Ecolab delivers a growing range of products, systems and services. PSS thinking is the routes of the company. Ecolab provides reliable and efficient methods for maximizing food safety and quality. Instead of selling cleaning chemicals, complete hygienic solutions are offering. The company overtakes the responsibility for ensuring a hygienic work environment for its customers. Integrated solutions help to improve efficiency of use of chemicals and greatly reduce the risk of contamination. Ecolab offers innovative “total solutions” for superior performance in cleaning and disinfection in institutional markets, safety and ease of use for the institutional market by going beyond products and systems with exceptional training, service and support.

- Sector: Cleaning solutions

- PSS type: Functional result

- Geographical area: International

- Firm dimension: Big (revenues >40 mln €)

As anticipated above, PSS offers are nowadays a successful reality for many companies. The previous case studies are only some recorded examples of its winning diffusion, and they are the best proof of the very positive effects on firms coming from its correct implementation.

3. LITERATURE ANALYSIS PART 3: BUSINESS MODELS

3.1 The concept of business model

‘Business model' is a term often used to describe the key components of a given business. Surprisingly, the popularity of the term "business model" is a relatively young phenomenon. Though it appeared for the first time in an academic article in 1957 (Bellman, R., 1957) and in the title and abstract of a paper in 1960 (Jones, GM, 1960) it rose to prominence only towards the end of the 1990s.

Both business and model, by themselves have a specific meaning. In combination that meaning mirrors many of the possible applications of the business model concept. The word model can be interpreted as "a simplified description and representation of a complex entity or process" (Osterwalder, 2005). Representation implies conceptualization, which can be described as “the objects, concepts and other entities that are assumed to exist in some area of interest and their inter-relationship (Genesereth, 1987). The word business can be interpreted as "the activity of providing goods and services involving financial, commercial and industrial aspects" (Osterwalder, 2005). Putting these elements together we propose that the reflection on the business model concept must go in the direction followed by Osterwalder, 2005: “A business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm”. Here are proposed other definitions of “business model” from the literature selected by Zott et al, 2011:

Selected Business Model Definitions

Author(s), Year	Definition	Papers Citing the Definition
Timmers, 1998	The business model is "an architecture of the product, service and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; a description of the sources of revenues" (p. 2).	Hedman & Kalling, 2003
Amit & Zott, 2001; Zott & Amit, 2010	The business model depicts "the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities" (2001: 511). Based on the fact that transactions connect activities, the authors further evolved this definition to conceptualize a firm's business model as "a system of interdependent activities that transcends the focal firm and spans its boundaries" (2010: 216).	Hedman & Kalling, 2003; Morris, Schindehutte, & Allen, 2005; Zott & Amit, 2007, 2008; Santos, Spector, & Van Der Heyden, 2009; Bock, Opsahl, & George, 2010
Chesbrough & Rosenbloom, 2002	The business model is "the heuristic logic that connects technical potential with the realization of economic value" (p. 529).	Chesbrough, Ahern, Finn, & Guerraz, 2006; Chesbrough, 2007a, 2007b; Teece, 2007, 2010
Magretta, 2002	Business models are "stories that explain how enterprises work. A good business model answers Peter Drucker's age old questions: Who is the customer? And what does the customer value? It also answers the fundamental questions every manager must ask: How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?" (p. 4).	Seddon, Lewis, Freeman, & Shanks, 2004; Ojala & Tyrväinene, 2006; Demil & Lecocq, 2010
Morris et al., 2005	A business model is a "concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets" (p. 727). It has six fundamental components: Value proposition, customer, internal processes/competencies, external positioning, economic model, and personal/investor factors.	Calia, Guerrini, & Moura, 2007
Johnson, Christensen, & Kagermann, 2008	Business models "consist of four interlocking elements, that, taken together, create and deliver value" (p. 52). These are customer value proposition, profit formula, key resources, and key processes.	Johnson & Suskewicz, 2009
Casadesus-Masanell & Ricart, 2010	"A business model is . . . a *reflection* of the firm's *realized* strategy" (p. 195).	Hurt, 2008; Baden-Fuller & Morgan, 2010
Teece, 2010	"A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value" (p. 179).	Gambardella & McGahan, 2010

According to Osterwalder, 2005, we can find two different interpretations of the concept of business model; some authors use the term to simply refer to the way a company does business whilst others emphasize the model aspect. In other words, for business models, the

quest is to identify the elements and relationships that describe the business a company does. Thus, the business model concept can best be understood as a conceptual view of a particular aspect of a specific company.

Along the literature in the last 10 years, it is possible to find several business modeling frameworks. Although not all of them are called as frameworks, they are named sometimes canvas, steps, methodologies, approaches, etc, SustainValue, (2012).

Following business model frameworks are exposed by using the descriptions proposed by SustainValue, (2012):

Betz, 2002, describes the creation process of generic business model through inputs and outputs from the business and presents 6 generic strategic business models: Strategic Finance, Strategic Response, Strategic Enterprise, Strategic Learning, Strategic Firm and Strategic Innovation. For each business model are shown their inputs, outputs and the competitive advantage of each of them.

Richardson, 2008, developed a business model framework organized around the concept of value for the execution of business strategy. Its three major components are the value proposition, the value creation and delivery system and the value capture:

Tab 3: Components of the business model framework developed by Richardson, 2008.

Component	**Description**
Value proposition	What the firm will deliver to its customers, why they will be willing to pay for it, and the firm's basic approach to competitive advantage.
Value creation and delivery System	How the firm will create and deliver that value for its customers and the source of its competitive advantage.
Value capture	How the firm generates revenue and profit.

Teece, 2010, defines some steps in order to design a competitively sustainable business model:

1) Segment the market

2) Create a value proposition for each segment

3) Design and implement mechanisms to capture value from each segment

4) Figure out and implement “isolating mechanisms” to hinder or block imitation by competitors, and disintermediation by customers and suppliers.

A competitively sustainable business model requires a strategic analysis filter.

Teece, 2010, highlights that understanding how to deliver value to the customer and how to capture value are. However, he considers sustainability only regarding economic subsistence and uniqueness of the business model. Moreover he states 3 factors that prevent from imitation of a company’s business model:

1) Implementing systems, processes and assets hard to be replicated

2) Keeping a level of opacity, that prevents outsiders to understand all details of how the business model works

3) Other firms already in the market may not copy the business model if it involves cannibalizing their existing sales and profits or upsetting current important business relationships.

To conclude we go back to Osterwalder’s work to describe several areas of contribution where business model can help administrators in managing firms. Five categories of contribution and usefulness of business models are identified:

• understanding and sharing,

• analyzing,

• managing,

• prospects

• patenting of business models.

Tab 4: Contribution categories of a business model

BM contribution category in managing firms	***Contributions to the business logic***
UNDERSTANDING AND SHARING	Capture Visualize Understand Communicate and share
ANALYZING	Measure Track and Observe Observe
MANAGING	Design React Align Improve Decision Making
PROSPECTS	Innovate Business Model Portfolio Simulate and Test
PATENTING OF BUSINESS MODELS	Important role in legal domain

By analyzing several business models we noticed a tendency to refer to a specific field, for example in the last years have emerged a huge number of models specific for new technologies and for the web selling sector. Moreover the models are often written by academic authors for people who need a technical background to be able to better appreciate them. Osterwalder inverses this direction by proposing a new business model that can be adapted for every potential business and by combining to words a figurative way of explanation very easy to understand even for people with a relative know how in firm management. The continued use of examples makes the concepts exposed clear to comprehend, moreover the case studies proposed intrigue the reader and his book is enjoyable to read despite its size.

The simple view gave to this framework is not a limit to its exhaustiveness. We found this model very complete, giving attention to all the areas considered critical by previous writers. For these reasons we decided to adopt this business model for our work on Product-Service-System trying to match the Tukker model for PSS type and the Osterwalder business model. Moreover it is interesting to verify the versatility of this framework by applying it in the niche sector of agricultural machinery.

3.2 Focus on Osterwalder business model

Business model innovation is not a new practice. Business model innovation is about creating value, for companies, customers, and society. In the fifteenth century, when Johannes Gutenberg sought applications for the mechanical printing device he had invented he was practicing business model innovation, in 1950 the founders of Diners Club, introducing credit card, and Rolls-Royce, when it introduced “Power by the hour” payment system, they also practiced business model innovation.
Business model innovation is about replacing outdated models, it describes the rationale of how an organization creates, delivers, and captures value (Osterwalder, A., and Pigneur, Y., 2010).

Osterwalder proposes a new way to describe business model through nine basic building blocks that show the logic of how a company intends to make money. The nine blocks cover the four main areas of a business: customers, offer, infrastructure, and financial viability. According to Osterwalder the business model is a framework for a strategy to be implemented through processes, systems, organizational arrangements, and the nine blocks describe simply and adequately this framework.

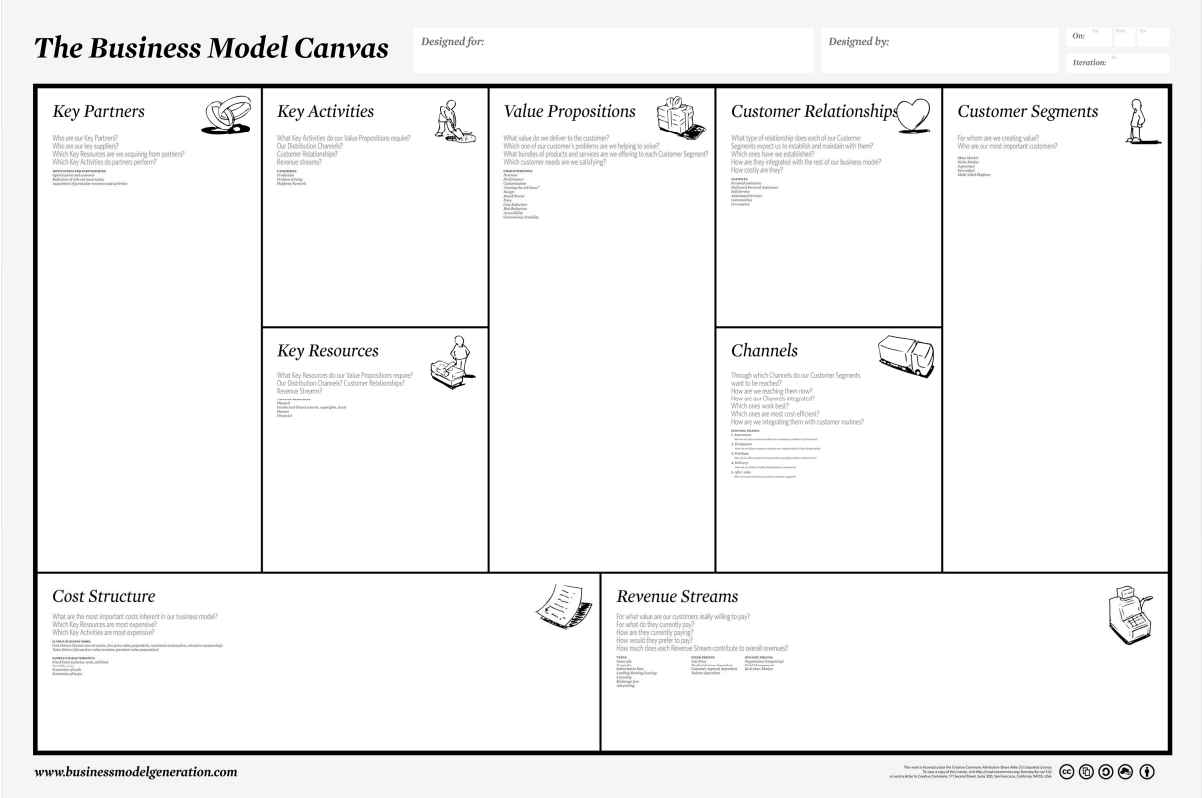
The nine building blocks proposed by Osterwalder are (Osterwalder, A., and Pigneur, Y., 2010):

Tab 5: Osterwalder building blocks

Osterwalder building block	**Connotation**
Customer Segments	An organization serves one or several Customer Segments
Value Propositions	It seeks to solve customer problems and satisfy customer needs.
Channels	Value propositions are delivered to customers through communication, distribution, and sales Channels.
Customer Relationships	Customer relationships are established and maintained with each Customer Segment.
Revenue Streams	Revenue streams result from value propositions successfully offered to customers.
Key Resources	Key resources are the assets required to offer and deliver the previously described elements...
Key Activities	...by performing Key Activities.
Key Partnerships	Some activities are outsourced and some resources are acquired outside the enterprise.
Cost Structure	The business model elements result in the cost structure.

Osterwalder uses a strategic template to represent each block, called the Business Model Canvas (figure 14):

Figure 14: The Osterwalder business model canvas.



3.2.1 Customer segments

The Customer Segments Building Block defines the different groups of people or organizations an enterprise aims to reach and serve.

Customers represent a central position of any business model. In order to better satisfy customers, a company may group them into distinct segments with common needs, common behaviors, or other attributes. Customer groups represent separate segments if:

- Their needs require and justify a distinct offer
- They are reached through different Distribution Channels
- They require different types of relationships
- They have substantially different profitability
- They are willing to pay for different aspects of the offer

A business model may define one or several Customer Segments. An organization must make a conscious decision about which segments to serve and which segments to ignore. Once this decision is made, a business model can be carefully designed around a strong understanding of specific customer needs.

Tab 6: Types and characteristics of customer segments

Types of Customer Segment	**Characteristics**
Mass market	Mass market customer segments don't distinguish within them between different customer groups.
Niche market	Niche markets are focused on specific, specialized Customer Segments.
Segmented	Business models distinguish between market segments with different needs and problems.
Diversified	A diversified customer business model serves two unrelated Customer Segments with very different needs and problems.
Multi-sided platforms (or multi-sided markets)	Some organizations serve two or more interdependent Customer Segments. All segments are required to make the business model work.

3.2.2 Value proposition

The Value Propositions Building Block describes the bundle of products and services that create value for a specific Customer Segment. The Value Proposition is the reason why customers turn to one company over another. It solves a customer problem or satisfies a customer need. Each Value Proposition consists of a selected group of products and/or services that caters to the requirements of a specific Customer Segment. In this sense, the Value Proposition is an aggregation of benefits that a company offers customers.

Tab 7: Types and characteristics of value propositions

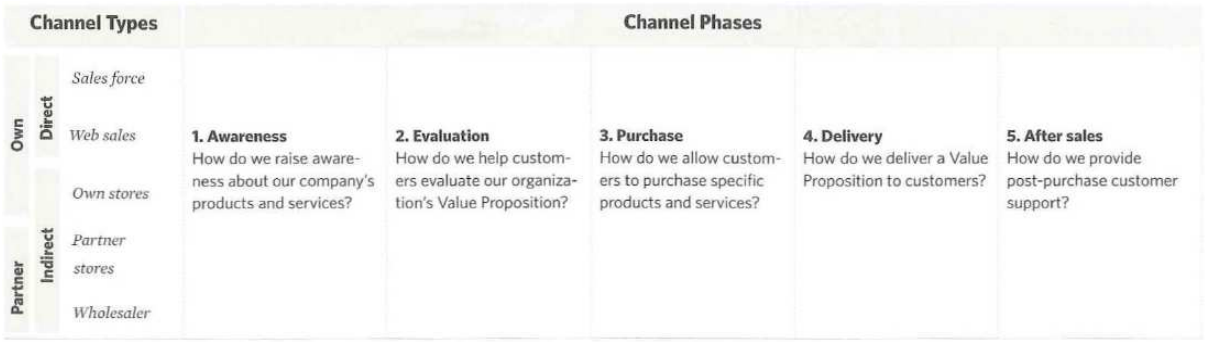
Types of Value Proposition	**Characteristics**
Newness	Some Value Propositions satisfy an entirely new set of needs that customers previously didn't perceive because there was no similar offering.
Performance	Improving product or service performance has traditionally been a common way to create value.
Customization	Tailoring products and services to the specific needs of individual customers or Customer Segments creates value.
"Getting the job done"	Value can be created simply by helping a customer get certain jobs done. Rolls-Royce (Ramani, A., 2007) understood this very well
Design	A product may stand out because of superior design. In the fashion and consumer electronics industries, design can be a particularly important part of the Value Proposition.
Brand/status	Customers may find value in the simple act of using and displaying a specific brand.
Price	Offering similar value at a lower price is a common way to satisfy the needs of price-sensitive Customer Segments.
Cost reduction	Helping customers reduce costs is an important way to create value.
Risk reduction	Reducing the risks customers incur when purchasing or using products or services.

Accessibility	Making products and services available to customers who previously lacked access to them is another way to create value.
Convenience/usability	Making things more convenient or easier to use can create substantial value.

3.2.3 Channels

The Channels Building Block describes how a company communicates with its Customer Segments and reaches them to deliver a Value Proposition. Communication, distribution, and sales are possible through Channels and compose a company's interface with customers; they are customer touch points that play an important role in the customer experience (figure 15):

Figure15: customer touch points:



Channels have five distinct phases (awareness, evaluation, purchase, delivery, after sales) and each channel can cover some or all these phases. There are direct Channels and indirect ones, as well as owned Channels and partner Channels or a mix of both. Finding the right mix of Channels to satisfy how customers want to be reached is crucial in bringing a Value Proposition to market. Owned Channels can be direct, such as an in-house sales force or a Web site, or they can be indirect, such as retail stores owned or operated by the organization. Partner Channels are indirect and span a whole range of options, such as wholesale distribution, retail, or partner-owned Web sites. Partner Channels lead to lower margins, but they allow an organization to expand its reach and benefit from partner strengths. Owned Channels and particularly direct ones have higher margins, but can be costly to put in place and to operate. It is important to find the right balance between the

different types of Channels, to integrate them in a way to create a great customer experience, and to maximize revenues.

3.2.4 Customer relationship

The Customer Relationships Building Block describes the types of relationships a company establishes with specific Customer Segments. A company should clarify the type of relationship it wants to establish with each Customer Segment. Relationships can range from personal to automated. Customer relationships may be driven by the following motivations:

- Customer acquisition
- Customer retention
- Boostingsales (upselling)

Tab 8: Types and characteristics of customer relationships

Types of Customer Relationship	**Characteristics**
Personal assistance	This relationship is based on human interaction. The customer can communicate with a real customer representative to get help during the sales process or after the purchase is complete.
Dedicated personal assistance	This relationship involves dedicating a customer representative specifically to an individual client. It represents the deepest and most intimate type of relationship and normally develops over a long period of time.
Self·service	In this type of relationship, a company maintains no direct relationship with customers. It provides all the necessary means for customers to help themselves.
Automated services	This type of relationship mixes a more sophisticated form of customer self-service with automated processes. For example, personal online profiles give customers access to customized services.

Communities	Companies are utilizing user communities to become more involved with customers/prospects and to facilitate connections between community members. Many companies maintain online communities that allow users to exchange knowledge and solve each other's problems.
Co-creation	More companies are going beyond the traditional customer-vendor relationship to co-create value with customers. Some companies engage customers to assist with the design of new and innovative products.

3.2.5 Revenue streams

The Revenue Streams Building Block represents the cash a company generates from each Customer Segment (costs must be subtracted from revenues to create earnings). Each Revenue Stream may have different pricing mechanisms, such as fixed list prices, bargaining, auctioning, market dependent, volume dependent, or yield management.

A business model can involve two different types of Revenue Streams:

- Transaction revenues resulting from one-time customer payments
- Recurring revenues resulting from ongoing payments to either deliver a Value Proposition to customers or provide post-purchase customer support

There are several ways to generate Revenue Streams:

Tab 9: Types and characteristics of revenue streams:

Types of Revenue Streams	**Characteristics**
Asset sale	The most spread Revenue Stream derives from selling ownership rights to a physical product.
Usage fee	This Revenue Stream is generated by the use of a particular service. The more a

	service is used, the more the customer pays.
Subscription fees	This Revenue Stream is generated by selling continuous access to a service. A gym sells its members monthly or yearly subscriptions in exchange for access to its exercise facilities.
Lending/Renting/Leasing	This Revenue Stream is created by temporarily granting someone the exclusive right to use a particular asset for a fixed period in return for a fee. For the lender this provides the advantage of recurring revenues. Renters or lessees, on the other hand, enjoy the benefits of incurring expenses for only a limited time rather than bearing the full costs of ownership.
Licensing	This Revenue Stream is generated by giving customers permission to use protected intellectual property in exchange for licensing fees.
Brokerage fees	This Revenue Stream derives from intermediation services performed on behalf of two or more parties.
Advertising	This Revenue Stream results from fees for advertising a particular product, service, or brand.

3.2.6 Key Resources

The Key Resources Building Block describes the most important assets required to make a business model work. These resources allow an enterprise to create and offer a Value Proposition, reach markets, maintain relationships with Customer Segments, and earn revenues. Different Key Resources are needed depending on the type of business model. For example a manufacturer requires capital-intensive production facilities. Key resources can be physical, financial, intellectual or human and can be owned or leased by the company or acquired from third companies.

Tab 10: Types and characteristics of key resources

Types of Key Resources	**Characteristics**
Physical	This category includes physical assets such as manufacturing facilities, buildings, vehicles, machines, systems, point-of-sales systems, and distribution networks.
Intellectual	Intellectual resources such as brands, proprietary knowledge, patents and copyrights, partnerships, and customer databases are increasingly important components of a strong business model.
Human	Every enterprise requires human resources, but people are particularly important in certain business models. For example, human resources are crucial in knowledge-intensive and creative industries.
Financial	Some business models call for financial resources and/or financial guarantees, such as cash, lines of credit, or stock options for hiring key employees.

3.2.7 Key activities

The Key Activities Building Block describes the most important things a company must do to make its business model work. Every business model calls for a number of Key Activities. These are the most important actions a company must take to operate successfully.

Tab 11: Types and characteristics of key activities

Types of Key Activities	**Characteristics**
Production	These activities relate to designing, making, and delivering a product. Production activity dominates the business models of manufacturing firms.
Problem solving	Key Activities of this type relate to coming up with new solutions to individual customer problems.
Platform/network	Business models designed with a platform as a Key Resource are dominated by platform or network related Key Activities. Key Activities in this category relate to platform management, service provisioning, and platform promotion.

3.2.8 Key partnerships

The Key Partnerships Building Block describes the network of suppliers and partners that make the business model work. Companies forge partnerships for many reasons, and partnerships are becoming a cornerstone of many business models. Companies create alliances to optimize their business models, reduce risk, or acquire resources. We can distinguish between four different types of partnerships:

- Strategic alliances between non-competitors
- Coopetition: strategic partnerships between competitors
- Joint ventures to develop new businesses
- Buyer-supplier relationships to assure reliable supplies

It can be useful to distinguish between three motivations for creating partnerships:

Tab 12: Types and characteristics of key partnerships

Types of Key Partnership	**Characteristics**
Optimization and economy of scale	The most basic form of partnership or buyer-supplier relationship is designed to optimize the allocation of resources and activities.
Reduction of risk and uncertainty	Partnerships can help reduce risk in a competitive environment characterized by uncertainty. It is not unusual for competitors to form a strategic alliance in one area while competing in another.
Acquisition of particular resources and activities	Few companies own all the resources or perform all the activities described by their business models. Rather, they extend their own capabilities by relying on other firms to furnish particular resources or perform certain activities.

3.2.9 Cost Structure

The Cost Structure describes all costs incurred to operate a business model. Creating and delivering value, maintaining Customer Relationships, and generating revenue all incur costs. Such costs can be calculated relatively easily after defining Key Resources, Key Activities, and Key Partnerships. Some business models, however, are more cost-driven than others. It can be useful to distinguish between two broad classes of business model Cost Structures: cost-driven and value-driven, but many business models fall in between these two extremes:

Tab 13: Types and characteristics of business model cost structures

Types of Business model Cost Structure	**Characteristics**
Cost-driven	Cost-driven business models focus on minimizing costs wherever possible.
Value-driven	Some companies are less concerned with

	the cost implications of a particular business model design, and instead focus on value creation.

Cost Structures can have the following characteristics:

Tab 14: Characteristics and descriptions of cost structures

Characteristics of Cost Structure	**Description**
Fixed costs	Costs that remain the same despite the volume of goods or services produced (salaries, rents, physical manufacturing facilities, etc.)
Variable costs	Costs that vary proportionally with the volume of goods or services produced.
Economies of scale	Cost advantages that a business enjoys as its output expands.
Economies of scope	Cost advantages that a business enjoys due to a larger scope of operations. In a large enterprise, for example, the same marketing activities or Distribution Channels may support multiple products.

4. AGRICULTURAL MACHINERIES: AN INDUSTRY OVERVIEW

In this chapter we present the state of the art in the agricultural equipment manufacturers sector, the focal one for the development of the proposed framework. We are going to start by giving a classification of the products offered and by describing the sectorial segmentation which we will consider in the following analysis. Afterwards we describe the state of the art in the market and production of agricultural equipments in Italy, in Europe and globally, by providing some data and pieces of information about revenues, market dimension and leader companies. In the third and last section there will be a focus on sustainable practices in agriculture, which often require new and more sustainable machineries, by briefly describing impacts on environment and human health of present-day agriculture and possible solutions and sustainable changes in today farm productions.

4.1 Sectorial classification:

Agricultural machinery is any kind of machinery used on a farm to help with farming. There are self-propelled machineries (as harvesters), pulled by a tractor (as a plow), or fixed (as the dryer). In the research it was decided not to include fixed agricultural machineries for two main reasons:

- Fixed ones are very different from other two kinds of machineries; they are static and often located in a building and used to work products of farming. Often the product to be worked must be brought to the machinery (oil grinder, mill, dryer).

- These machineries have a very low market share, compared to self-propelled and towed by tractors ones.

Also towed machineries transporters and trailers are not included, because they are not for an exclusive agricultural use.

To better describe agricultural machinery sector, it was decided to break down self-propelled and towed products in a more detailed classification. The following classification, data and descriptions are based on the Freedonia group, 2010, and Agrievolution, 2010, categorizations:

- Traction and Power (tractors etc)

- Harvesting (combine harvester, flail type harvester etc)

- Seeding, Planting and Fertilizing (seeders, planters, fertilizer distributors etc)

- Haying and Mowing (preparation and collection of hay, mowers etc)

- Soil Cultivation (plows, harrows, cultivators, weeders, pulverizers, rollers, land levelers etc)

- Sprayers (for pesticides, fertilizer compounds, water etc)

With the term “agricultural machines” are often named all agricultural equipments except tractors (traction and power). “Agricultural machinery” includes all agricultural equipment producers, tractor ones included.

Traction and Power:

Farm tractors are very useful for their versatility since they can pull plows, rakes, mowers, planters, etc. Tractors are available in a wide range, from under 40 to over 400 horsepower. Modern tractors can be equipped with the latest technological advances, such as satellite-based guidance systems, variable transmissions, and other electronic controls, while still meeting requirements for pollution control. On a unit basis, the two largest markets are China and India, with the United States as a distant third. All major agricultural machinery manufacturers offer tractors as part of their portfolio. The largest for revenues are Deere & Company, CNH Global, AGCO, Mahindra & Mahindra, and Kubota.

Harvesting:

This category includes many specific items and the combine (a combination of harvester and thresher) is the dominant type of harvesting machinery. Harvesters cut the crop, and threshers remove the grain or seed. Other specialized equipment in this category includes field forage and flail-type harvesters, cotton pickers, potato diggers, and sugar cane harvesters. The two largest producers on a global basis are Deere & Company and CLAAS, followed by AGCO, CNH Global, Kubota, and others. Harvester models usually have diesel engines, electronic transmissions, spacious cabs, and a wide range of attachments.

Seeding, Planting and Fertilizing

This kind of machinery has a low market share, but its annually growth rate is one of the highest. Higher crop prices, especially for corn, should stimulate planting activity and hence investment in such goods as seeders, planters, in both developed and developing

economies. Diverse product lines in this category include general purpose planters and specific ones, such as corn, cotton, sugar cane planters. Other items are manure spreaders and fertilizer distributors. Many planters can be attached to or pulled by tractors. The leading suppliers include AGCO, CNH Global, Deere, Kverneland, and Kukje. The key feature emphasized by these as well as smaller manufacturers is "maximum coverage with minimum waste".

Haying and Mowing

Haying machinery is used in preparation and collection of hay (i.e., dried grass and similar items). Specific goods in this category include mowers, rakes, balers, made by large companies such as AGCO, CLAAS, CNH Global, Deere, and smaller ones such as Gehl, Krone, and Kubota. The Norwegian firm, Kverneland, has a major division called "Grass" with three business units: bailing, mowing, and haying equipment. These product families offer many options for users such as mowers with single or double-swath features, disc or drum brakes etc. In this category we include also flail equipment without harvesting.

Soil Cultivation:

This is one of the smallest categories for sales in all agricultural machineries, but its growth rate per annum is one of the highest, approaching six percent during 2005-2010. Increased crop demand and production drive this trend, and also because of the movement of medium-size farmers from manual or animal-operated plows to tractor-pulled equipments. A wide variety of products is utilized for soil preparation and planting: plows, harrows, cultivators, weeders, pulverizers, rollers, and land levelers. Notable suppliers are AGCO, Bush Hog, Deere, Iseki, Kukje, Kverneland, and Thrige Howard. A Japanese manufacturer, Yanmar, makes tillers (a generic term that covers cultivators, plows, and harrows) that are available with gasoline engines, detachable plows, and ergonomic handles; user-friendly features include low noise, high torque, and good fuel economy.

Sprayers:

A sprayer is a device used to spray a liquid in fields. It is a piece of equipment with spray nozzles to apply herbicides, pesticides, and fertilizers to agricultural crops. Sprayers range in

size from man-portable units (typically backpacks with spray guns) to self-propelled units similar to tractors. In this category there are also irrigation equipments. For example drip irrigation, also known as trickle irrigation is a very common irrigation method which saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters. It is done with the help of narrow tubes which deliver water directly to the base of the plant. Sprayers are usually offered by many of the major producers, while irrigation systems are often sold by specific manufacturers.

4.2 Agricultural machinery market and production: state of the art.

In the following market researches we collected data primarily from reliable international and independent statistical entities. The main involved ones are: EUROSTAT, UNACOMA servizi statistici, VDMA, and AGRIEVOLUTION. In next sections, Italian, European and global market will be deeply described.

4.2.1 Italian agricultural machinery market and production:

In 2010, Italy had over 1.6 million farms, covering 13 million hectares, respectively 14% and 8.1% of the EU total. Italian number of farms is the most numerous in the EU and is down by 5.7% since 2005 (EUROSTAT Data, 2011). Italy's agricultural structure is dominated by small operations; the average area of land managed by the country's 1.6 million agricultural operators is only seven hectares.

In the EU the number of farms has been decreasing for a long time, and this trend is likely to continue. The main reason of decrease is the shift to larger farms, driven by economic necessities, and larger farms need more machineries for profitable operation.

These trends are stimulated by an internationalization of farming, with West Europeans buying large farms in Eastern Europe.

Here is (figure 16) the number of farms in Italy and EU nations, 2005-2010 in thousand units:

Figure 16: number of farms in EU nations.

	2005	2007	2010	CAGR 2005-2010
EU27	14,195	13,401	11,856	-3.9%
EU15	5,560	5,363	5,095	-2.7%
EU12	8,636	8,038	6,761	-4.8%
Poland	2,476	2,391	1,506	-9.5%
Italy	1,729	1,679	1,630	-1.2%
Spain	1,079	1,044	990	-1.7%
France	567	527	515	-1.9%
Germany	390	370	299	-5.2%
United Kingdom	287	300	202	-6.7%
Austria	171	165	154	-2.0%
The Netherlands	82	77	72	-2.5%
Other EU countries	7,415	6,846	6,488	-3.4%

Source: Eurostat (2011)

N.B: CAGR: (compound annual growth rate) is a number that describes the rate at which a quantity would have grown if it grew at a steady rate:

$$\text{CAGR} = \left(\frac{\text{Ending Value}}{\text{Beginning Value}}\right)^{\left(\frac{1}{\#\text{ of years}}\right)} - 1$$

In Italy 129000 square kilometers were used for agriculture in 2010, 43% of the total land area, and the agricultural area in use increased 1.4% since 2005 (Servizi statistici UNACOMA, 2011).

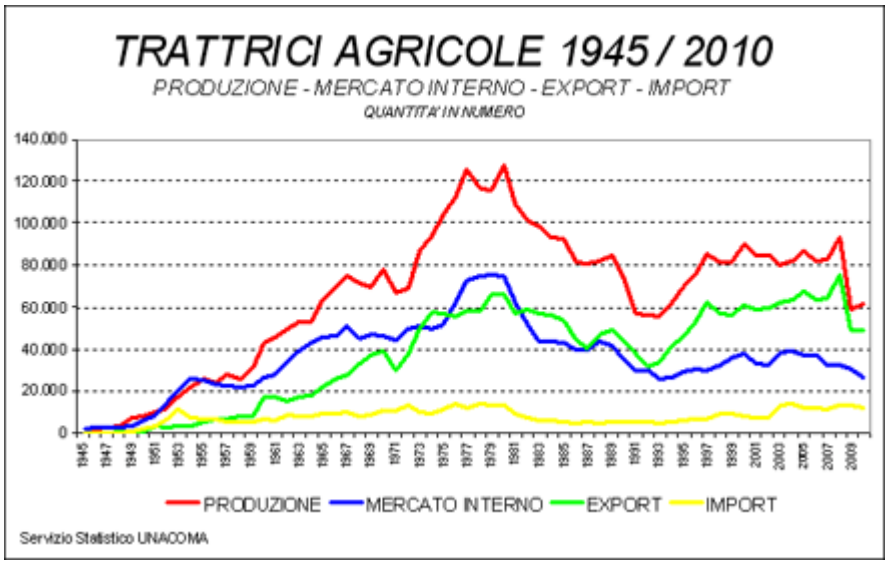
The market for agricultural machinery was the 3rd largest market in the EU in 2010, after Germany and France, before the UK and Spain. According to the German trade organization VDMA (VDMA, 2011), the market for agricultural machinery in Italy reached € 2.6 billion in 2010. This was up 2.9% on the previous year. The Italian share of the total EU market for agricultural machinery was 11%, down 1.1% since 2006.

In 2010 agricultural and horticultural Italian output was 1.6% of total output, indicating that in economic terms agriculture is only of slight importance, the EU average is 2.8%.

For centuries Italy has had an economy dominated by agriculture. After World War II there was a radical change in society and a strong impetus to industrialization, which gradually assimilated almost all workers from agricultural sector. In a few years Italy, from an agricultural country, became one of the most industrialized economies.

This shift of labor, continuing also today, caused the transfer of 8 million workers from 1950 to 2010, from agricultural to industrial production, and it has determined the urgent need to compensate for the progressive shortage of labor force with the rapid development of agricultural mechanization. This phenomenon is demonstrated by the evolution over the years (figure 17) of the production and the use of tractors (fundamental agricultural machinery, which characterizes the mechanization's level in agriculture), (Servizi statistici UNACOMA, 2011):

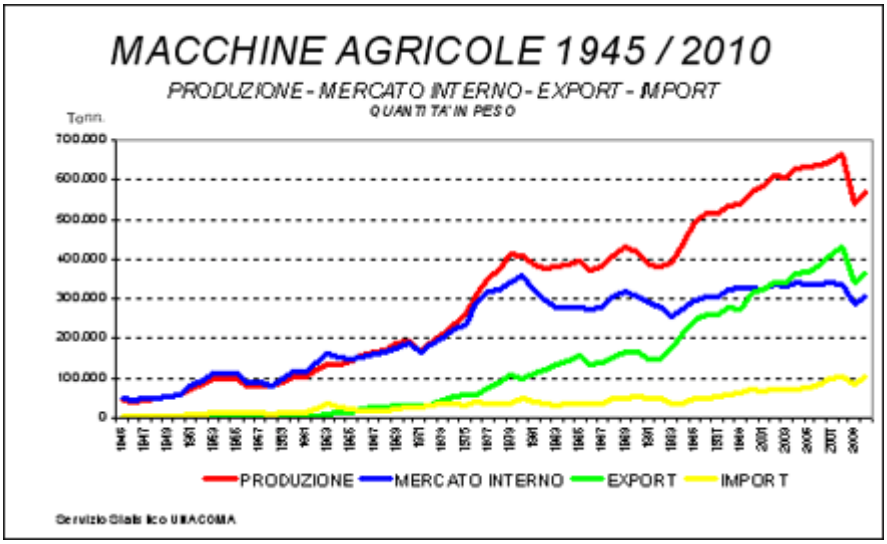
Figure 17: evolution of production, internal market, export, import of tractors in Italy.



In 1945, the Italian tractor fleet was composed by 52000 machines, in 2010 by 2 million. In Italian internal market 27000 units were sold in 2007, 2008 and 2009. In 2010, sales dropped to 23 thousand, down 14% on 2009. In 1950 in Italy were made 4700 tractors, 61040 in 2010. New agricultural machineries manufacturers were born to meet the increasing need and demand. Today the tractor fleet is composed mainly by tractors produced in Italy, and Italian production reached a high level of quality, competing with foreign competitors and exporting 3.9 billion € in 2010 (Servizi statistici UNACOMA, 2011).

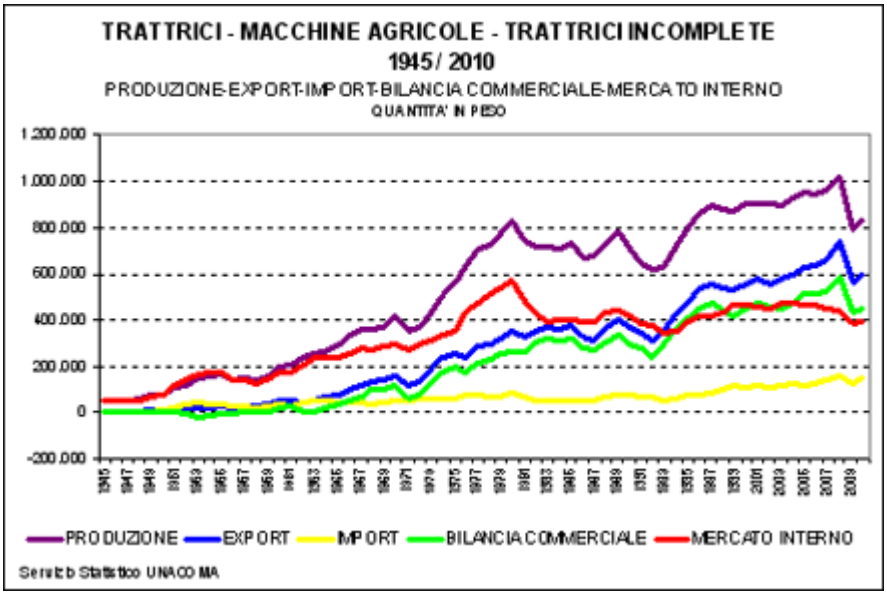
In the same years there were the increasing demand and production of other kinds of agricultural machineries for soil cultivation, seeding, planting, harvesting, fertilizing, irrigation etc, as shown in figure 18:

Figure 18: evolution of production, internal market, export, import of other machines in Italy.



The following graphic (figure 19) represents the total Italian agricultural machineries production, by aggregating both previous historical trends. After the peak in 2008 (€8.3 billion of revenues) and the big fall in 2009 (-23.9 percent), the production of today is not at 2008 level yet (Servizi statistici UNACOMA, 2011):

Figure 19: evolution of total Italian agricultural machinery production, internal market, import and export.



Italian agricultural machinery manufacturers' revenues:

As said above, in following analysis, "agricultural machineries" represent total agricultural equipments; "agricultural machines" are all agricultural equipments except tractors (for harvesting, seeding, planting, fertilizing, haying, mowing, soil cultivation, sprayers etc):

"Agricultural machines" + "Tractors" = "Agricultural machinery"

To clarify the composition of Italian agricultural machinery production we break down the total 2010 sector's revenues (Servizi statistici UNACOMA):

Tab 15: Revenues of the Italian agricultural machinery sector

Tractors*			**Agricultural machines, components, etc**		
40% of Revenues			**60% of Revenues**		
Number of Italian firms	**Revenues (billion €)**	**Weight (tons)**	**Number of Italian firms**	**Revenues (billion €)**	**Weight (tons)**
25	**2.7**	**260400**	**2750**	**4.0**	**569550**

TOTAL REVENUES: 6.7 Billion €

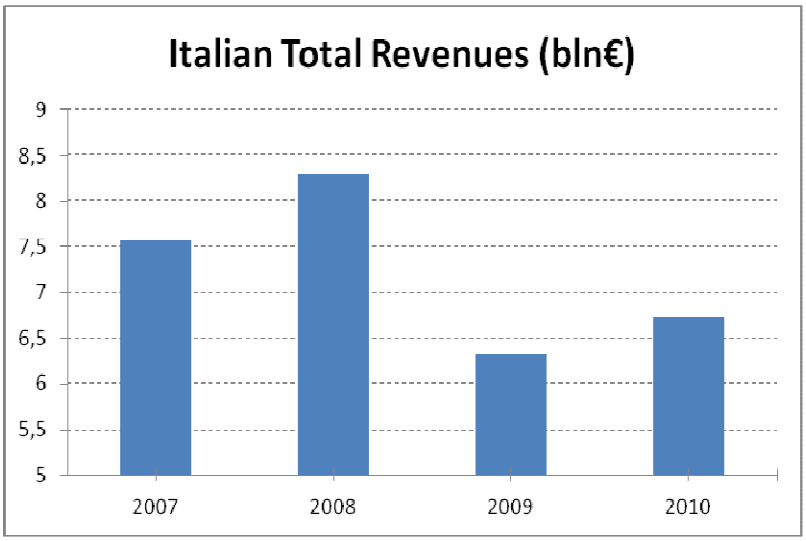
***incomplete tractors, parts and tractors' components included.**

UNACOMA Data

As shown above, about 40% of total sectorial Italian revenues come exclusively from 25 Italian tractor manufacturers, which represent only the 0.9% of total Italian agricultural manufacturers; accordingly the other 60% of revenues derive from the 99.1% of total companies (agricultural machine and components producers). The 40% of market is in the hands of very few tractor manufacturers.

Amount of revenues in 2010 was still below the results in 2008. After a good growth rate of 9.64% in 2008 there was a big drop in 2009 (-23.86 percent) which led the sector years back in revenues. In 2010, after the recession Italian manufacturers experienced a slight rise, +6.49% (as shown in figure 20), and are expecting positive results in the following years (Servizi statistici UNACOMA, 2011):

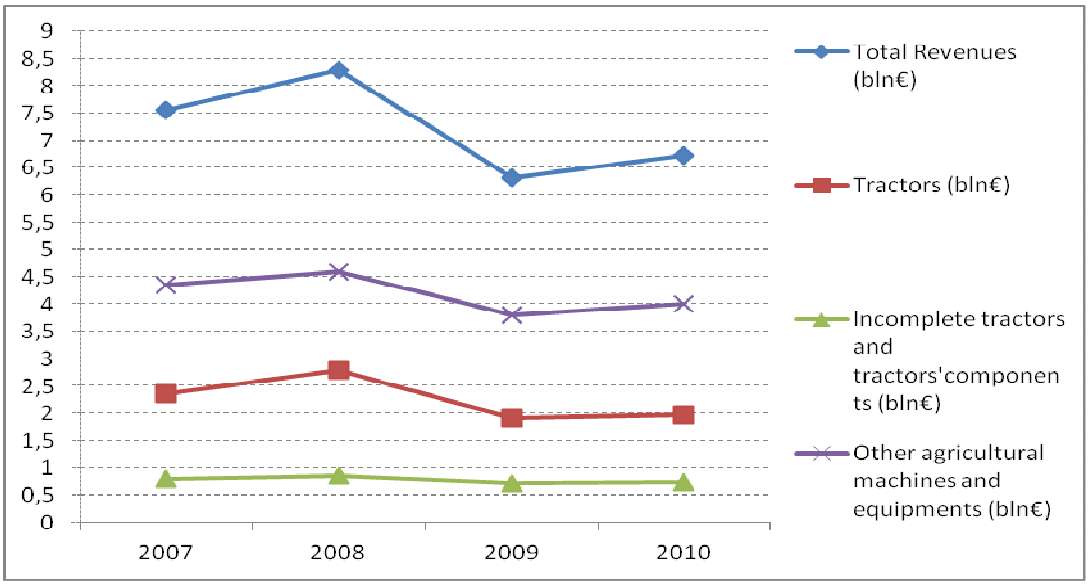
Figure 20: Italian agricultural machinery companies revenues.



Year	Italian Revenues (bln€)	%Change
2007	7.57	
2008	8.30	9.64%
2009	6.32	-23.86%
2010	6.73	6.49%

In next figure 21 we present some more detailed Italian companies sales results, by considering the total revenues as the sum of the main 4 under-sectorial segments:

Figure 21: Italian companies revenues by sector.



Tab 16: Revenues of the Italian agricultural machinery under-sectorial segments

Year	Italian Total Revenues (bln€)	Tractors (bln€)	Incomplete tractors and tractors' components (bln€)	Other agricultural machines and equipments (bln€)
2007	7,57	2,36	0,81	4,35
2008	8,3	2,8	0,86	4,6
2009	6,32	1,92	0,73	3,8
2010	6,73	1,99	0,74	4

Sales of tillage equipment have increased continuously during the last three years. In 2010 the tractor market restarted growing (+3.4 percent) after a shocking -31.4% in the previous year. The main part in “other agricultural machines and equipments” (+5.2% in 2010) is represented by harvesters, especially combines, but sales of harvesting equipment were slow and slightly above 2009 level. Registrations of agricultural trailers are also above previous year’s levels (Servizi statistici UNACOMA, 2011).

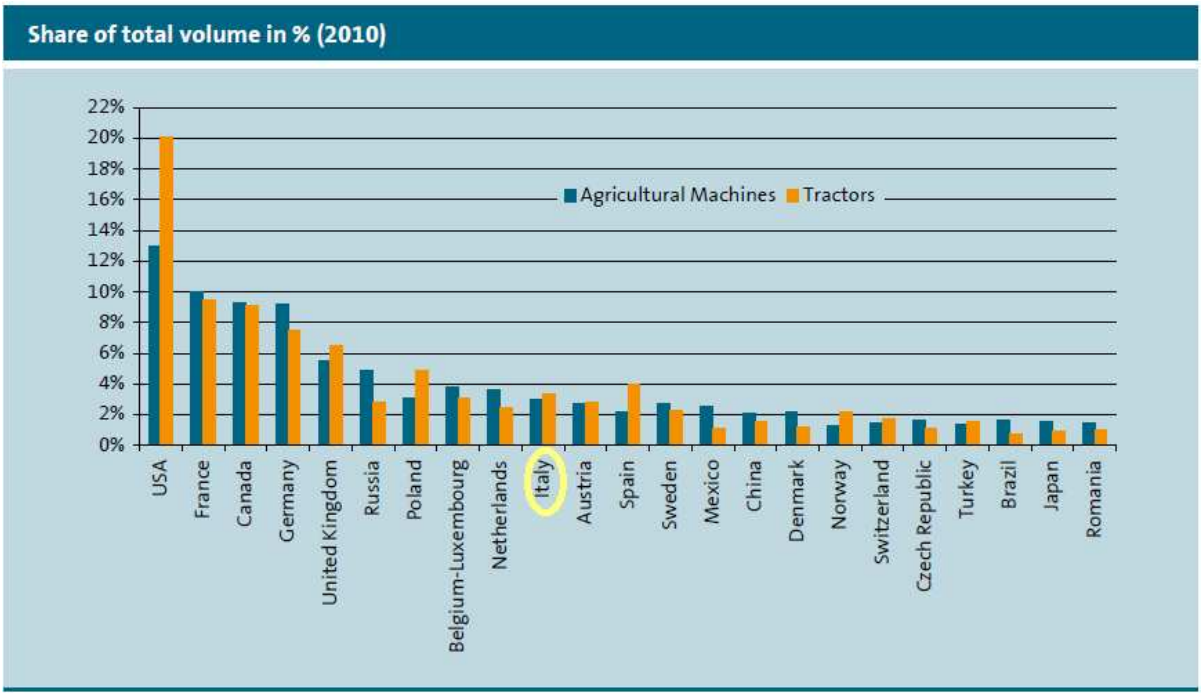
Import/export:

In the northern part of Italian country agriculture is significantly more export-oriented and hence more profitable. 70% of agricultural exports are destined for the European Union, and a respectable 10% is exported to North America.

About machineries, in EU, Italy’s import rate is relatively low at only slightly above 30% in recent years, with Germany and France acting as the main suppliers (EUROSTAT Data, 2011).

In figure 22 is shown the share of total volume of imports of agricultural machines and tractors worldwide (VDMA, 2011):

Figure 22: share of total volume of imports of agricultural machines and tractors.

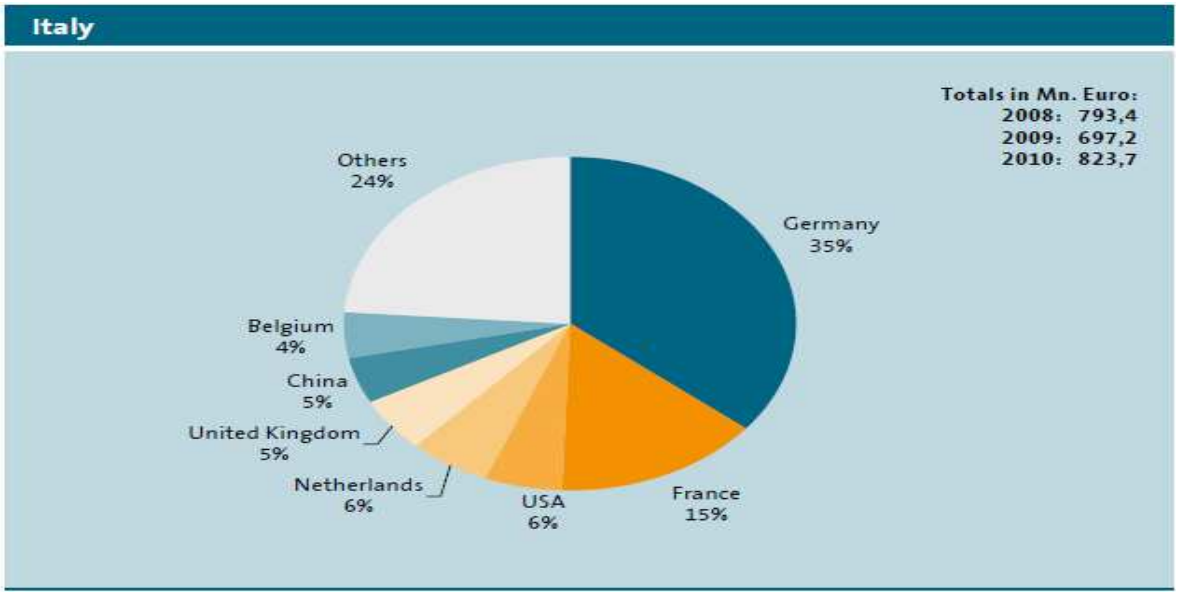


Source: German trade organization VDMA, 2011

In 2010 Italy was the tenth global importer (in percentage of share of total volume) of agricultural machines, and eighth of tractors.

Below, in figure 23, there are the origin countries of Italian agricultural machinery imports (average of the years 2008-2010):

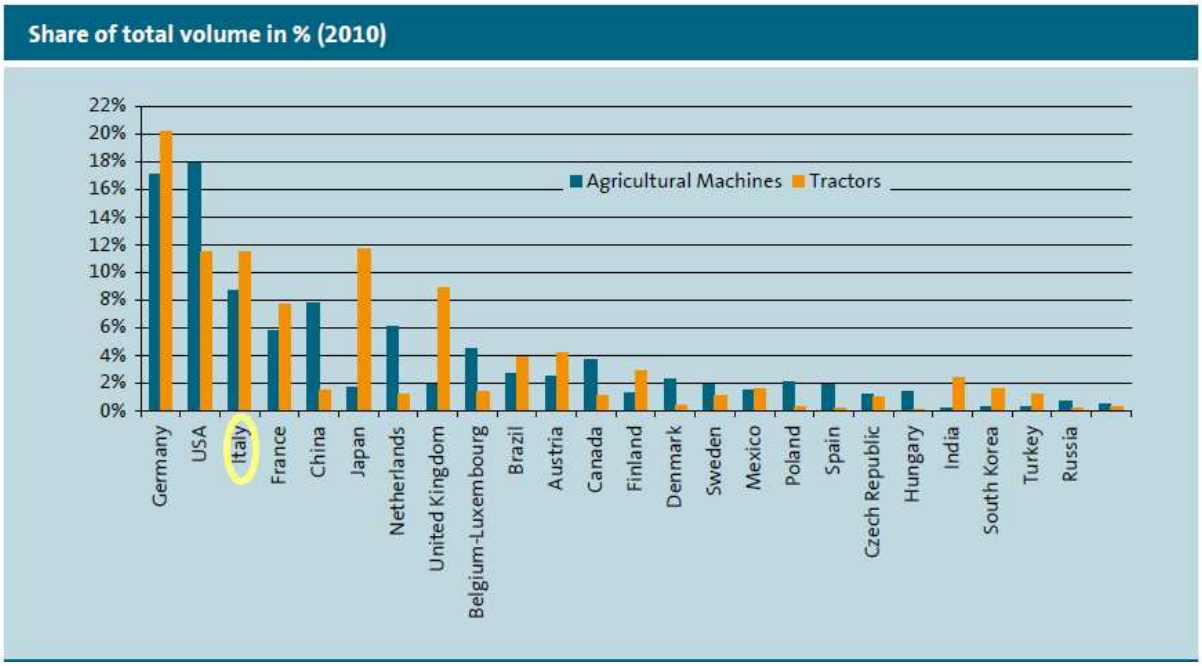
Figure 23: origins of Italian imports. Source: German trade organization VDMA, 2011



Our country imports 50% of agricultural machineries from Germany and France. Germany is widely our main supplier.

In figure 24 there are the worldwide exports of agricultural machines and tractors worldwide (VDMA, 2011):

Figure 24: share of total volume of exports of agricultural machines and tractors

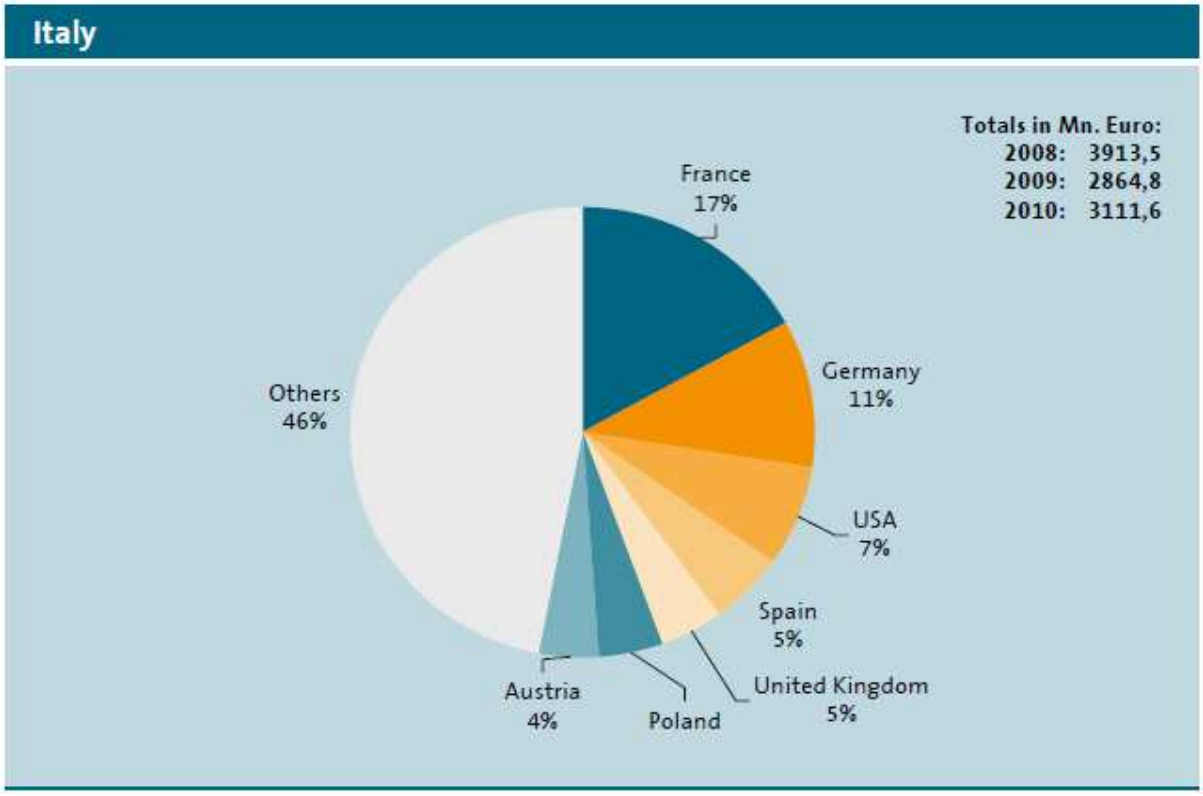


Source: German trade organization VDMA, 2011

In 2010 our country was the third for exports of agricultural machines and tractors by considering the share of total volume in %. China is in fourth position but has the highest export year growth rate (Agrievolution Data, 2010). India has a low share of agricultural machineries' production, but has the highest export year growth rate of tractors (VDMA, 2011).

Below, in figure 25, there are the customers of Italian agricultural machinery exports (average of the years 2008-2010):

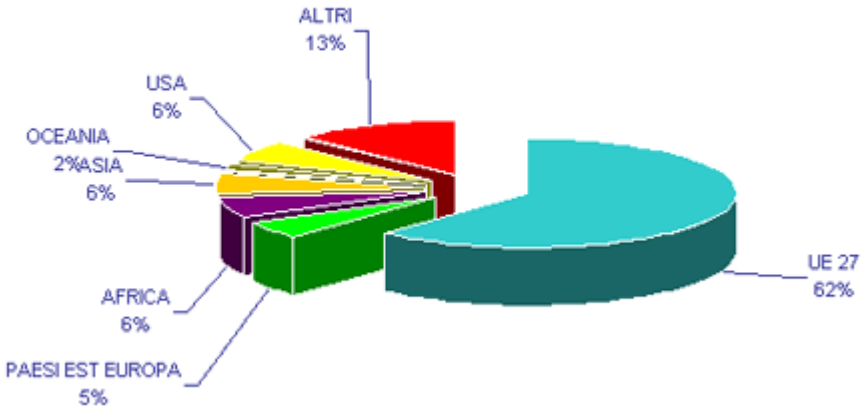
Figure 25: destination of Italian machinery exports.



Source: German trade organization VDMA, 2011

France is our first customer, followed by Germany and USA. In 2010 (figure 26), 62% of Italian export was in EU27, 6% in the USA (Servizi statistici UNACOMA, 2011).

Figure 26.1: Italian machinery exports.



Source: Worldwide Italian exports in 2010, UNACOMA 2011

To conclude, the following aggregation shows the 2010 Italian balance of payments for agricultural machineries (Servizi statistici UNACOMA, 2011):

Tab 17: Italian balance of payments for agricultural machinery

Italian Export		
Value	3.911 € Bln	+9.4% on 2009
Weight	596098 Tons	+6.6% on 2009
Italian Import		
Value	1.050 € Bln	+16.8% on 2009
Weight	146116 Tons	+17.2 on 2009
Balance of payments		
Value	***+2.9 € Bln***	***+6.9% on 2009***

4.2.2 Global and European market and production of agricultural machines and equipments:

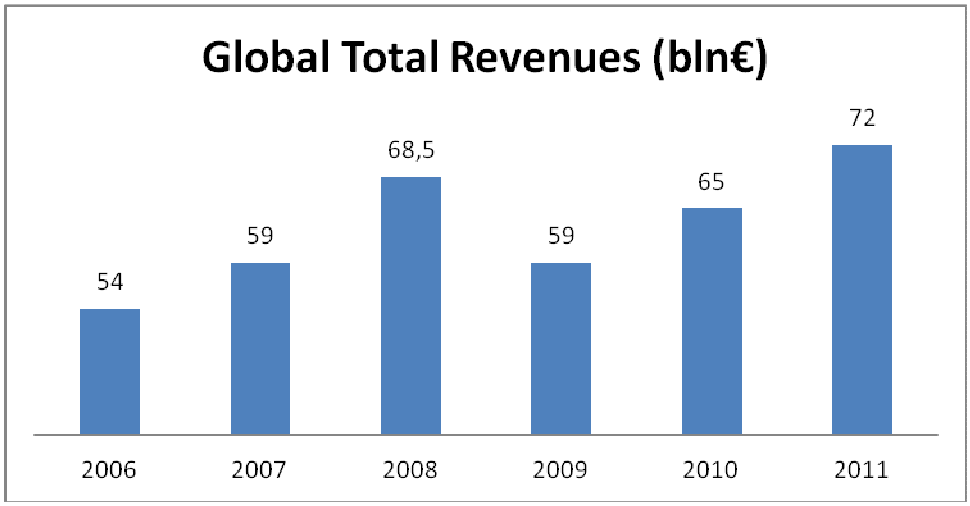
After experiencing an important slowdown during the crisis year of 2009, (€59 billion, -13.9% from €68.5 billion in 2008), the world's agricultural equipment industry has regained its growth and producing strength (VDMA, 2011).

Tab 18: global total revenues of the last 5 years in the agricultural machinery sector

Year	Global Total Revenues (bln€)	% global revenues change
2006	54	
2007	59	+9,26%
2008	68,5	+16,10%
2009	59	-13,87%
2010	65	+10,17%
2011	72	+10,77%

Global production and market volume reached €72 billion in 2011 representing an annual growth rate of 10.8%. It was €65 billion in 2010 (+10.2% after crisis) slightly below the level of €68.5 billion reached in the pre-crisis year of 2008. It is summarized in figure 26 (VDMA, 2011):

Figure 26.2: global total revenues.

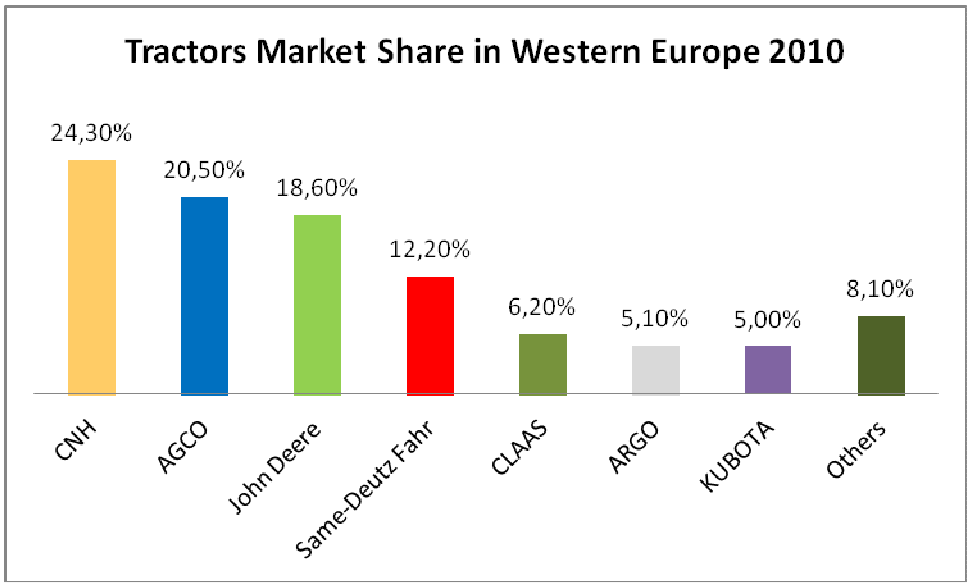


Source: VDMA

Emerging markets, such as China, India, Latin America, Eastern Europe and Turkey, lead the growth with double-digit rates. This trend is expected to continue, driven by high commodity prices and an extraordinary need for mechanization shown by emerging countries caused by the world's growing population and the limited amount of arable land (Agrievolution Data, 2011).

The agricultural machinery industry, similar to the automotive sector, is increasing globalization and concentration. This is most clear with regard to tractors. Three global companies dominate this market, of which only one is European. The biggest companies are John Deere and Agco (brand names include Massey Ferguson, Fendt, Valtra), both from the USA, and Case New Holland, which is part of Fiat Industrial, carrying the brands Case IH, New Holland and Steyr (see next figure 27):

Figure 27: tractors market share in Western Europe 2010



Source: Freedonia group 2011

Globally, in 2011 these three main companies had very good economical results, and consolidated their world leading position:

John Deere had net sales and revenues of $32 billion, up from $26 billion in 2010; CNH sold for $18 billion, up from $14.5 billion in 2010; and AGCO had revenues of $8.8 billion, up from $6.9 billion in 2010 (Agrievolution Data, 2011).

The main reasons why 2011 was great for global farm equipment manufacturers are several: Growing populations need more food; crop prices tend to increase; emerging markets like Brazil, Russia, Turkey, India and China are increasing demand for farm machinery, and technology advances mean more devices to sell and more total equipment sales.

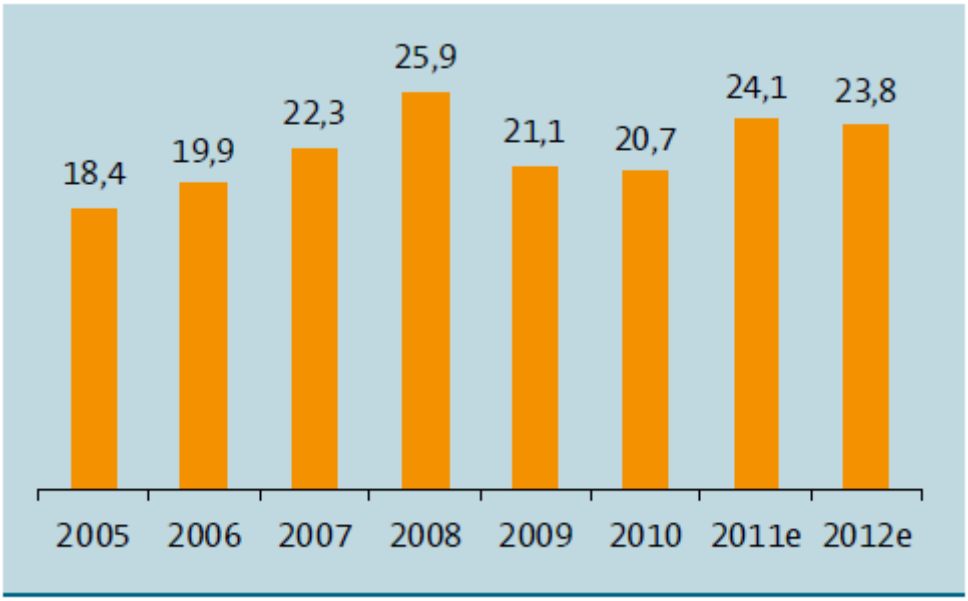
Today the top three producers of machinery: Deere & Company, CNH Global, and AGCO, together they account for one-third of the global market. Other key players are Kubota, Yanmar, CLAAS, Iseki, and Same Deutz-Fahr. Still others dominate only in a specific category, e.g. Mahindra & Mahindra in tractors.

The European Union is the world's biggest region regarding the production of agricultural machinery, and in 2010, a production of about € 20 billion was achieved (EUROSTAT Data, 2011).

Following the fall of 18 percent in 2009, with a volume of €20.7 billion in 2010, the EU agricultural machinery market again experienced a slight decline. For most countries, the years 2009 and 2010 were featured by the recession at differing rates. The earliest signs of an economic recovery were felt in Europe's largest market, Germany, and in some Central and Northern European countries.

In next figure 28 we show the agricultural machinery market volume in European Union (billion €, e=esteem):

Figure 28: agricultural machinery market volume in European Union.



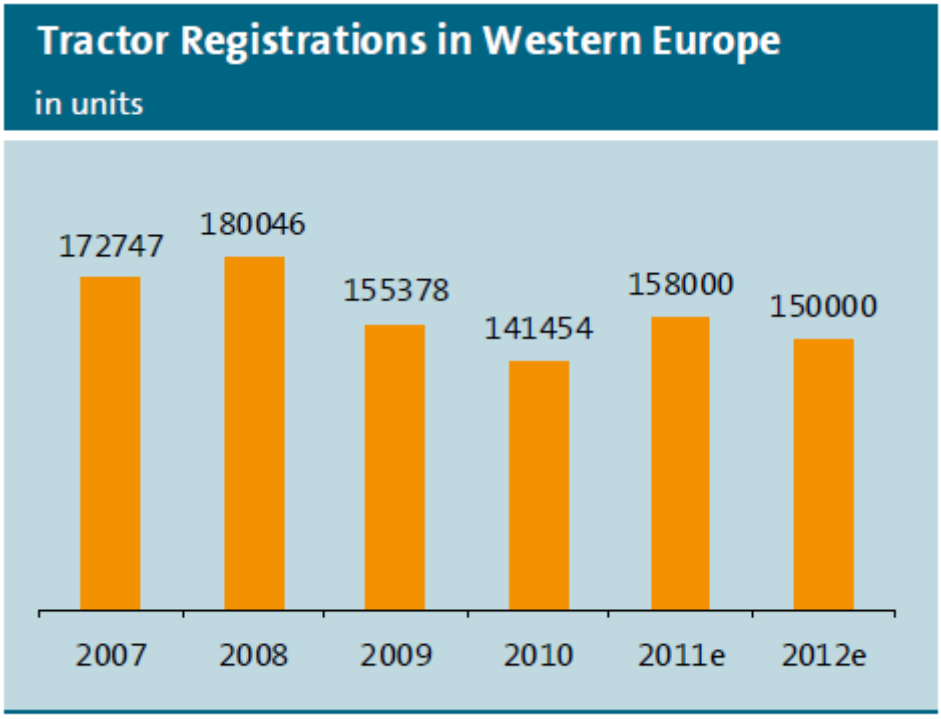
Source: Eurostat, VDMA

Worldwide and in Europe, tractors and harvesters are the two largest categories, accounting together for nearly half of all product shipments.

Tractors:

In Europe the two largest tractors markets, Germany and France, sales surpassed those of last year by respectively 29 and 23 percent respectively, while farmers in Italy, Spain and Great Britain invested around the same as in 2010 (VDMA, 2011). In 2011 were sold about 158,000 units in the Western European market (an increase of 12 percent). As shown in figure 29 prospects for 2012 continue to be positive:

Figure 29: Tractor registrations in Western Europe



Following the very strong result of 2008, in 2010 the Western European combine harvester market decreased for the second year in a row to only around 5600 machines. The collapse of the Western European market was felt very severely by European manufacturers, since it represented a drop of 37 percent in comparison to the year 2008 (VDMA, 2011).

Harvesters:

Although western European difficulties, worldwide in 2011, the sale of combine harvesters increased to an estimated 36,000 units (see figure 30), only slightly less than the 38,000 of the record year of 2008. In 2010, the worldwide market for self-propelled forage harvesters comprised approximately 2,300 machines, of which around 45 percent were sold in Germany and the United States (VDMA, 2011).

Figure 30: Sales volumes of harvesting machines

Sales Volumes of Harvesting Machines*				
in units	2009	2010	2011	Change
Combine Harvesters				
Western Europe	8.000	5.600	6.850	22%
World	31.450	30.500	36.000	18%
Forage Harvester				
Western Europe	1.300	1.350	1.500	11%
World	2.200	2.350	2.700	15%
Round Balers				
Western Europe	10.900	9.450	10.000	6%
World	27.100	25.700	27.200	6%
Square Balers				
Western Europe	1.800	1.500	1.700	13%
World	3.500	2.900	3.200	10%

Source: VDMA members, * "west brand" machines

4.3 Sustainable agriculture: new trends

In this section we are going to describe present-day agricultural practices and their harmful effects on human and environment. A new sustainable agriculture requires sustainable practices and new innovative machineries. This future and necessary new way of food production might be a big opportunity for agricultural machinery manufacturers, which might profit by this new trend by entering this still niche market.

New more sustainable agricultural practices need innovative agricultural machines, in some cases even much different from those used nowadays. As described below, sometimes this shift toward more sustainable practices is even forced and regulated by community laws. New equipments, always more technologically advanced, need more evolved associated services to successfully satisfy customers.

Today the industrial agriculture system causes environmental and human health problems associated with current food production practices. These common practices consume fossil fuel, water, and topsoil at unsustainable rates. Industrial production in agriculture contributes to numerous forms of environmental degradation, including air and water pollution, soil depletion, diminishing biodiversity, and so on; and to various kinds of problems to human health.

Industrial agriculture views the farm as a factory with “inputs” (such as feed, pesticides, fertilizer, and fuel) and “outputs” (corn, potatoes, etc). The aim is to increase amount of production and decrease costs. This view does not consider enough, or at all, the effects on human health and environment.

The main problems are associated with the production methods (The European economic and social committee and the committee of the regions, 2010):

- Monocultures are eroding biodiversity among both plants and animals.
- Synthetic chemical pesticides and fertilizers are polluting soil, water, and air.
- Water is consumed at unsustainable rates in many agricultural areas.
- Soil is eroding much faster than it can be replenished.

4.3.1 Impact of Industrial Agriculture on the Environment and human health:

Environmental and human health problems associated with current agricultural systems are mainly related to these topics (The European economic and social committee and the committee of the regions, 2010):

Fertilizers:

Between 1950 and 1998, worldwide use of fertilizers increased more than 10-fold overall and more than 4-fold per person (FAO, 1999). Chemical fertilizers can gradually increase the acidity of the soil until it begins to impede plant growth. Excess nitrogen in soil can lead to less diversity of plant species, and this decrease in diversity makes the ecosystem more susceptible to drought. Moreover Nitrogen that runs off croplands into a closed area (via the Mississippi River and its tributaries, as in the “dead zone” of the Gulf of Mexico (Rabalais, 1996) has been implicated as a major cause of a zone where nothing will ever grow.

Pesticides:

Worldwide pesticide use (comprising herbicides, insecticides, and fungicides) increased 10-fold between 1945 and 1989 (Pimentel, 1991). Pesticides are formulated from about 1,600 different chemicals, and some of the increase in pesticide use can be attributed to monocropping practices, which make crops more vulnerable to pests. Their use causes decline in bird and beneficial insect populations, pollution of surface waters and groundwater, drop of number of honeybee colonies, abnormalities in amphibians, and even some insects and plants developed resistance to the chemicals used against them.

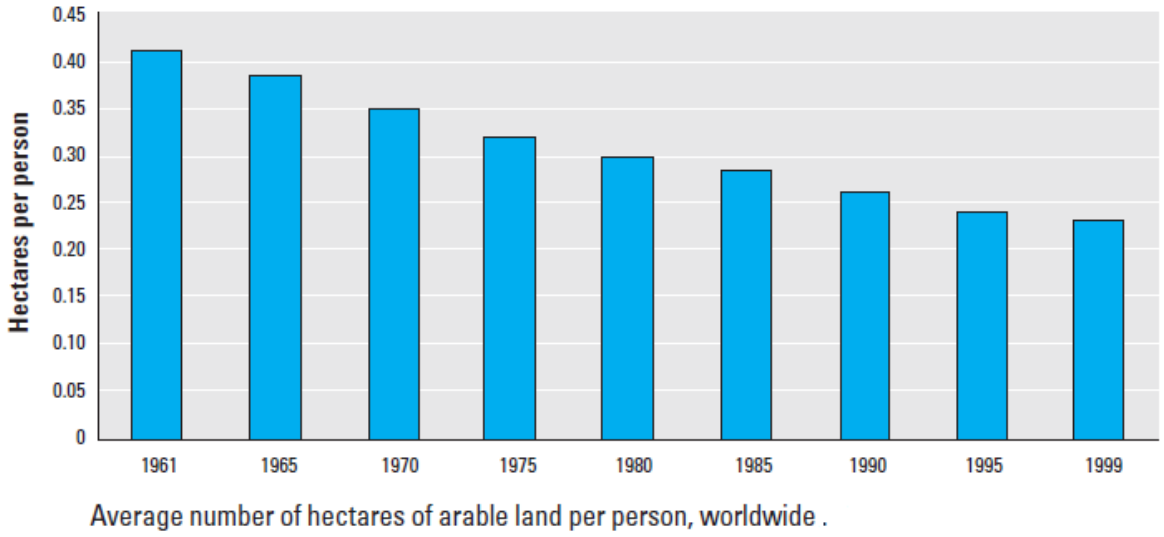
For human health their use is one of the most dangerous practices in agriculture. Pesticide residues enter our bodies through air, water, and food and raise risks for certain cancers as well as reproductive and endocrine system disorders.

Soil erosion:

Erosion is a natural process, which can however be significantly accelerated by human activities. It is known to be a serious problem throughout Europe, especially in the Mediterranean zone, but snowmelt erosion happens in Scandinavian countries and wind erosion is common in Central and Western Europe.

Land degradation, and in particular, the deterioration of soils, is one of the most dangerous challenges facing humankind. It takes anywhere from 20 to 1,000 years for a centimeter of soil to form (McMichael, 1993). Industrial agriculture compromise soil health because it depends on heavy machinery that compacts the soil, destroying soil structure and killing beneficial organisms in the soil food frame. Moreover a monocropping practice arrests natural processes of soil regeneration. As shown in figure 31, hectares of arable land per person are decreasing worldwide (U.N. Food and Agriculture Organization):

Figure 31: Average number of hectares of arable land per person, worldwide

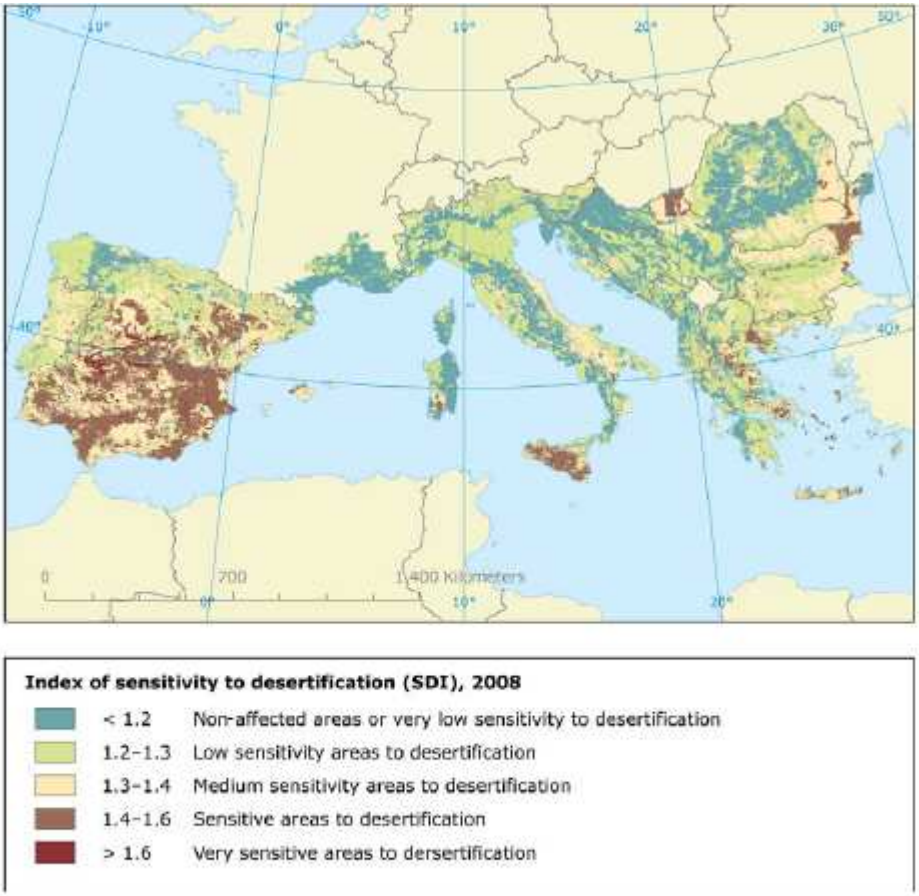


Source: U.N. Food and Agriculture Organization

Land:

An example of land degradation is the phenomenon known as desertification, increasing all over the world (see figure 32). According to the Worldwatch Institute, almost 20 million km^2, or 15% of the all land surface, may already be experiencing some degree of desertification (Bright, 1997). Desertification reduces deeply the amount of land available for agriculture.

Figure 32: Map showing the sensitivity to desertification

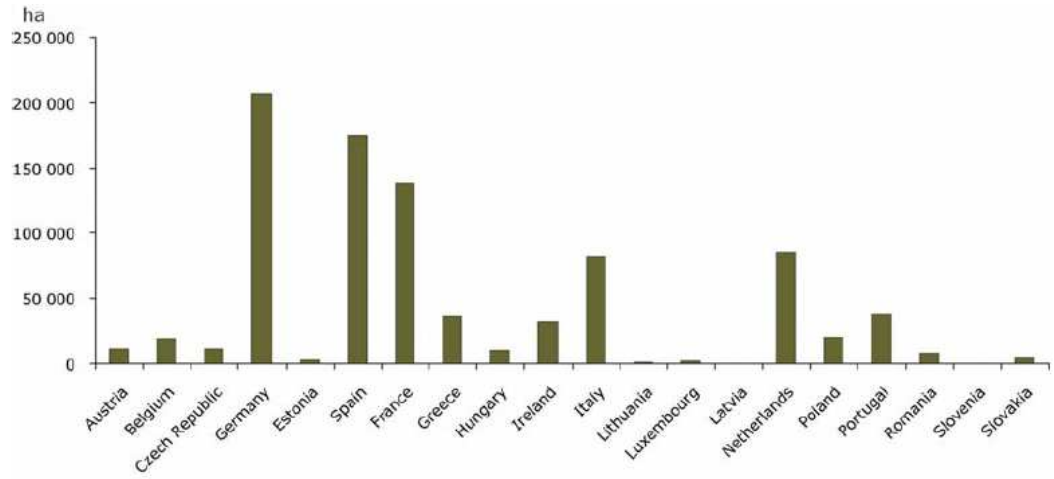


Map from the DISMED project (Desertification Information System for the Mediterranean) showing the sensitivity to desertification and drought as defined by the sensitivity to desertification index (SDI) based on soil quality, climate and vegetation parameters.

Source: Domingues and Fons-Esteve, 2008.

Agriculture can contribute directly to desertification through poor agricultural practices such as overcultivation, overgrazing, and overuse of water, and indirectly when land is deforested to create new cropland or new pastures for livestock. Moreover increasing urbanization causes a sizeable loss of agricultural areas, as shown in the next figure 33 (SOER, 2010):

Figure 33: Losses of agricultural areas to urbanization (ha)



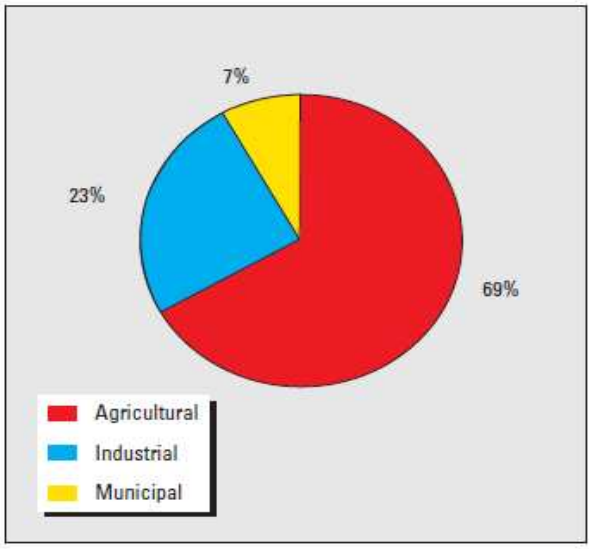
Losses of agricultural areas to urbanisation (ha). Comparison of CORINE land cover data for 1990 and 2000 shows an estimated loss of 970 000 ha of agricultural land due to urbanisation for 20 EU Member States in this 10-year period. The rate of change is not the same across all countries.

Water:

Agriculture affects water resources in two ways: irrigating fields using a huge amount of surface waters or aquifers; and farming practices polluting surface waters and aquifers, reducing the amount of water that is suitable for other uses.

Agriculture accounts for about two-thirds of all water use worldwide (figure 34), far exceeding industrial and municipal use (Postel, 1996). Agricultural food production extracts 92% of the water taken from the river, which in many cases fails to reach the sea for 200 or 300 days a year; and after all it returns polluted water to the environment.

Figure 34: Global water use by sector



Global water use, by sector, based on 1990 figures. Adapted from Postel.

Energy:

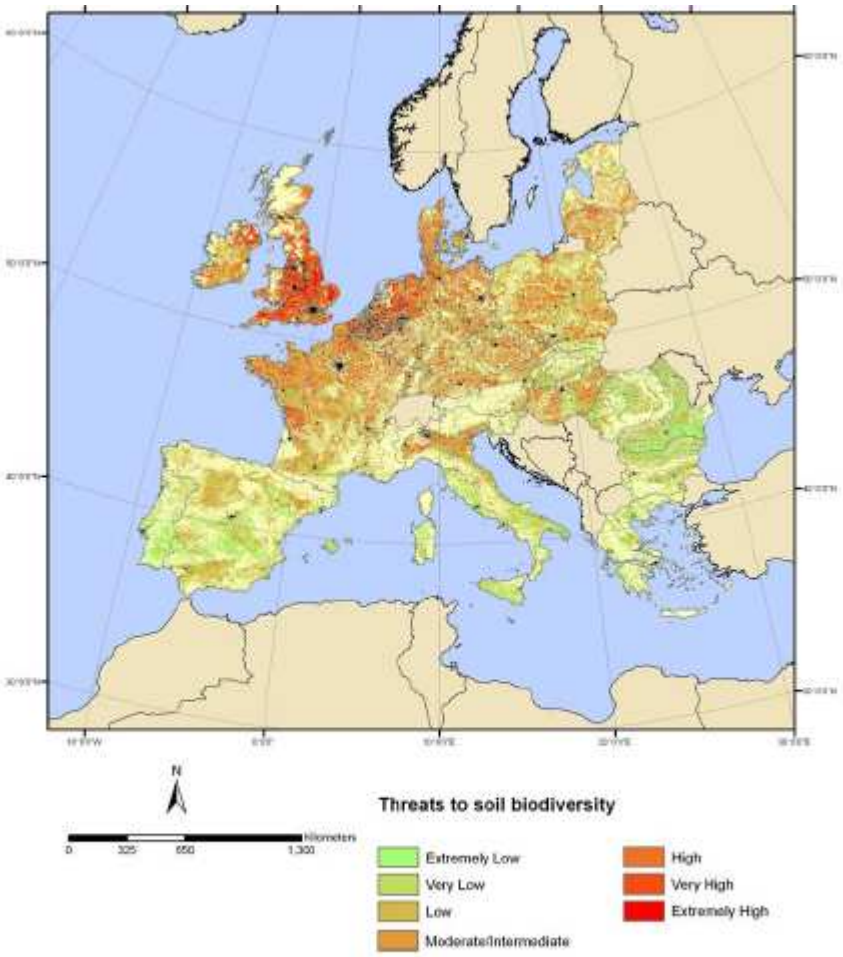
Fossil fuel energy is the major input to industrial agriculture. In addition, the road from the farm to the consumer is an energy-intensive one because transporting, processing, and packaging our food requires large amounts of fuel. The food system, in next years, is becoming more energy intensive without a substantial change.

Biodiversity:

Soil biodiversity means not only the diversity of genes, species, ecosystems and functions, but also the metabolic capacity of the ecosystem.

Agriculture is dependent on biodiversity for its existence and, at the same time, is a threat to biodiversity. Because farmers are under pressure to bring a product to market quickly and to increase their production, they practice monoculture, planting the same crop over a large land area. Industrial agriculture erodes biodiversity of plants and insects, not only because it favors monocultures but also because those monocultures replace diverse habitats. In next figure 35 potential threats to biodiversity in different countries are shown:

Figure 35: threats to soil biodiversity.



Potential threats to soil biodiversity on the basis of expert evaluation, taking into account factors such as land-use change, intensive management and soil degradation processes such as compaction, pollution and erosion. The main driver for the high values is intensive agriculture.

Source: JRC/Jeffery et al., 2010.

There are also some economic reasons pushing to react and to try to avoid all these consequences on environment. It is difficult to estimate costs of previous harmful effects related mainly to land and soil degradation (European commission, 2006), because of the lack of sufficient quantitative and qualitative data, but numerous studies point to significant annual costs to European society, in the ranges of:

soil erosion: €0.7 – 14.0 billion,

organic matter decline: €3.4 – 5.6 billion,

soil compaction: no estimate possible,

salinisation (excess of irrigation): €158 – 321 million,

landslides: up to €1.2 billion,

contamination: €2.4 – 17.3 billion,

biodiversity decline: no estimate possible.

Erosion, organic matter decline, salinisation, landslides and contamination might be costing the EU up to €38 billion annually. As the costs of the other threats could not be assessed, the real costs of soil degradation are likely to exceed this estimate. The majority of these costs are borne by society.

4.3.2 Sustainable methods in agriculture:

"Sustainable agriculture systems are based on relatively small, profitable farms that use fewer farm inputs, integrate animal and plant production where appropriate, maintain a higher biodiversity, emphasize technologies that are appropriate to the scale of production, and make the transition to renewable forms of energy" (Horrigan, L., 2002).

Today's conventional agriculture is considered unsustainable because it is eroding natural resources faster than the environment can regenerate them, because it depends heavily on resources that are nonrenewable, and because it affects directly on human health.

Sustainable agriculture focuses on long-term interests (e.g., preserving topsoil, biodiversity, and rural communities), rather than only short-term interests such as profit.

A common definition of sustainable agriculture is the following:

"Sustainable agriculture integrates three main goals: environmental health, economic profitability, and social and economic equity [….] Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs" (University of California, 2009).

We briefly describe some methods that enhance sustainability:

Crop rotation. By rotating two or more crops in a field, farmers interrupt pests' reproductive cycles and reduce the need for pest control. Rotations often reduce the need for added fertilizer because one crop provides nutrients for the next crop.

Cover crops. Cover crops are planted to improve soil quality, prevent soil erosion, and minimize weed growth.

No-till and low-till farming. These farming systems are based on the fact that minimizing disturbances to the soil (not or low tilling) will increase the retention of water, nutrients, the topsoil itself, and less use of, sometimes pollutant, agricultural machineries. it is a conservative technique of soil management, a way of growing crops from year to year without disturbing the soil through tillage, without removing herbaceous crops, and thus maintaining a physical fertility comparable to that of natural soils. Studies have found that no-till farming can be more profitable, economically and for the environment, if performed correctly. Less tillage of the soil reduces labour (1/4 less), fuel, irrigation and machinery costs. No-till can increase yield because of higher water infiltration and storage capacity, and less erosion (decreased by 95%).

Soil management. Good stewardship of the soil involves managing its chemical, biologic, and physical properties. Industrial agriculture has tended to emphasize the chemical properties of soil, to the detriment of the other two. Healthy soil produces plants that are more vigorous and therefore less susceptible to pests.

Diversity. Growing a variety of crops provides a buffer against both ecologic and economic problems. Monocultures are more vulnerable to pests as well as to fluctuations in market price.

Nutrient management. After monitoring the soil content of nitrogen and other nutrients, farmers can prevent runoff into adjacent waters, and also save money on purchased fertilizers, by applying only what the plants and soil can absorb, with no excess.

Integrated pest management. An integrated pest management (IPM) system prefers biologic methods and uses (least-toxic) chemical pesticides only as a last resort. To keep destructive insects under control, an IPM emphasizes crop rotations, intercropping, and other methods of avoiding pest cycles, as well as plant varieties that have high resistance to pests. IPM also uses insect predators, as well as biopesticides.

Rotational grazing. By continually moving animals to different grazing areas, rotational grazing prevents soil erosion by maintaining sufficient vegetative cover.

Better use of agricultural machineries. By reducing or improving the use of pollutant agricultural equipment (for air, e.g. with fuel consumption, or land, e.g. with intensive use on soil, or multisided lifecycle pollution from production to disposal of raw material intense, or

high pollutant in-use, agricultural machineries). A way to decrease pollution from agricultural equipments is by reducing their production, and their disposal and substitution. An important mean to reach it, is by increasing the adoption (manufacturers and farmers) of Product-Service Systems (PSS), that drive toward this sustainable direction mainly by proposing renting/sharing systems, empowering maintenance, thus extending lifecycle of machineries, and by offering outsourcing solutions).

Barriers to agricultural sustainability:

The most important barrier is represented by “powerful economic interests that benefit from the status quo in agriculture. Industrial agriculture relies heavily on external inputs (e.g., synthetic chemical fertilizers and pesticides, machinery, fossil fuels), which mean costs for farmers but profits for farm input industries” (Horrigan, 2002).There is also a cultural barrier, and a change of mentality is necessary; farmers and agricultural equipment manufacturers do not fully recognize the effects on environment and human health, or under esteem them; the same for the consumers, that do not give enough more importance to sustainable practices, thus not pulling agricultural business toward a sustainable change. Moreover “Governments’ subsidies often help perpetuate unsustainable practices” (Horrigan, 2002), and rulers do not give a strong push (with laws, subsidies) toward a real sustainable agriculture.

4.3.3 Worldwide and Italian diffusion of sustainable agriculture:

Something is changing in the world of cultivation in a direction of a more sustainable agriculture. Italy is lagging behind in diffusion of sustainability in agriculture, which protects the environment and human health and preserves the fertility of the soil, but the interest about it is growing and Regional Development Programs are being provided to support this new agriculture (L’informatore agrario, 2012).

For example, the diffusion of “No till or low till farming”, also known as “sod seeding” (in Italian “Semina su sodo”), one of the most pervasive and effective sustainable practices, is up 50% in the world during last 10 years.

Worldwide the No Till is used on about 100 million hectares, 7% of agricultural land in the world, and of these, approximately 85% is concentrated in the North and South America. America and Australia are the top countries in its spread. Europe is still lagging behind,

there are about 30 million hectares of no or low till, approximately 1% for ECAF (European Conservation Agriculture Federation). In Italy there is the same European percentage, far from American and Australian spread (Marandola, 2011).

The 44.8% of Italian agricultural CO_2 emissions derive directly from the management of the soil, and studies proved that a no or low-till diffusion could reduce them deeply (L'informatore agrario, 2012).

Other less common sustainable practices are still unknown for the majority of Italian farmers, and have a very low spread also in the most sustainable agricultures (America and Australia).

In the last 20 years sustainable practices have had a low but positive trend of growth all over the world, and the "sod seeding" is the leading technique driving toward a more aware and modern agriculture.

4.3.4 CAP (Common Agricultural Policy):

The Common Agricultural Policy (CAP) is a system consisting of European Union agricultural subsidies and programmes. In 2010 the budget for direct farm payments (subsidies) and rural development, the twin pillars of the CAP, was 58€bn, that is 47% of the total EU budget. The direct payments alone was 43€bn (Nao.org.uk, 2011).

The aim of the common agricultural policy (CAP) is to provide farmers with a reasonable standard of living, consumers with quality food at fair prices, to preserve rural heritage and to direct agriculture toward more sustainable practices by putting the environment at the centre of farming policy. By new rules and laws the European Commission wants to improve the competitiveness, sustainability and permanence of agriculture in the EU, and gradually move rewards away from intensive farming to more sustainable practices (European Commission, 2012).

The CAP began operating in 1962, with the Community intervening to buy farm output when the market price fell below an agreed target level. This helped reduce Europe's dependence on imported food but led soon to over-production, and the creation of surplus food and drink.

From 2014 to 2020 in the EU there will be a new agricultural policy and new rules that will change the agriculture and the practices of many farmers and machinery manufacturers.

This new policy created many discussions and critics and it is considered as one of the most controversial in the EU. This caused many debates and modifications that put CAP closer, or not so far, to its right basic principles.

These new rules and subsidies are new important reasons and strong incentives which will drive European farmers and agricultural machinery manufacturers towards new sustainable practices and productions.

Here there are some relevant areas covered by CAP (European Commission, 2011):

- *Food security*
- *Sustainability*
- *European Cultural heritage*
- *Rural development*
- *Working conditions/modernization*
- *Agricultural Production practices (non-compliant agricultural equipments will not be admitted)*

This last area is very large and is the most interesting for our work. The deepening of this policy is out of our thesis work, but we want to underline above all that CAP includes many new rules which will affect directly many manufacturers, and in some cases, they will be even forced to redesign their products.

For example some necessary changes on equipments are related the harrows and plows; the new CAP reduced the maximum length of the teeth of the two types of machine in order to reduce the negative subsidiary effect of frequent plowing on organic soil composition. Other designing changes concern with the seeders; innovative machines are required for the sod seeding, a new sustainable practice that will be spread through the incentives of the new CAP.

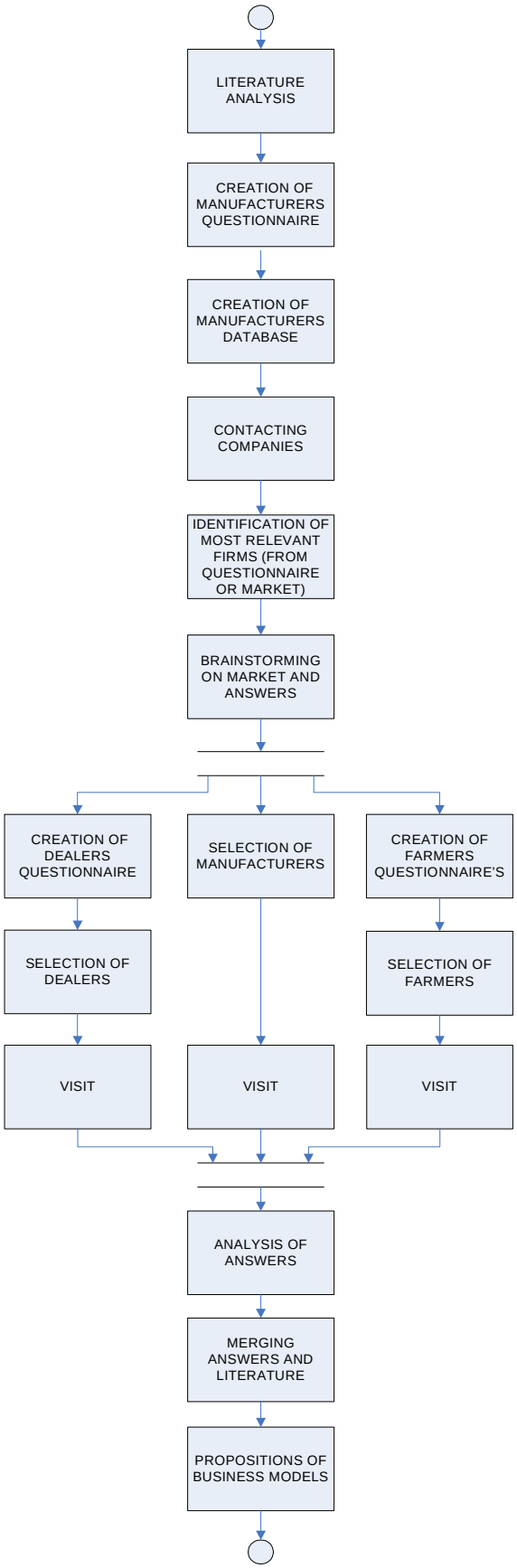
We strongly think that this new policy might be a new important push towards different more sustainable business models for farmers and mostly for manufacturers.

5. RESEARCH METHODOLOGY

In this chapter we are describing the phases, methodologies and tools we used to build our research. The focus of the analysis is on the agricultural equipment manufacturers but, as the first results began to rise, we decided to extend our survey on the dealer/assistance networks and on the farmers: final users of the equipment.

In the next flow chart, figure 36, we show our research and analysis process:

Figure 36: Research and analysis process.



In next paragraphs we are going to describe in more detail every single phase; giving now a general description of our work.

Literature analysis was the first step of our process of work. In this phase we studied mainly topics about PSS and Servitization, business models, and sustainability (see previous chapters). After our literature analysis, the next group of activities dealt with manufacturers' business model analysis.

Through our literature analysis we created a manufactures questionnaire based on Tukker research on PSS, Osterwalder's business model framework and sustainable work from SustainValue. After that we passed to set up a firm reference database on which to base our following questionnaire submission, interviews and visits. Subsequently we started contacting every manufacturer. It was decided to submit the questionnaire by phone or mail, and eventually for relevant companies emerged from our market analysis, to visit and interview people in crucial roles.

After analyzing the first complete questionnaires we understood, by a mindful brainstorming on market and first answers, that it was very important for our work to extend our analysis to other two important actors in supply chain: dealers and customers. Through the first analysis and our brainstorming we individuated the most crucial areas in manufactures' business models to provide customers high quality services. Consequently we came to the decision to visit manufacturers with a specific focus on some interesting dimensions of their business model, and to submit new questionnaires to selected dealers and farmers.

It was created a specific questionnaire for dealers and customers (see next paragraphs) and we decided to submit questions directly through site visits. These visits gave us new important cues and helped and improved our following analysis.

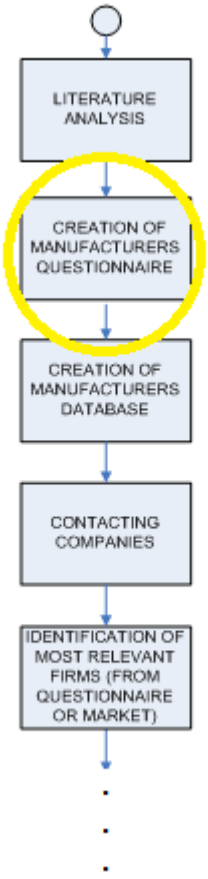
After receiving all questionnaires we started analyzing answers through some spreadsheets (see chapter 6), then we cruised our field researches with literature theories and so we were able to propose our specific business models for agricultural machinery manufacturers (chapter 7) to improve their service offers and go toward a Product-service system.

5.1 Agricultural equipment manufacturers research activities

In this paragraph we describe in detail the phases of our analysis involving the agricultural equipment producers. First we explain how the main questionnaire was developed then we show tools and techniques used to create our firm's database and finally we present the types of contact and the relationships we established with some relevant companies.

5.1.1 Questionnaire development

Figure 37:



Phase of our activity flow chart.

This phase (figure 37) describes how the questionnaire was born combining together 4 main areas: a company overview on the dimension, an analysis of the services offered by producers (according to the Tukker classification), a deep survey of the business model implemented using the dimensions proposed by Osterwalder and a final focus on sustainability (see questionnaire attached 1).

<u>Company overview</u>

The first two questions are proposed with the aim of classifying firms by dimensions, using the CE regulation 364/2004 (small firms are considered when the revenues are under 7 € millions or when the number of employed people is less than 50; medium firms with revenues between 7 and 40 millions € or 51 to 250 employees and finally big firms bill more than 40 million € and employee more than 250 people). The third question is posed to understand what level of servitization is reached by the company: the more revenues comes from the services the

<u>Services enabling a product-service system (PSS)</u>

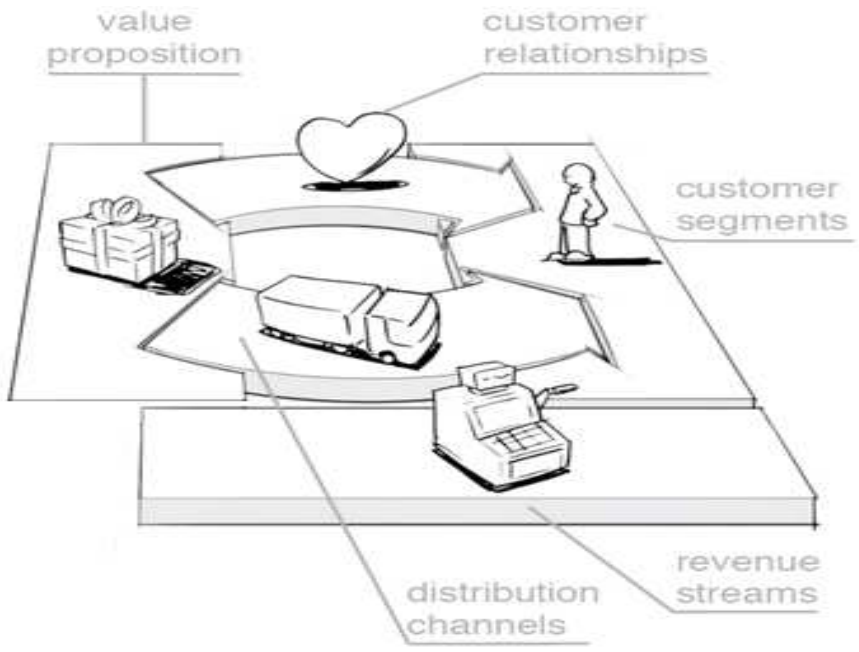
The first question is proposed to evaluate what kind of services are offered by the company, we used the Tukker classification of PSS and we adapted it to the agricultural machinery sector by excluding some categories of services. Maintenance and consultancy are part of the product oriented services, renting and leasing are in the use oriented sections and are advanced types of services in this market; finally the total care is part of the result oriented

section, we included this answer among the options even if we assumed it was not widespread in agricultural equipment manufacturers market as we never found literature examples. The second and the third questions of this section are posed to evaluate the weight of the use oriented and result oriented services in the company business model and to clarify the concept of PSS. In the advanced types of PSS it is not planned the sale of the product ownership; maintaining the possession of a relevant part of the installed base means that there is a focus on advanced PSS types in the company business model (see questionnaire attached 1).

Business model front

These five questions are proposed to analyze the relationships between companies and customers. We have developed this section on the wake of Osterwalder work on business models, (fig. 38) asking a question for every block individuated in the model. The aim of this methodology is to identify the best practices for every block or successful combination of canvas that bring to an efficient business model.

Figure 38: Osterwalder business model front.



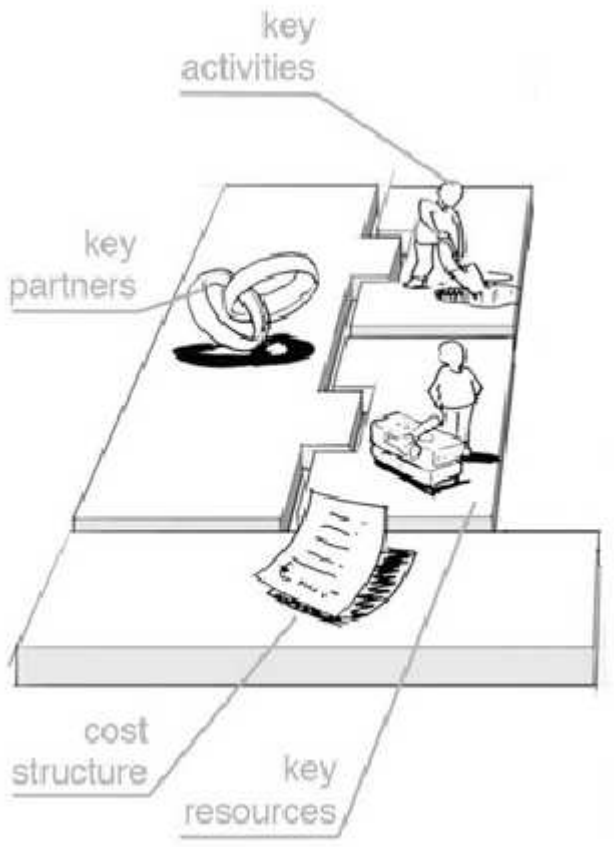
The attention on customers is investigated through the seventh question. Osterwalder recognizes five different categories of customers (see chapter 3) but dealing with agricultural machinery manufacturers we excluded implicitly the mass market and, because of the focus of our research, we banned the diversified and the multi-sided market. With the octave question the analysis is shifted on the core value in the company offer. Among all the possible proposed values it is impossible to identify which ones are the most useful in a

service offer and for the companies it is often difficult to chose some rather than others, anyway it could be very relevant to know what the value behind the most successful firms is. Ninth, tenth and eleventh question are analyzing critical areas of our research: a service oriented business model must be focused on customer satisfaction. Reaching customers through proper channels and develop good relationships must be the aim of any company which is trying to add types and improve quality of its services. On the crucial blocks of "*Customer Relationships"* and "*Channels"* we focused our analysis and we explored deeply activities, policies and best practices of these areas in our firm visits. The last question of the section is about revenue streams, by asking this we clarify the type of PSS proposed by the firm: an asset sale inevitably involves a product oriented PSS, other types of revenues stream are symptom of advanced types of services (see questionnaire attached 1).

Business model back

Osterwalder model leads us to propose these four questions, the aim is to analyze the back side of the company (figure 39): the structure adopted by organizations to be efficient in the service provision.

Figure 39: Osterwalder business model back.



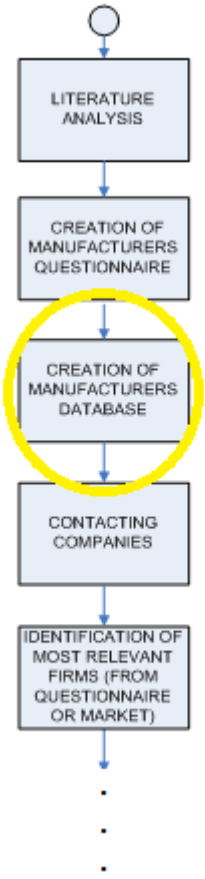
The framework proposed by Osterwalder is useful here to understand if a company is more focused on production or in service provision; in this context we see the following two questions. The twelfth one is proposed to frame a company from the production oriented when choosing manufacturing facilities, buildings and patents. A service oriented company will be more directed on choosing human resources or the distribution network. We can make a similar argument for the thirteenth question where the distinction is even greater between production and problem solving. We propose then two questions asking about the partnership and the role of partner. This building block which becomes critic in the analysis that follows. Finally, dealing with the cost structure building block, an additional question is added to ask about any changes passing from a product offer to a product-service one.

Sustainability

We extrapolate our questions on sustainability from an already existing questionnaire created by SustainValue (http://www.sustainvalue.eu/) a research project funded by European Commission's Seventh Framework Programme (FP7). We decided to insert five questions in our questionnaire after a detailed analysis. The first question chosen (eighteenth of our questionnaire) is asking in general the meaning of sustainability for the company, it is useful to understand if there is a general attention to sustainable themes, we go deeply with the nineteenth question to see if sustainability has an influence on company's business model and, with the twentieth, we individuated firms with a formalized process to develop a sustainable business model. Finally, with the last two questions, we ask about challenges and barriers to sustainable initiatives and about the hypothesis of creating value for the company trough sustainability.

5.1.2 Creation of manufacturers Database

Figure 40: Phase of our activity flow chart.



After creating the questionnaire to be used for our research we passed to the following step (fig. 40): the creation of a main database of firms to which submit our questionnaires.

We stated that agricultural machinery manufacturers, agricultural equipments' dealers, and farmers were the three main actors in our research (the supply chain from manufactures to final customers) and we decided to select a significant group of manufacturers and some characteristic dealers and farmers that could be helpful to our analysis.

The primary and largest database was the machinery manufacturers one and it was the result of a selective, deep and meditated research.

Agricultural machinery manufacturers database creation:

First of all we decided to identify a large database of firms which produce at least one kind of agricultural equipment considered in our research (Traction and Power, Harvesting, Seeding Planting and Fertilizing, Haying and Mowing, Soil Cultivation, Sprayers), and afterward to start sorting companies from this initial database. Our main tools to create it were the internet and some sectorial magazines and fairs.

By the net, through the website of UNACOMA (http://www.unacoma.it), (unione nazionale costruttori machine agricole), the Italian agricultural machinery manufactures organization, we identified and inserted in our base some national companies, members of the organization, after excluding the ones produced only components, or trailers, or small wagons, or machines to process agricultural products. Afterward we used the search engine EUROPAGES (http://www.europages.it) in order to include in our initial large database also

Italian manufacturers not members of UNACOMA, Italian subsidiaries of big international companies, and some main foreign companies.

To increase the quality and the size of our initial database we selected other agricultural machinery manufacturers by reading the main agricultural magazines ("Macchine agricole domani", "Informatore agrario", "Agricoltura 24", "Machine e motori agricoli") and their websites. Then we also analyzed some informative papers collected in our day visit in biennial fair FIERAGRICOLA in Verona and the press releases of main national and international fairs ("Fiera Agricola", "Agriexpo", "Agrilevante", "Agritechnica", "SIMA").

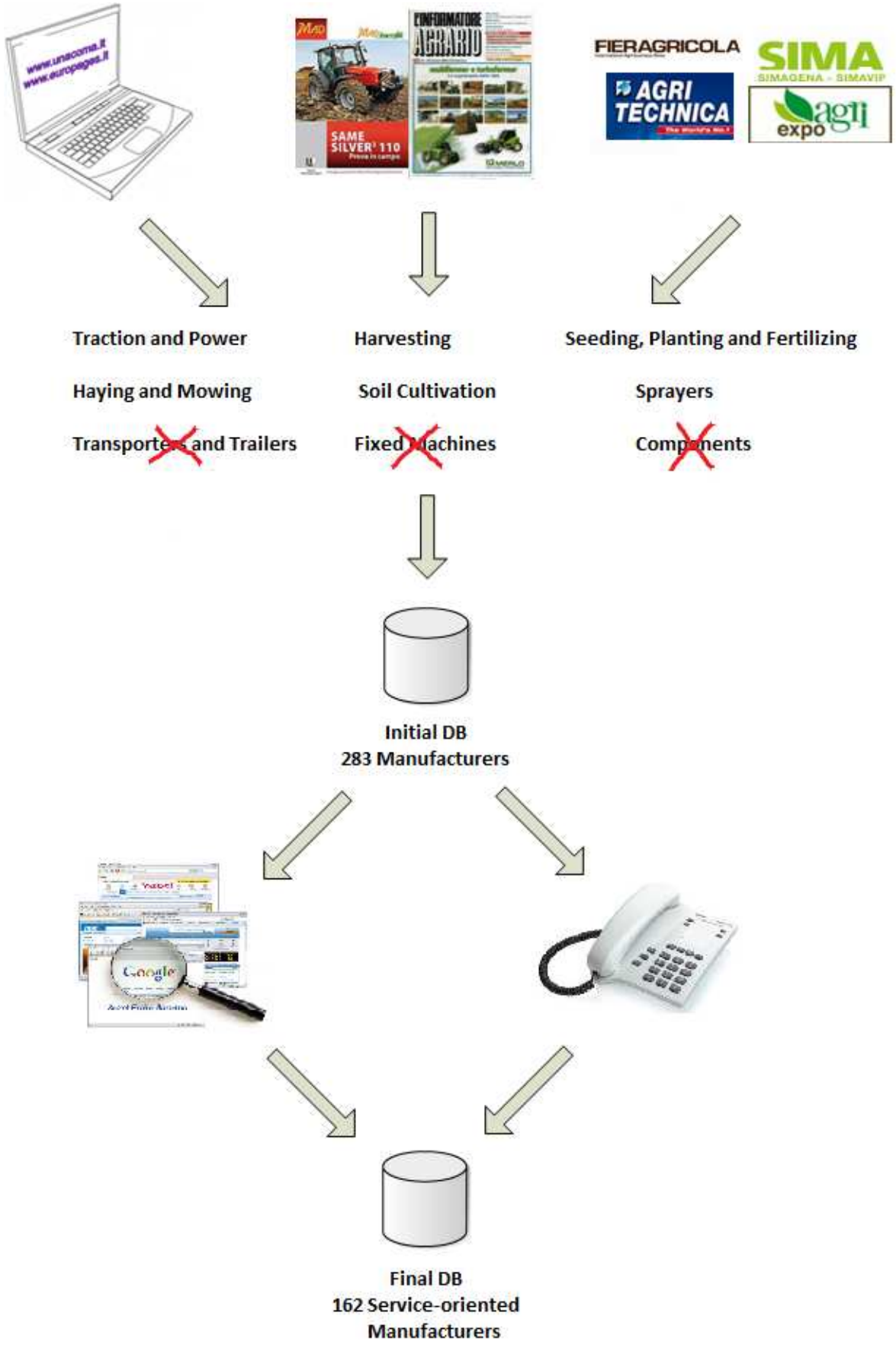
After this research work we created an initial database consisting of 283 agricultural machinery manufacturers.

Our following activities were focused on sorting and selecting, from the initial database, only manufacturers which provide customers services related to their products (following the classification of Arnold Tukker, 2004).

In order to consider in our following analysis only manufacturers which offer possible kinds of PSS, we had to exclude from the initial companies' database all firms do not account services among their offers. We scanned all 283 manufacturers' websites to individuate products and services offered, and in some cases, whether the site was not clear and explicit we telephoned directly companies to have a better idea of what type of products and services they provide to customers. After this reasoned selection our final agricultural machinery manufacturers' database was complete.

Final DB consists of 162 firms, Italian and foreign ones, producing kinds of products considered in our research (see agricultural offers in figure 42 and figure 43), and offering services with these products. We summarize our DB creation process in figure 41:

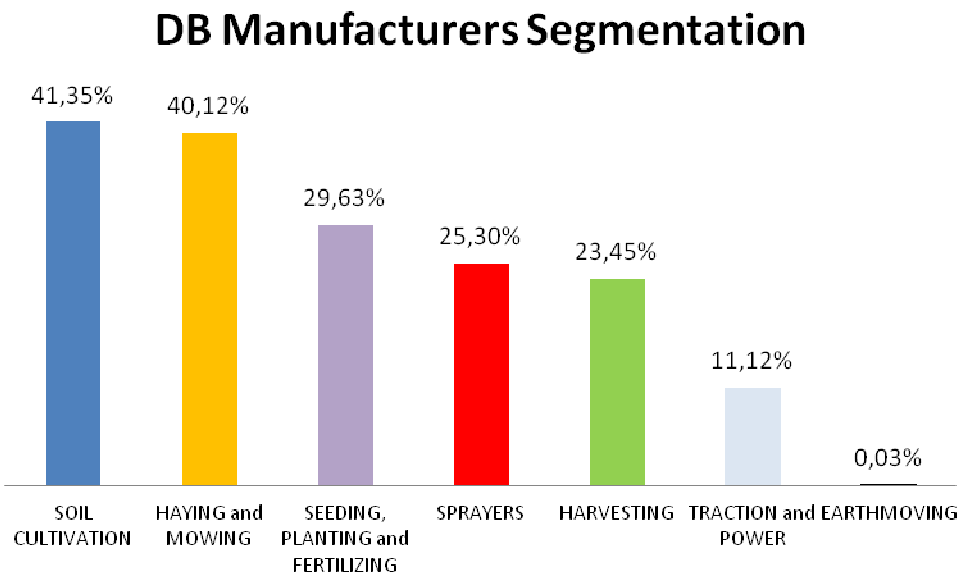
Figure 41: Process of creation of our manufacturers DB.



We inserted in our DB also the market leader company in earthmoving business, recognized globally as a “best practice” in service offers and service quality. This earthmoving company is not in the category of agricultural manufacturers, but, mostly for the similarity of the two sectors, we found interesting to interview and visit also this unquestioned service leader.

Many manufacturers make more than 1 kind of agricultural machinery; no one produces the full line (all kind of products):

Figure 42: sectorial composition of manufacturers final DB.

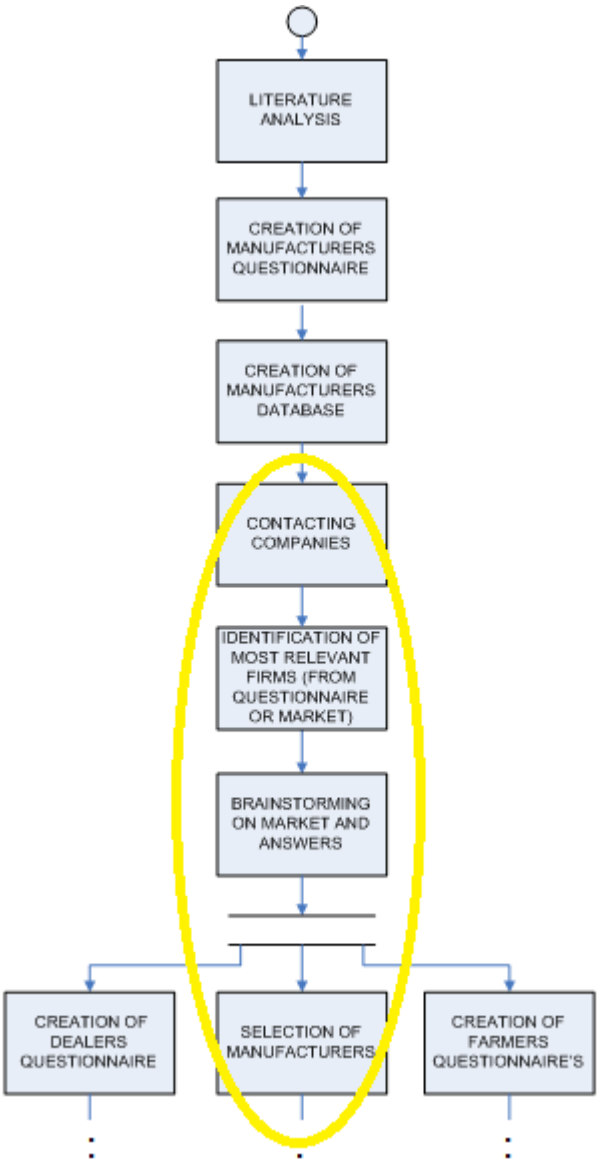


The 41.35% of companies of our final DB (manufacturers selected to be contacted) produce soil cultivation equipments. This kind of manufacturers is the most numerous in our manufacturers DB. This datum is due to the particular composition of manufacturing structure in our country: in Italy there are many domestic manufacturing firms and a low percentage of agricultural manufacturing firms has more than 20 employees (EUROSTAT Data, 2011); soil cultivation machines are quite simple equipments, and they do not need a high technology production plant to be made. For these reasons also in our final DB there is the prevalence (even if slightly) of soil cultivation producers, that sometimes, for their local and small dimensions, reach directly customers with their services.

We have used the just described final manufactures DB for all our analysis studies, characterized by on-line surveys, telephonic interviews, and site visits. We are going to depict them in deep in the following sections (chapter 6 and 7).

5.1.3 Contacting manufacturers

Figure 43:



Phases of our activity flow chart.

After creating manufactures database we proceed in interviewing companies, to submit them our questionnaire, and to visit some in order to study in deep relevant practices (fig. 43). Our contact process consisted of different sequential activities as shown in figure 44.

The initial contact consists of a first presentation call or e-mail to ask firm its availability to take part in our research. If company declines or does not answer, then we do not consider it in our analysis, otherwise we submit them our questionnaire.

There are different ways to submit manufacturers our questions, if the company is a relevant one, or it is already known for its service quality we request a visit to study profoundly their business model and discussing deeply on the most important questions; if we do not have enough pieces of information about the company we send our questionnaire by e-mail or we call them

We also had the opportunity to have a first interview with some manufacturers at the fair FIERAGRICOLA in Verona, and in some cases this first direct contact was very important for our following deepening.

The analysis answer rate was 19%, 31 out of 162 contacted manufactures; 16 out of the 31 available producers answered by e-mail, and the remaining 15 were interviewed directly: 6 through firm visit, 6 by telephone call and 3 by the FIERAGRICOLA visit.

(description continues below activity flow chart fig. 44)

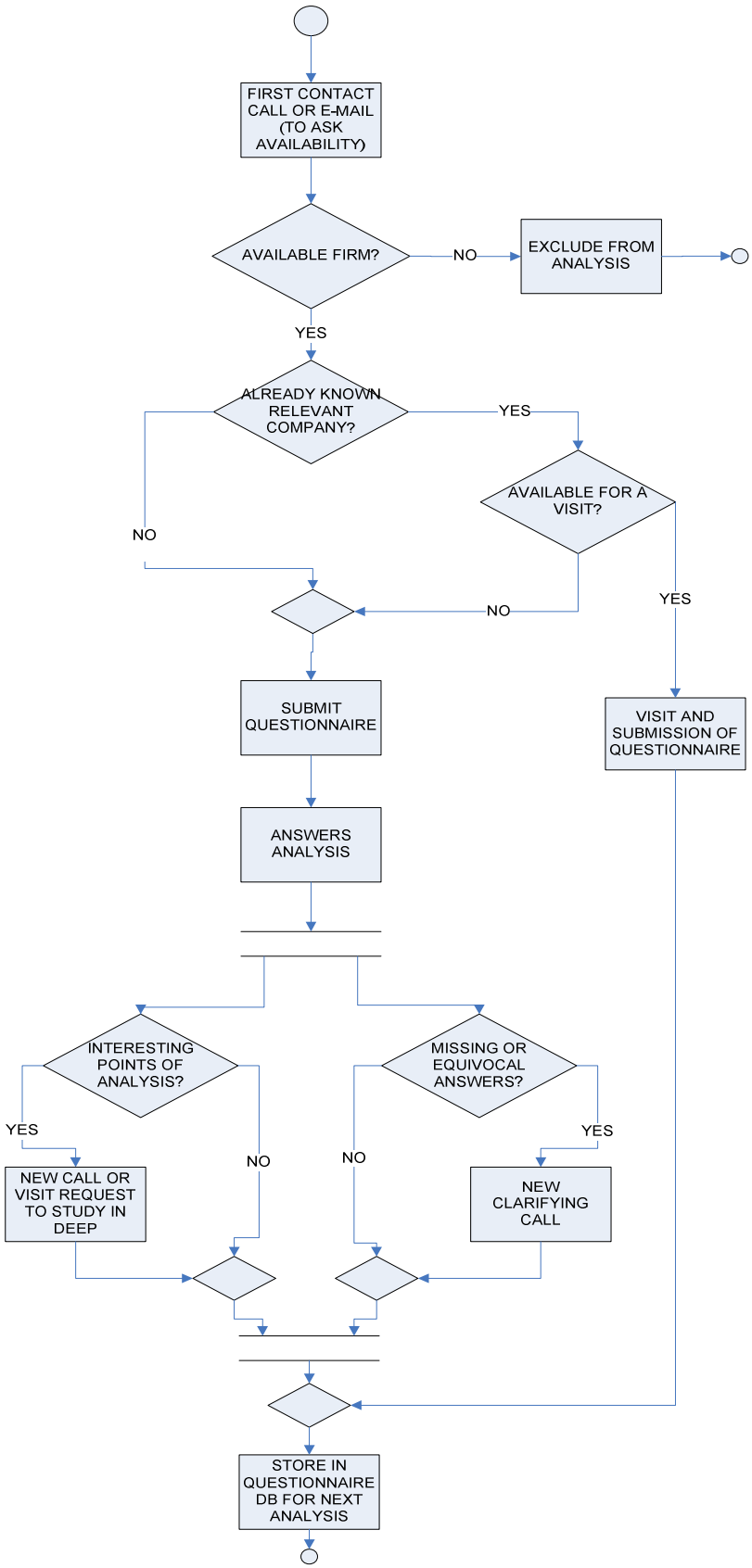


Figure 44: Contacting process flow chart.

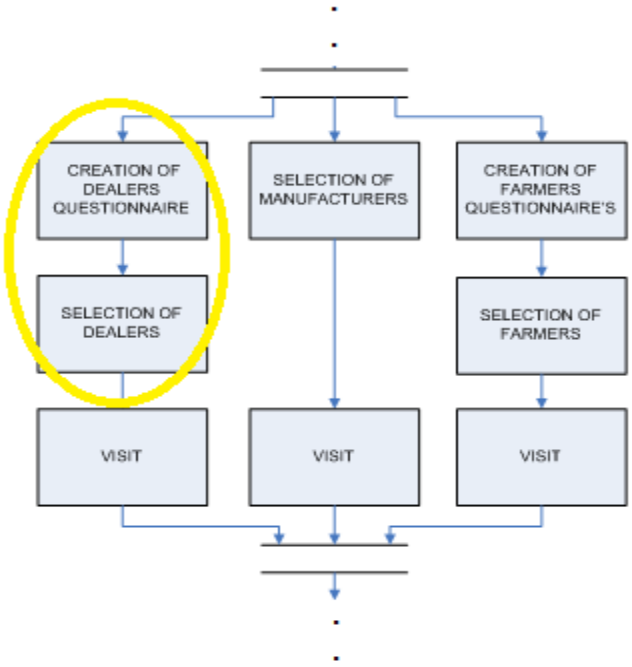
After an interview or the receipt of a compiled questionnaire by e-mail, we pass to analyze answers and if we find interesting points of view then we contact the company again for a study visit. Whether the questionnaire contains some missing or equivocal answers, we make a new clarifying call to avoid any doubts. At the end of the process every complete questionnaire is stored in a spreadsheet for further analysis.

5.2 Dealer network research activities

In this paragraph we describe how, after our brainstorming, we extended our research to the dealers network. During our researches we understood that dealers had a central and crucial role in the provision of services to customers, and so we decided to extend towards the distributors our inquiries and interviews. The dealers play a relevant role in the relationship with the final user and their ulterior pieces of information were merged with ones of producers (which remain the main study focus) to better analyze the sector. It was evident that the services offered were strictly connected to the dimensions: the bigger the dealer is the more his service offer is complete. We describe below the questionnaire proposed to the dealers and how we got in contact with them.

5.2.1 Creation of questionnaire for dealers

Figure 45: Phase of our activity flow chart (dealers).



According to Osterwalder dimensions, the dealer is managing the customer relationship block and it is the channel trough with the company is reaching its customers. It is the main actor in the after-sales area but in general for the complete service provision. The first four questions are proposed to clarifying the size of the dealer, asking about number of employers and revenues.

It is very interesting to know the percentage of revenues coming from services because, by analyzing future trends, we saw that successful dealers will earn more from service sale than from product sales. Moreover it is important to understand if a dealer is strictly linked with a single producer and if it is selling tractors and machinery or tractors alone (exclusively machinery dealers aren't existing). In a second step we focused our questions on the service offering asking about the type of services provided and the help received from the producer companies. Finally our questions go deeply on the offer of advanced services such as rental or total-care. We asked, directly to the owner of the process, the barriers to the development of those kinds of services.

5.2.2 Contacting dealers

We looked for big dimensions distributors able to offer evolved types of services (according to the Tukker, 2004, classification) with a business model structured to earn money from services as well as from sales. To analyze different dealers with special futures we searched a dealer focused on tractors, one on machinery and finally a dealer operating in a parallel sector (earthmoving machinery) recognized as an excellence in serving provision. The first dealer contacted was individuated at FIERAGRICOLA where directly the producer has cited it as one of the best examples. After a first contact e-mail the owner said he was proud to contribute to our research telling he was: "the inventor of rental in agriculture sector"). The second distributor individuated was reported to us by an agricultural machinery producer (not tractors), we were looking for a dealer of relevant dimensions that was focused on machinery more than tractors and with a defined mission based on the delivering and the improvement of the service offer. He was glad to help as because he recognized a lack of service-oriented dealers in Italy and was proud to tell us his experience. Finally the third dealer came in contact with us thanks to Politecnico di Milano University that organized a visit for us.

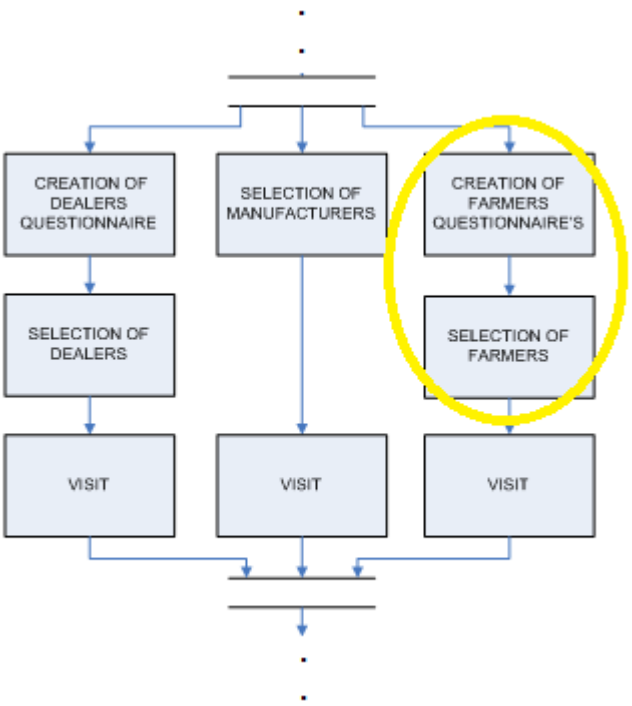
5.3 Farms research activities

In this paragraph it is explained how we got to the conclusion to interview some farmers and the development of the questionnaire proposed to them. The analysis was not primarily focused on end-users farmers, but we thought it could be important and useful to interview also agricultural machinery final customers, about services exploited and sustainable agricultural practices, to better study the manufacturers service provisions. Moreover, as usual, we describe under what parameters the farms were chosen and involved in our

research. It is important to specify that – as for the dealer network - all the questionnaires are submitted by visiting companies so the information obtained is much more extensive than those required.

5.3.1 Creation of questionnaire for farmers

Figure 46: Phase of our activity flow chart (farmers).



The questionnaire is structured in three main areas; the first one is an overview of the company asking about number of employers, acreage, type of crops and fleet. The second area is focused on services, with the fifth question we ask to farmers what type of services he is exploiting and with the sixth if he is satisfied of the service received.

The last area of investigation is concerned with evolved services, we ask through the seventh question about the use of rental or total-care services.

Finally the eighth question is to openly ask farmers a prediction, based on his experience, on the spread of the rental.

5.3.2 Contacting farms

We decided to concentrate our analysis on two different farmers, a big one (for production and number of machineries), and a small one, to understand their points of view on topics.

In order to obtain enough pieces of information from our two visits and interviews, we knew that we had to select carefully the two farmers. We searched in the net and in some sectorial magazines, finding out what we were looking for. We contacted both of them by a phone call and both agreed to cooperate with us.

6. ANALYSIS OF AGRICULTURAL MACHINERY MANUFACTURERS CASE STUDY

In this chapter the 31 answers obtained by questionnaires and the 10 case studies are analyzed. The structure of this section consists of three main blocks in which are studied the players of the agricultural sector. First there is the core analysis of manufacturers (31 questionnaires and 5 case studies) then the dealers' business is investigated (3 case studies) and finally there is a focus on farms' activity described by 2 case studies.

In manufacturers section the analysis follows Osterwalder framework on business models but first it is reported an introduction section giving an overview (market segmentation, service offered and dimension) on the sample considered. A final part focused on sustainability concludes the manufacturers' section.

Purposely the research follows in deep the key to the analysis proposed by Osterwalder. Another aim of the study is also to test in detail the effectiveness of his business model structure (recommended to every sector) to investigate companies and suggest solutions specifically to agricultural machinery producers.

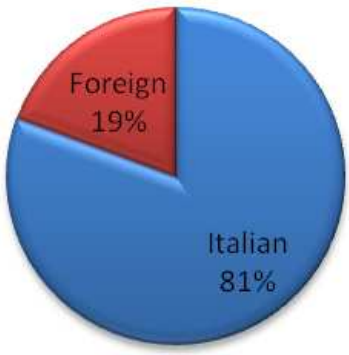
The paragraphs on dealers and farmers do not follow the Osterwalder classifications. They are not enriched by graphics on questionnaires results (the sample was too limited) but the interesting pieces of information obtained in the visits are deeply analyzed.

6.1 Manufacturers' answers analysis

This paragraph analyzes the responses to our questionnaire integrated with some pieces of information obtained in company visits. 162 manufacturers have been contacted and 31 questionnaires were collected by visits, mail contacts and telephone interviews. Two of them were submitted in English to the main foreign headquarter of two relevant international companies. The response rate was of 19.13%, quite high compared to other statistical interviews; this means that machinery manufacturers were fairly interested in our studies and in increasing service provisions to their final customers.

25 Italian companies and 6 foreign were involved (figure 47); as said before, 2 foreign ones were contacted by an English questionnaire and the remaining 4 by an Italian one to the national headquarter.

Figure 47: Nationality of interviewed firms.



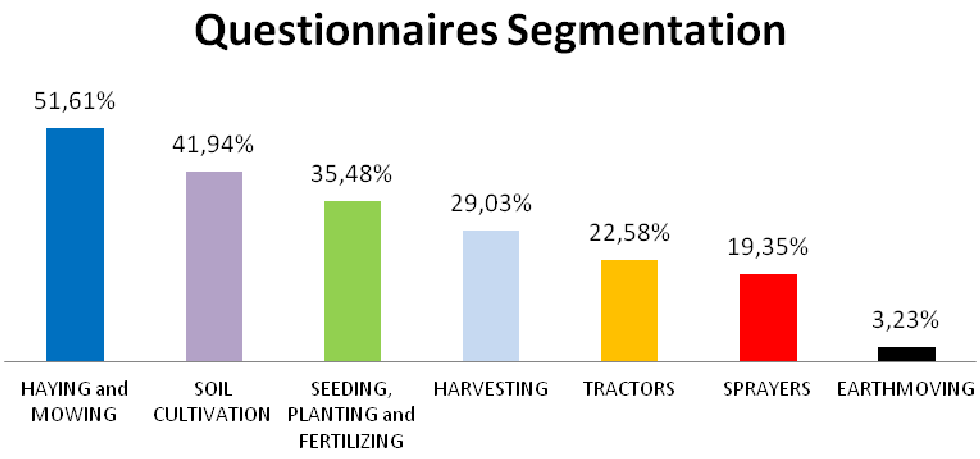
Many companies were interviewed by case studies to study in deep every single aspect of their business model.

Our 31 questionnaires were filled in by different kind of producers (figure 48 and 49). All the major producers of tractors were contacted (category traction and power) and several producers of machinery, by categorizing them with the standard classification (see chap. 4).

Among involved manufacturers: 13 firms make soil cultivation equipments; 11 produce seeding, planting and fertilizing machines; 9 make harvesting machineries; 7 construct tractors; 16 make haying and mowing tools; 6 produce sprayers and 1 earthmoving machines.

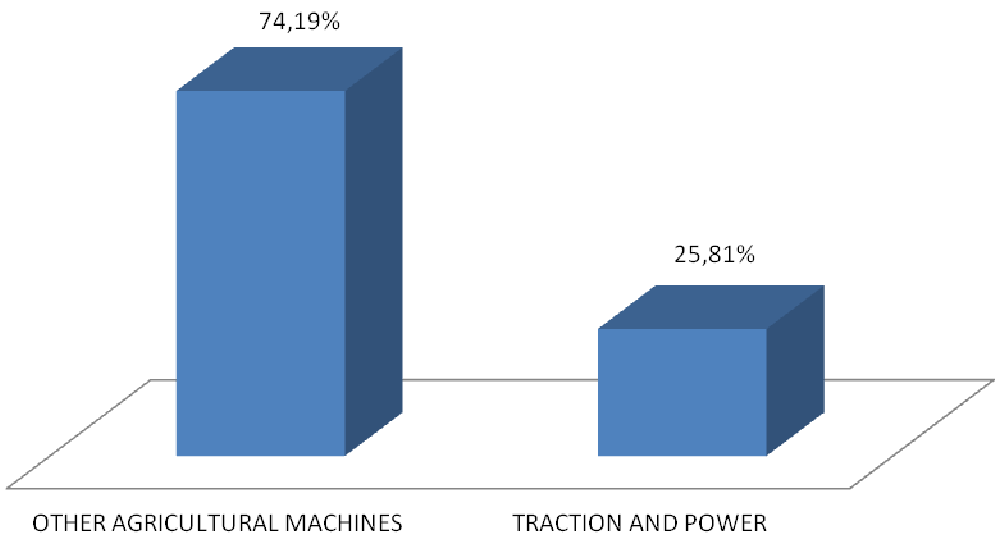
A manufacturer often produces more than one kind of agricultural machinery. Below there is the sectorial composition of answers database.

Figure 48: Sectorial sample composition.



Because of many common characteristics and to have a major ease in following analysis and exposition, in next sections only two main categories will be considered: companies producing tractors and earthmoving machines (traction and power), and firms making other agricultural machines.

Figure 49: Macro-category belonging of interviewed firms.

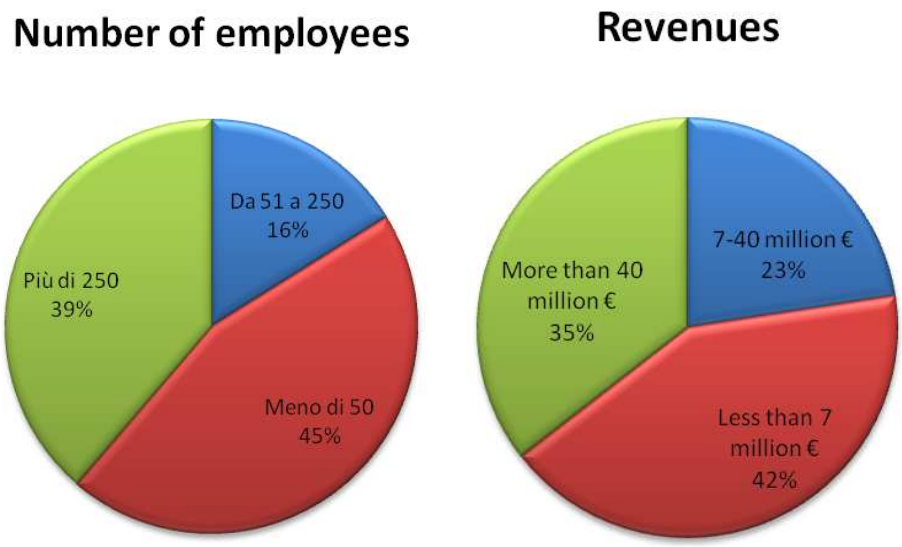


The questionnaire analysis involved 7 tractors makers including the world leader and the first five players in Europe for revenues. These five companies, in aggregate, reach more than 89% of total European revenues. Moreover the world leaders in producing harvesting machines were analyzed and also some relevant Italian and multinational other machines producers. The earthmoving machines producer is the Italian and world leader in its sector, also and above all for its high quality service offers.

Sample of firms' analysis:

Almost half of all manufacturers involved in the research are considered small companies with limited revenues and low number of employees. Approximately the remaining half is mainly composed of big firms. Only 5 companies had more than 50 but less than 250 employees (fig. 50).

Figure 50 and 51: classification of samples for number of employees and amount of yearly revenues.



This particular composition is due above all to the Italian manufacturing structure which is characterized by a predominance of small companies and a limited presence of large enterprises. It was decided to interview both small and big companies, firms belonging to every kind of machinery manufacturers; by considering small soil cultivation equipment producers and also involving the biggest tractor manufacturers which overcome easily one thousand employees.

Also having interviewed some Italian branches of foreign manufacturers an international focus was preferred. The multinational number of employees and the total amount of revenues were considered, not exclusively the Italian ones.

In figure 51 is shown the distribution of revenues among contacted companies. There are obvious similarities with the data of the employed people.

In Italy in 2010, 25 tractor producers represented 40% of all agricultural machinery revenues, and the other 2750 machines and equipments manufacturers made the remaining 60% (Servizi statistici UNACOMA, 2011). This is an important datum to take into account that also came out from questionnaires; the 8 traction and power producers have much higher revenues than other machine manufacturers have; 6 out of 8 traction makers have over 1 billion € of yearly turnover.

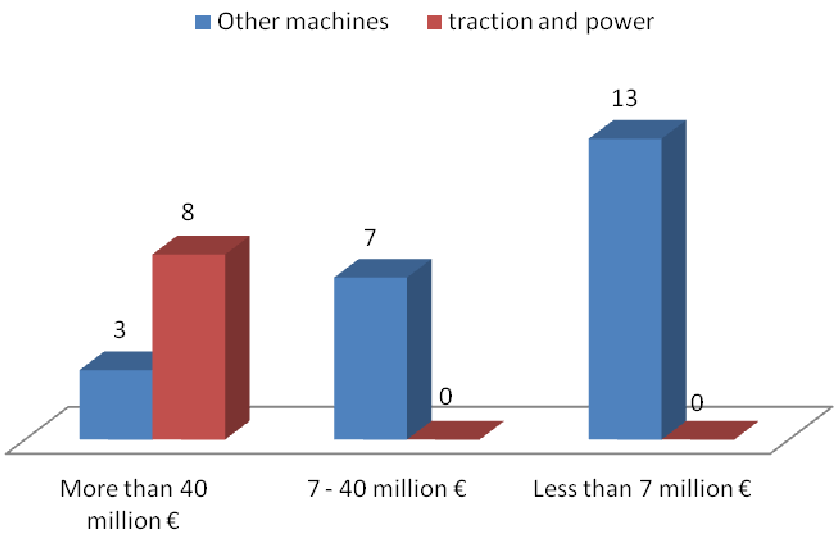
In the sample composition there is a higher presence of tractor producers than the real national composition; this feature was sought to study in deep the most relevant sector of tractor makers.

The 42% of interviewed manufacturers have a yearly turnover of less than 7 million €, 13 out of 31 companies. 11 companies have more than 40 million € of revenues and 7 between 7 and 40 million €.

All six foreign companies (3 tractor producers, 2 other machine makers and 1 earthmoving machines manufacturer) have an amount of revenues over 40 million € and employ more than 250 people.

In next figure 52 is clearly shown the relation between firm revenues and kind of production.

Figure 52: firm revenues by sector.



All traction and power machines manufactures have a yearly turnover higher than 40 million €; among biggest companies there are also three other machines producers. These three companies make mainly advanced technology machines, as precision seeders. No company producing technologically simple products, as soil cultivation equipments (plows, harrows), or mowers, it can be considered a big company.

As emerged by our visits, and shown in previous graphic, it might be useful to make a more in detail distinction among other machines makers. Technologically more advanced operative machines producers are often bigger than other simpler agricultural equipment manufacturers. Sometimes in next sections, if relevant, it might be adopted also this second more detailed distinction.

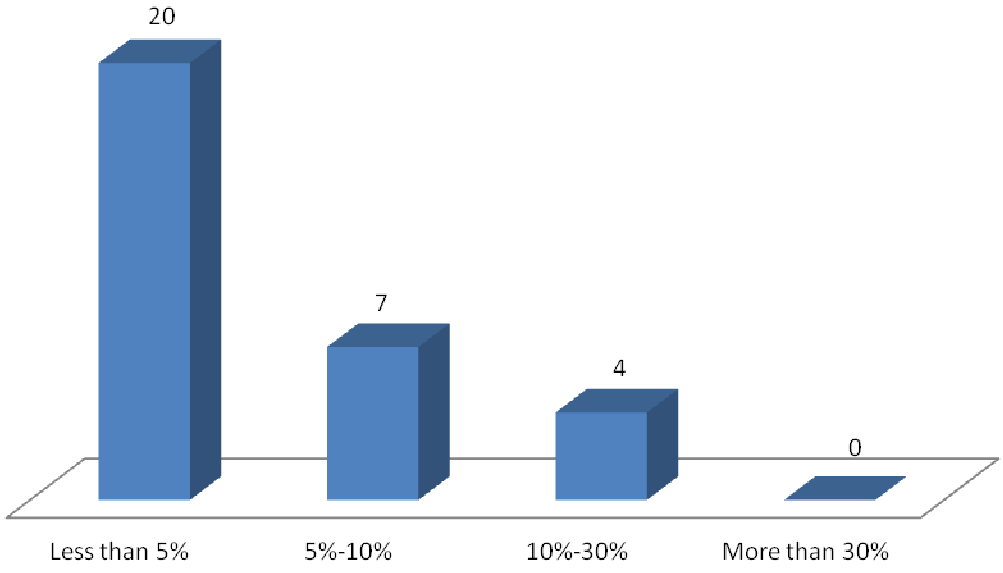
Previous overall firm results drive us to make an important distinction among traction and power machines manufacturers and other machines producers. As deepened in next sections, this distinction deals with, not only firm dimension, but above all some other

aspects as available economical resources, internal structure and organization, and bargaining power toward customers and dealers.

From firms' answers it emerged that services are very far to be a central offer among agricultural machinery manufacturers.

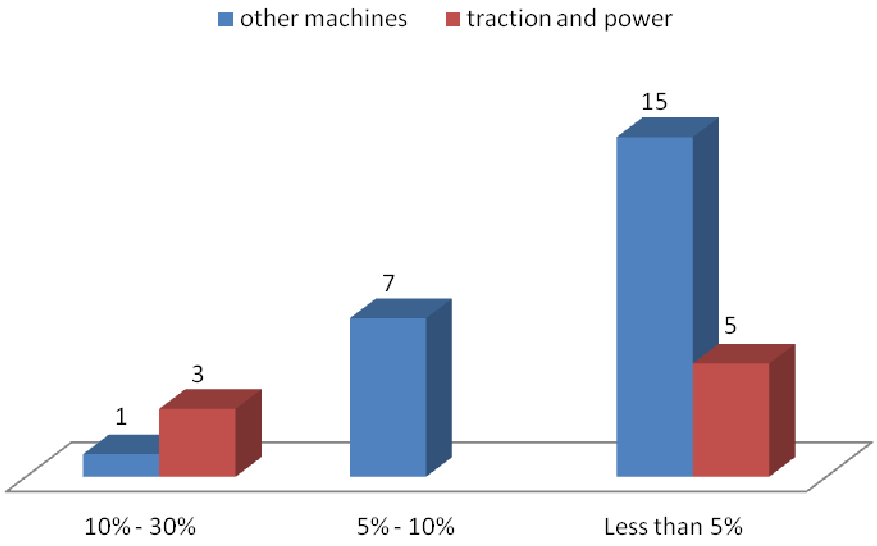
As shown in figure 53, approximately 64.5% of companies involved have less than 5% of its yearly turnover coming out from services. In this manufacturing sector, production processes are far apart the firm core activities, and in no case were found service revenues over 30%. As deepened later, rarely companies make customers pay for consultancy also because in machinery sector the average technology level is low; for this reason the revenues coming from services are mainly deriving from maintenance: in some small companies there is a service of direct maintenance whilst in big companies (especially tractors producers) this service is provided by the distribution network and the producers get incomes from maintenance programs sold directly with the product. The four companies standing out in the range 10%-30% are tractor producers that mostly thanks to this service maintenance package improved their revenues from services.

Figure 53: percentage of service revenues on total volume.



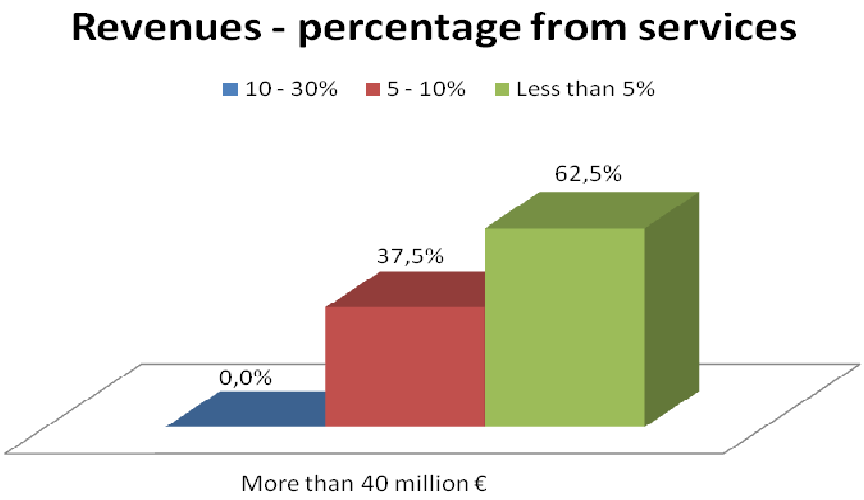
As clear in next figure 54, 65% of other machines producers (15 out of 23) have a low percentage of revenues from services, as well as 63% of traction and power makers; the remaining 37% (3 out of 8 have from 10% to 30% of service revenues) includes only 2 out of the 5 global sectorial leaders.

Figure 54: percentage from services by sector.



By a deeper analysis it can be noticed that not all traction and power companies, having a turnover more than 40 million €, have a high percentage of service revenues (fig. 55). This means that being a big company is often a necessary feature but not absolutely enough to be an evolved service oriented firm.

Figure 55: percentage from services in firms having over 40 million € revenues.



Only one manufacturer of other machines has more than 10% of revenues from services and it is 1 out of three other machines makers which have revenues up 40 million €. This producer is an Austrian company making mainly advanced precise seeders and it is also one of the only three other machines firms which has a total revenue higher than 40 million €.

SERVICES ENABLING A PRODUCT-SERVICE SYSTEM (PSS):

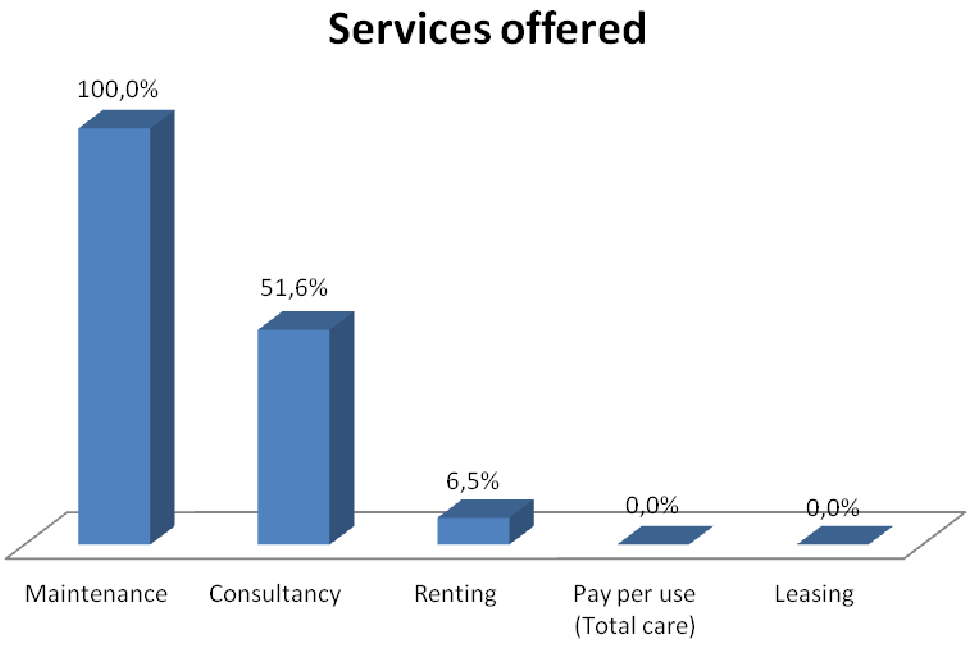
The following study is centered only on some services provided by manufacturers. The aim of research is to focus only on services, strictly related to the products, necessary and enabling the potential implementation of one of the 8 kinds of PSS proposed by Tukker (Tukker, 2004). For this reason some services offered by producers (as spare-parts, financial services) are not considered in next analysis.

Maintenance is the more offered service with a product. 93% of companies provide it with the sale of the product, 29 out of 31 (fig.56). Product-oriented product-services (in Tukker classification: maintenance and consultancy) are the most common in agricultural manufacturers: every company providing services offers a product oriented product-service, and only a small part, 6.5%, 2 companies, affords directly use-oriented offers too (in Tukker classification: renting, pooling, leasing). The only kind of services found, enabling a potential use oriented PSS, was exclusively the renting/sharing. No company provides some result-oriented offers (in Tukker classification: Pay per service unit, outsourcing, functional result); this kind of product-service seems to be still too advanced for this sector. Maintenance (offered through coverage solutions) is the only service provided by every manufacturer.

Through site visits to manufacturers, dealers and farmers, it was found a particular sort of renting, mostly for harvesting machineries, called “the operated equipment rental” (“noleggio a caldo” in Italian), that differs from normal rental (“noleggio a freddo”) because it includes also the driver of the machinery. This kind of rental is provided by contractors, (autonomous agricultural field workers which are able to use agricultural machinery and are paid by farmers for worked acres) and not by dealers or companies. For this reason we cannot consider it as a company’s direct offer. However this service offer can be classified, following the Tukker categorization, as a result oriented outsourcing.

The second most diffused kind of service is consultancy. Consultancy is a pre or after-sale service provision, often free, in order to advice customers on the best purchase solutions, to improve performances of machineries and their use, and to reduce customer’s costs, consumption, wastes and risks of breakdown. Obviously no manufacturing company can focus its service oriented business model on this single offer. In fact no analyzed manufacturer proposes it without another associated product-service. The 51% of interviewed firms provides consulting services before and after the product sale.

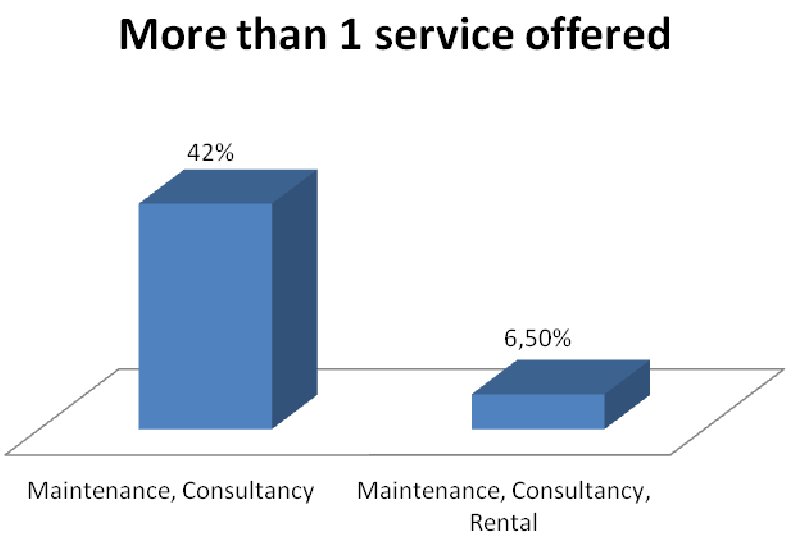
Figure 56: product-services offered by interviewed companies.



Product-oriented services are widely the most offered by agricultural machinery manufacturers. About use oriented offers the rental is the most adopted, but it has still a small percentage and a very low diffusion among producers (this topic will be deepened further).

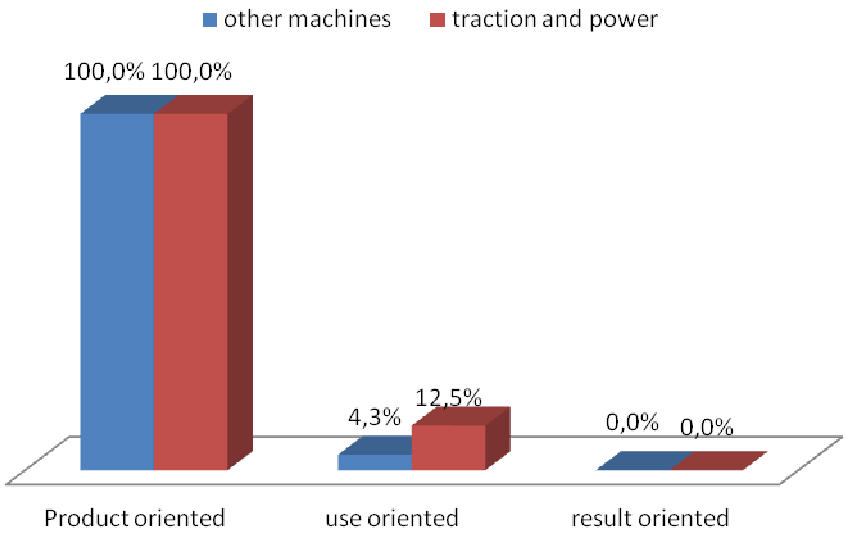
Only 48% of interviewed companies offer more than 1 (enabling PSS) service with the product. The most common combination consists of maintenance and consultancy. These services, both product-oriented, are offered combined by 42% of manufacturers; as shown in figure 57, only 6.5% provides also a third product-service and the only combination found is: maintenance, consultancy and rental. No manufacturer offers more than 3 product-services.

Figure 57: manufacturers offering more than 1 service.



By analyzing by sectors, every interviewed manufacturer offers, as shown in figure 58, a product oriented product-service. This percentage falls for use oriented, offered and pushed directly only by 2 manufacturers (another machine producer and a traction and power one), and goes to zero for result oriented for every sector of production.

Figure 58: service offers by sectors.



Among two manufacturers offering the rental service, only the equipment producer one does it directly and not trough its dealer network. The second manufacturer which declared to offer a rental service does not keep the ownership of any machinery after the transaction with the

client. This distinctiveness is due to the particular relationship between manufacturer and dealer/importer (it will be widely studied in chapter 7). Producer claims and pushes the offer of this service, provided through its unique distributor in Italy, but the manufacturer simply sells its products to the dealer, its only direct customer, which individually offers and makes profit from this service.

BUSINESS MODEL FRONT

In this section Osterwalder framework is driving the research. The canvas draws the guidelines for a segmentation of the business and each building block is analyzed for its role in the companies' strategies. It is important to specify that Osterwalder work is exploitable to study the implemented business models regardless of the sector that is analyzed. Moreover the tool adopted provides some possible options to describe the strategy implemented in each block (e.g. customer relationship block, options given: Personal assistance, dedicated personnel, automated service... etc.). In order to structure the analysis, the options provided by Osterwalder are considered to illustrate every single block but, to adapt the framework for a deeper investigation of the manufacturer sector, some additional and specific pieces of information were asked to the interviewed companies.

CUSTOMER SEGMENT

The 71% of analyzed companies provide customized offers for every segment (fig. 59). This datum is higher than we expected for an apparently standard market as agricultural machineries. Much competition in this sector has led firms, both big companies and local, to provide offers for every specific market segment.

It is interesting to analyze deeper this topic, trying to identify the different segments considered by contacted firms. In teleohonic interviews and during the visits it was asked to companies to list the customer segments considered.

Figure 59: standard or customized offers.

From the data obtained it is possible to classify the customers in the following segments:

- Farms of big dimensions adopting the extensive agriculture, large use of tractors and machines and quite high economic - bargaining power on producers.

- Medium / small farms, adopting the intensive agriculture, limited use of tractors and economic - bargaining power.

- Contractors, their business are focused on tractors and machines exploitation, they are autonomous workers delivering a total-care service to farms and are the only purchasers of some kind of evolved machines, obviously they are larger buyers of tractors too.

- Foreign farms in developing countries: firms operating in backward agricultural sector, for these customers the incremental innovation proposed are very attractive. The service need is limited to basic after-sale solutions, easily provided by local structures. Large distance and the need for low-technological products are strong barriers to the development of a profitable service-oriented business in these countries.

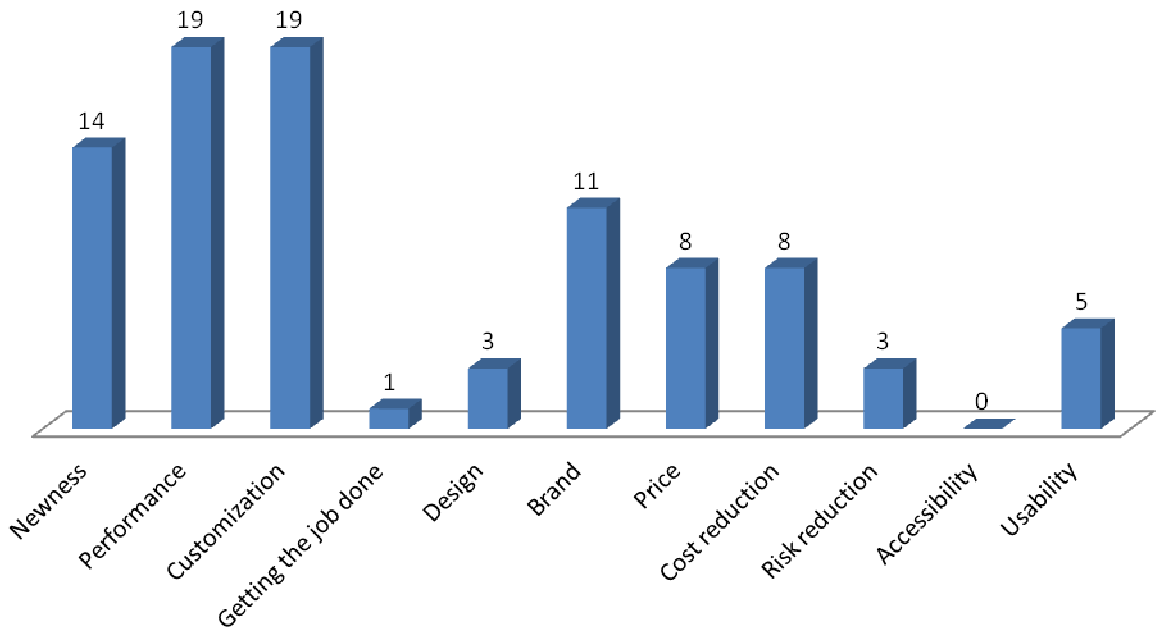
- Niche sectors: Customers of this segment need specific machines to develop their business (nursery farming, organic farming, etc.). In these segments large producers are not operating so there is the possibility for small specific producers to profitably exploit the sector. The limited number of these farms forces machinery producers to develop an international business.

VALUE PROPOSITION

First of all it is to specify that the interviewed companies were selected choosing ones that offer services provision together with the sale of an asset. What emerged from a first analysis is that the differential value generated by service oriented business models depends on the sector considered. From previous data it is observable that all the players interviewed offer a maintenance service with the asset sale, this imply that the provision of this service can not represent a differential value in agricultural machinery market. Actually, going deeper on the topic through case studies of excellent examples, it emerged that the real significance of a service oriented business model is represented by the manner in which a service is provided. For these reasons it was decided to follow Osterwalder's guidelines to understand which the values behind the business models analyzed are.

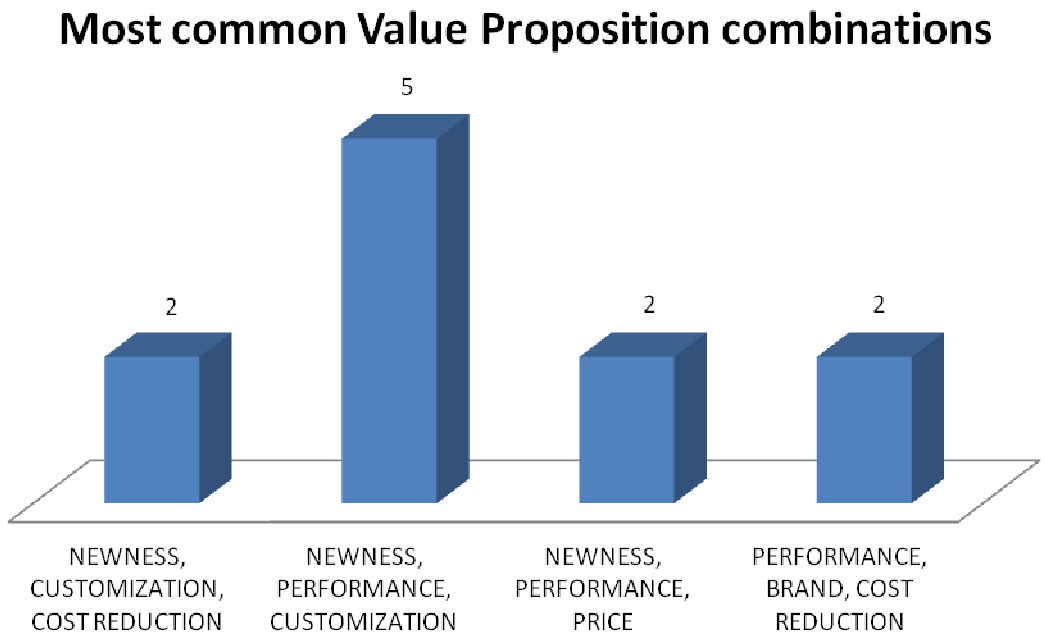
To describe value proposition data it is important to specify that it was asked to every interviewed company to give maximum three choices; only two from the total of 31 gave two options while the other 29 chose three. This is how the 91 results, in figure 60, were obtained.

Figure 60: main values behind offers.



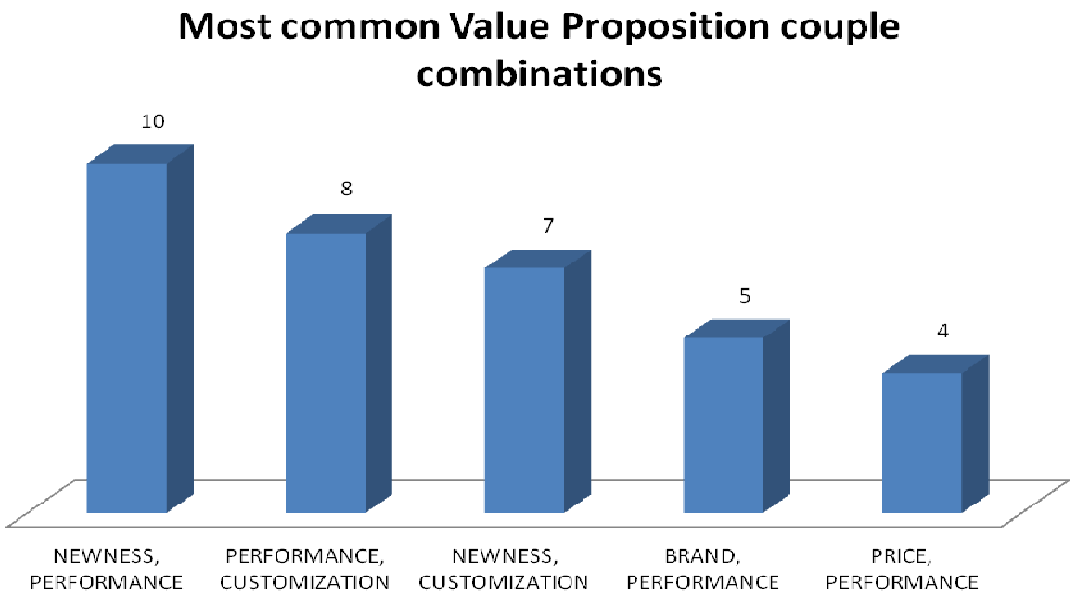
The data obtained from these answers are confirming what emerged from the previous question: the great need for customization in this sector. The market drove producers to propose this value and manufacturers seemed to be ready. The important numbers found in performance and newness are mainly explainable with a reason: the massive increase of technology in agricultural sector. In our visits, several managers told us that in these last years they are dealing with continue changes and introductions of new technologies with a frequence never seen before. In this context it is easier for companies to propose new specific equipment with improved performance. In addition to these data see figure 61 and 62:

Figure 61: most common value combinations.



Because of the increase of technology it can be seen how 10 companies are proposing the “newness” value combined with the “performance” one. This couple is the most chosen one, moreover these two options are proposed four times together with customization, this is a signal of the existence of a slightly common strategy in the sector.

Figure 62: most common coupled value combinations.



The great contribute of technology allows manufacturer to propose new product with good performance without neglecting the customization required. It is significant, in addition, to evidence how the “performance” value is proposed four times together with price, this means that technologies are reasonably accessible for several producers.

There are two options that are strictly linked with evolved service offer: “Getting the job done” which is due to result oriented PSS such as outsourcing and pay–per–service and “accessibility”, connected with the rental service. Consistent with what was found (the evolved service provision is almost absent) there are no companies that chose “accessibility” and only one company that selected “getting the job done” even if no result/use oriented PSS is adopted; after a telephonic contact the firm could not motivate strongly that choice.

An interesting datum to be highlighted is the one on brand, even in a not-mass market this option has chosen by 11 companies, it is quietly linked with performance (5 firms out of 11 chose the couple) and it is explainable with the nature of customers: farmers are recognizing a great value to their equipment and are predisposed to be very loyal to a single brand (especially in tractors sector).

It could be relevant to individuate what values stand behind a service oriented offer, in order to do this it was visited a company recognized by all competitors as a leader in service provision. This firm chose the triple combination “brand”, “customization” and “cost

reduction"; by discussing with managers it was clear that services' purpose is to simplify the activity of customers and even reduce their total cost, a well-structured service offer should contain this value and it is also advised the combination with customization for a complete "customer-centric" offer.

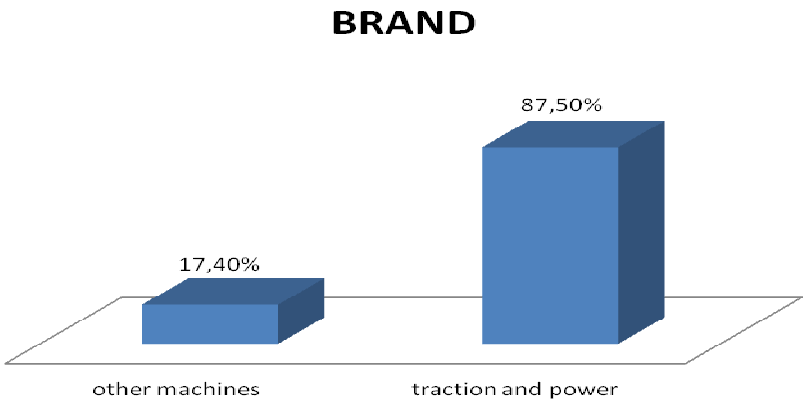
It was noticed that the couple customization – cost reduction appears three more times; so another company with these characteristics was visited. By this deeper interview it was definitely recognized a service oriented proposition but poor results in implementing an effective strategy. By discussing with the CEO the reason of this came out: a low capacity in reaching directly the customer with their values. The dealer network is not transferring the company mission to the final users (this topic will be deepened in chapter 7).

The data emerged previously about value propositions emphasize the frequent choice of newness and performance values; analyzing them by sector it is possible to see that no tractor producer chose the newness as a value proposed, on the other hand 60.9% of machines made this choice.

This datum clearly emphasizes that machine producers are continuously introducing new technologies on their products with the consequence of frequent introduction on the market of new machines. By visiting firms it emerged that these new products are bringing with them the necessity of specific maintenance and consultancy that weren't needed before; this is forcing producers to pay attention on the after-sales service which is mainly managed by dealers referring to tractor producer. The many partnerships between tractors and machines producers are readable also with this light.

On the wake of these reflections we analyzed the choice of "brand" among the interviewed companies; the data are reported in next figure 63.

Figure 63: manufacturers focusing on brand by sector.

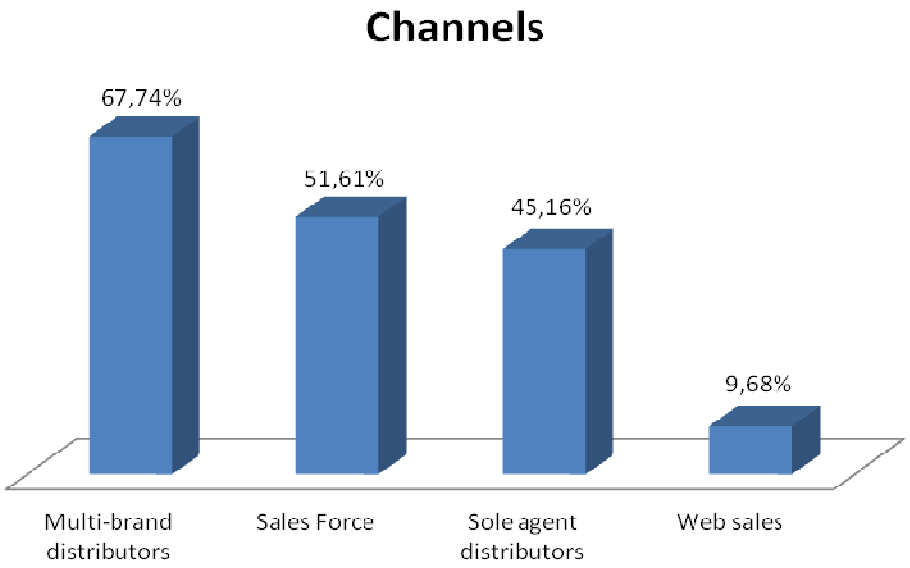


Only one out of the 6 tractor producers interviewed did not choose this option, on the other hand only 17.4% of the machines producers chose it. This is explainable with the maturity of the product tractor and the marketing actions to increase the market share. Due to this maturity and parallel to marketing initiatives the tractor producer leaders are investing, in these years, in service provision; again we observe another reason for what machines producers should exploit tractor producers' structures to improve their service offer.

CHANNELS

This is one of the core blocks to understand the implemented strategy for the service provision, from the selection of the channel it depends the nature of the relationships established with customers. In figure 64 it is observable the aggregate result of the choices, several companies exploit more than one channel, this is why the aggregate percentage results over 100%.

Figure 64:



For our research sole agent distributors were considered those dealers selling a single brand for a specific segment of agricultural equipment (e.g. selling only one brand of seeding machinery is sufficient to be considered a sole agent even if it is sold a different brand of tractor).

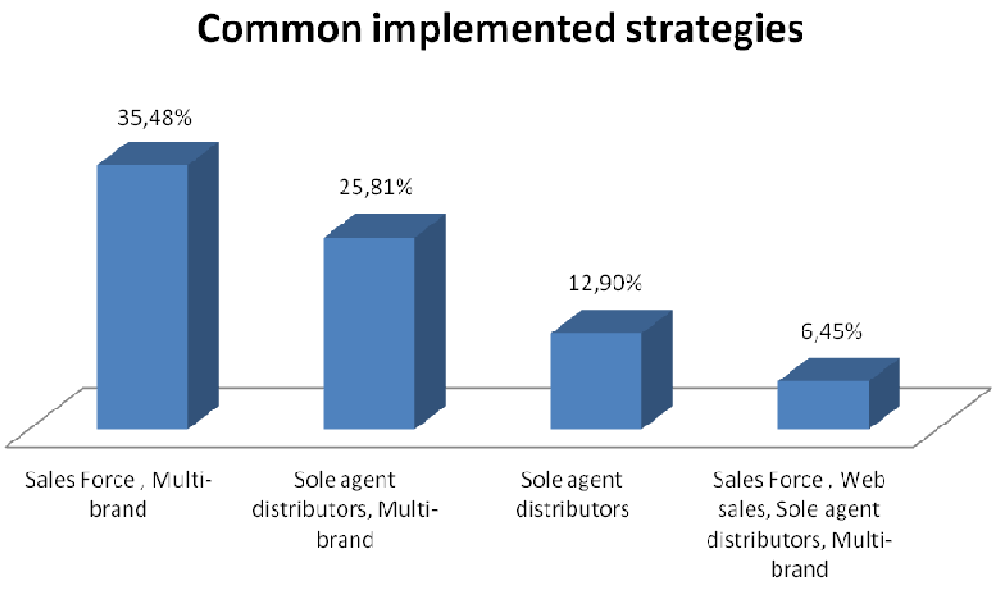
The majority of the interviewed companies is selling through multi-brand distributors, this choice is due to two different causes, it can be a strategy to obtain a good coverage or a

dealer choice in consequence of a low bargaining power of the producer (limited revenues from a single brand could not allow a dealer to purchase only it). Moreover, as specified above, there is a high level of segmentation in producers offer and, in order to satisfy different customer needs, selling an only brand could result ineffective.

From the case studies emerged that, speaking about service provision, for a multi brand distributor it is impossible to reach the service standard obtainable by a sole agent; there is a lack of specific competence necessary to maintain properly a machine/tractor and there is an insufficient preparation to give an appropriate consultancy. Obviously this subject is even more relevant when the equipment is endowed with a high technology level. In addition there is a strong link between service standard and dealer dimensions but we will describe this deeply in next paragraphs.

It is interesting to merge some answers (fig. 65) in order to define clearly what are the different strategies individuated.

Figure 65: common distribution solutions.



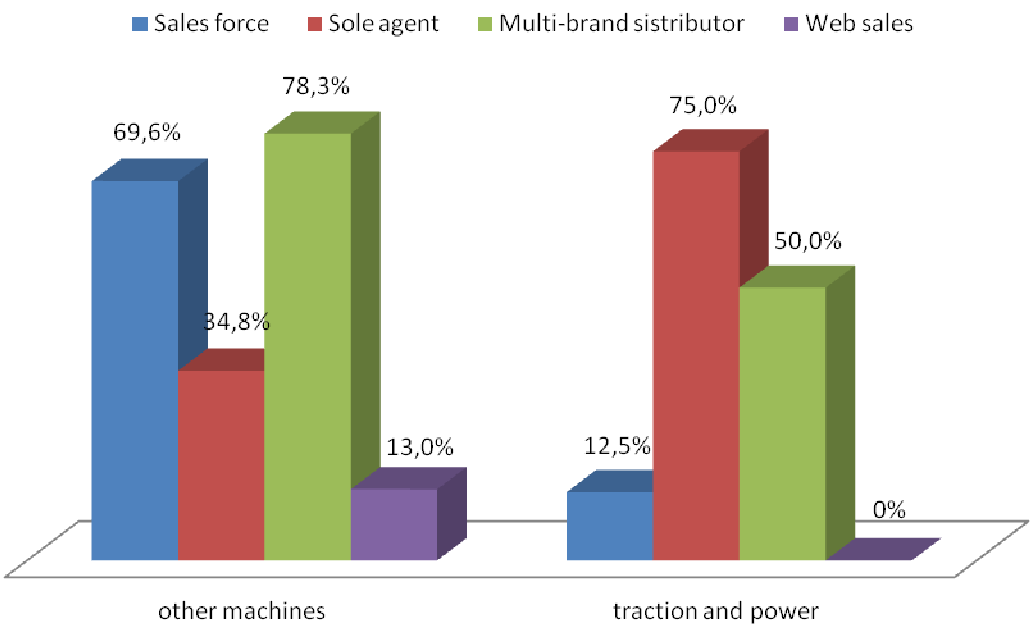
We recognized two different main strategies, the first one individuated by the first column and chosen by 35,48% of interviewed companies is a classic push action where manufacturers are selling their products through several multi-brand distributors and in addition they are reaching customers directly with their sales force. We already said how this strategy is sacrificing the quality of the service but could be effective for machinery with a low technological level, it is curious to notice that two firms extremes this policy by reaching customers through all possible channels. The second strategy individuated, represented by

the third column, is a quality-oriented one obtained resorting to sole-agent distributors, thanks to this it is possible to provide a defined service standard. Three firms which are adopting this strategy to increase their customer satisfaction have been visited and two of them are definitely achieving this objective, what they said is that it is important to measure and control dealer's quality standards through a dashboard of performance indicators and obtain information on distributors performance even through questionnaires directed to final users.

In this context seems strange the choice of 25.81% of the interviewed companies which are combining together the two strategies. To go deeper on this topic, a visit and some telephone calls were made and emerged that this situation is linked to geographic factors. In the areas near the production site/national branch the company is strong with its brand and the producer finds agreements with dealers to enter into relations of exclusivity. Far away from the manufacturing company there is no more possibility for this type of agreements and firms are forced to resort to multi – firm distributors. This could be helpful to increase revenues from selling products but is harmful for a brand which is aiming to a high level of service offer.

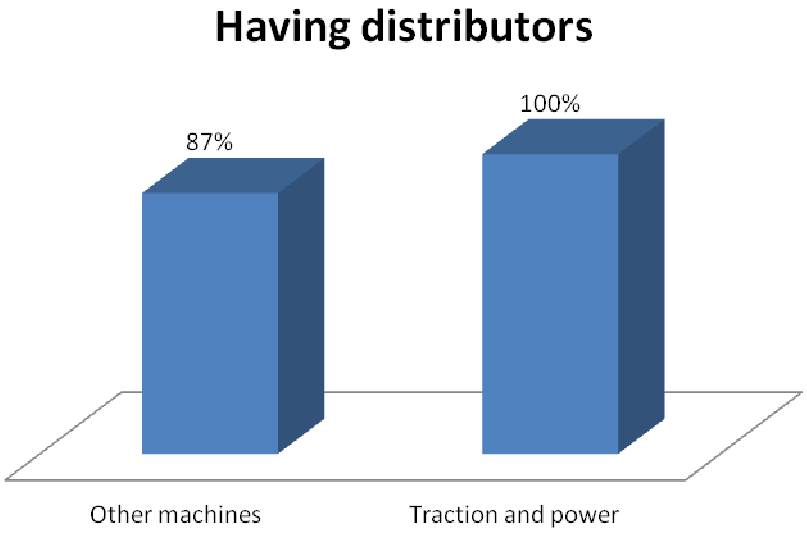
The majority of traction and power manufacturers, 75%, have sole agents to sell their products. This datum is strictly related to their bargaining power on dealers, which allows them to impose distributors their sole brand for the specific category of products. Other agricultural machines producers, mostly simple ones, more rarely have this power. 35% in our analysis sell through sole agent distributors, and 78% by multi-brand ones. Sales force is much more used compared to the traction producers, as shown in next figure 66 respectively 70% and 12.5%. This is due to the different sales structure and amount of sales. Other machines manufacturers, often smaller than traction and power ones (as shown previously), usually use their sale force to sell locally, and in many case directly to the final farmers. This datum can be read also in the figure 66, smaller companies often need to seek final users by own agents to increase, or not to decrease, their sales; 3 companies, 13% of machines producers do not have any distributors to reach their customers, and by going deeper in results all three have sales agents and 1 both sale agents and web sales. By our visits we found also another reason for this. Often smaller other machines producers see resellers and distributors as direct and final customers, interrupting any relationship after the transaction, and reaching them by their sales force.

Figure 66: distribution channels diffusion by sectors.



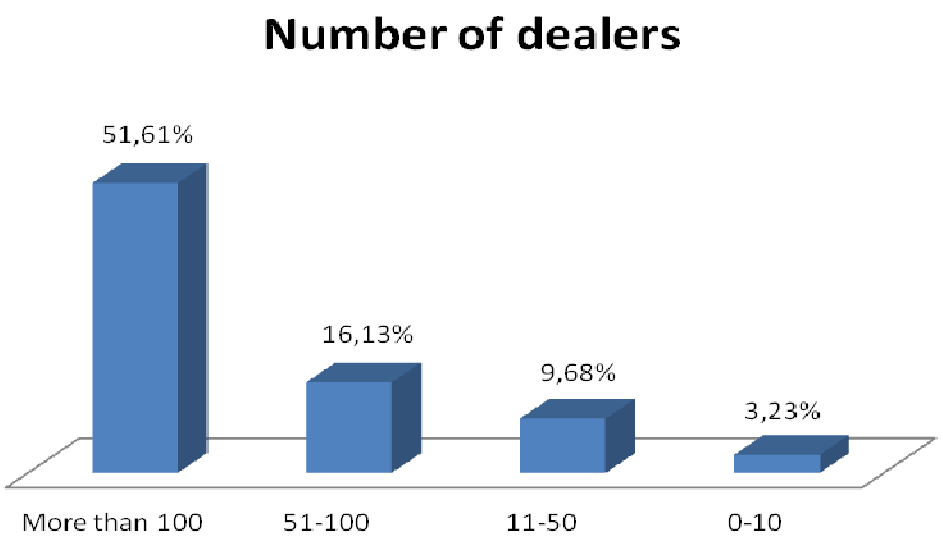
The smallest tractor manufacturer interviewed reaches customers also by sales force. Web sales were found in three companies, all three equipment producers. This was a good result for e-business, and growing yearly (as seen in visits), an opportunity to reach customers all over the world, mostly for small machines producers.

Figure 67: companies having distributors.



On the wake of these results it could be interesting to know the number of the dealers through which having distributors companies are selling/providing services in Italy. In figure 68 we report these data.

Figure 68: number of dealers in Italy.

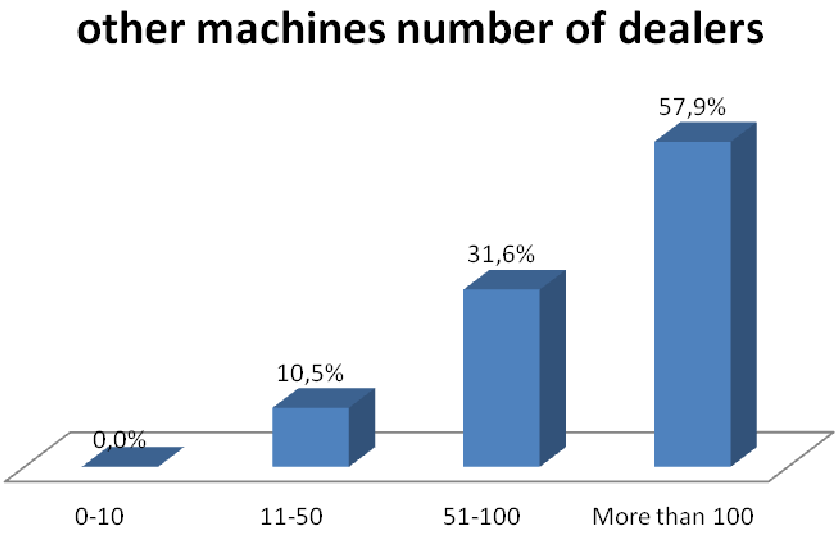


More than a half of the interviewed companies is covering Italian territory with more than a hundred dealers; 5 firms (16,13% of the total) are selling through 51 to 100 dealers; 3 companies through less than 50 and one company is selling only through one distributor.

As said before not all agricultural machinery manufacturers have direct distributors, but anyway this channel is the most common in this sector. In next figure 69 the number of dealers of other machines producers is shown.

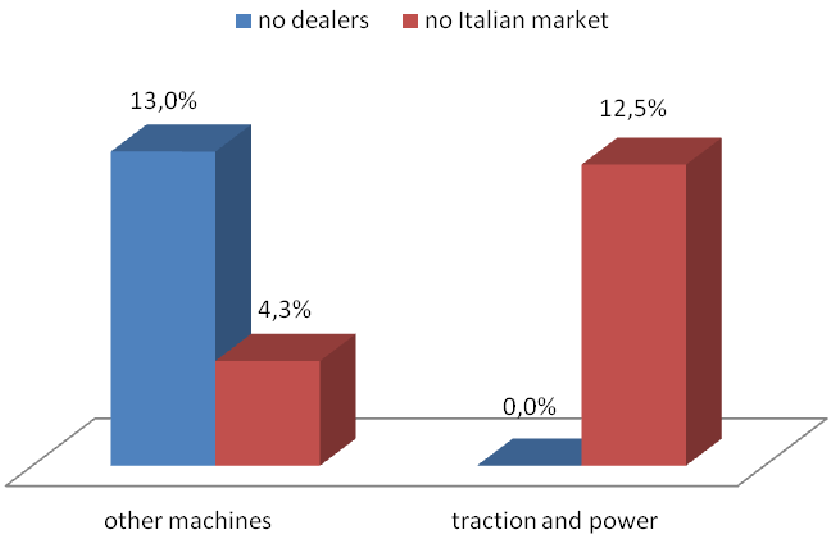
The most common practice is to have more than 100 dealers/distributors/resellers; only 2 out of 19 have less than 50; not for a strategic decision, but for a limited market demand.

Figure 69: number of dealers of other machine producers.



In the answers database there are also traction and machines companies which do not sell in Italy, and so they do not have any distributor in our country (fig. 70).

Figure 70: not having dealers and not having distributors in Italy by sector.

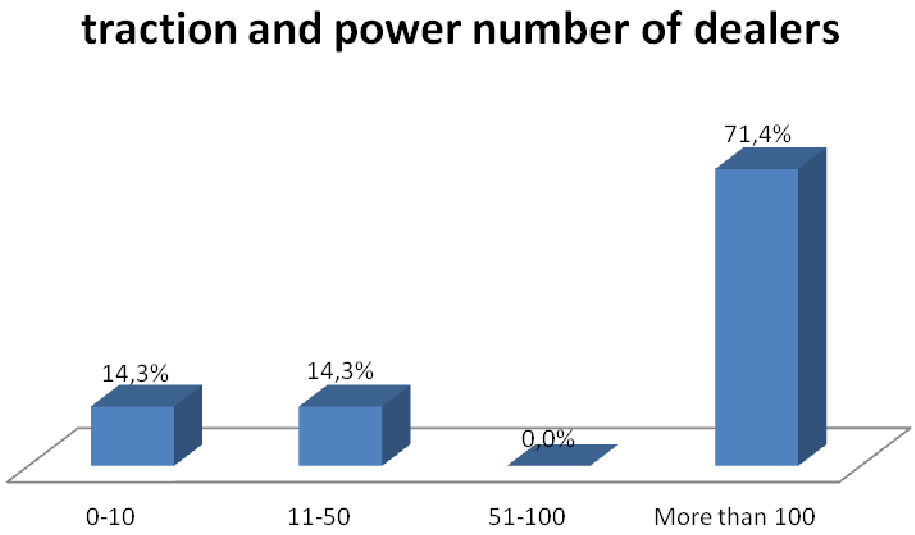


The number of dealer's analysis is more useful for traction and power producers.

As shown in next figure 71, 5 out of 7 companies declared to have more than 100 dealers. By the visits emerged that this datum is very common in this sector and it is the consequence of previous years strategic decisions in order to penetrate the more it is possible the market and to increase the sales share through a strong presence close to the customer.

During every visit it was clear that traction and power companies are aware that a change is necessary. In order to be close to the final client it is not sufficient anymore to be rooted and widespread locally, it is more important to be closer by services also, if necessary, by being less close physically. By one visit to the only firm having from 11 to 50 dealers, and their number is still slightly decreasing, this topic emerged strongly. This reduction often implies the enlargement of dealers' sales and thus the amount of resources available to invest and improve services to their customers and accordingly manufacturers' clients; anyway we postpone the deepening of this theme to the next chapter.

Figure 71: number of dealer of traction and power producers.



The earthmoving manufacturer is the only one having less than 10 distributors in our country. By a national exclusive reseller (for Italy and Ex-Yugoslavia), which owns and controls directly 40 branches in Italy, the parent company is able to offer the best quality services in its sector (see chapter 7).

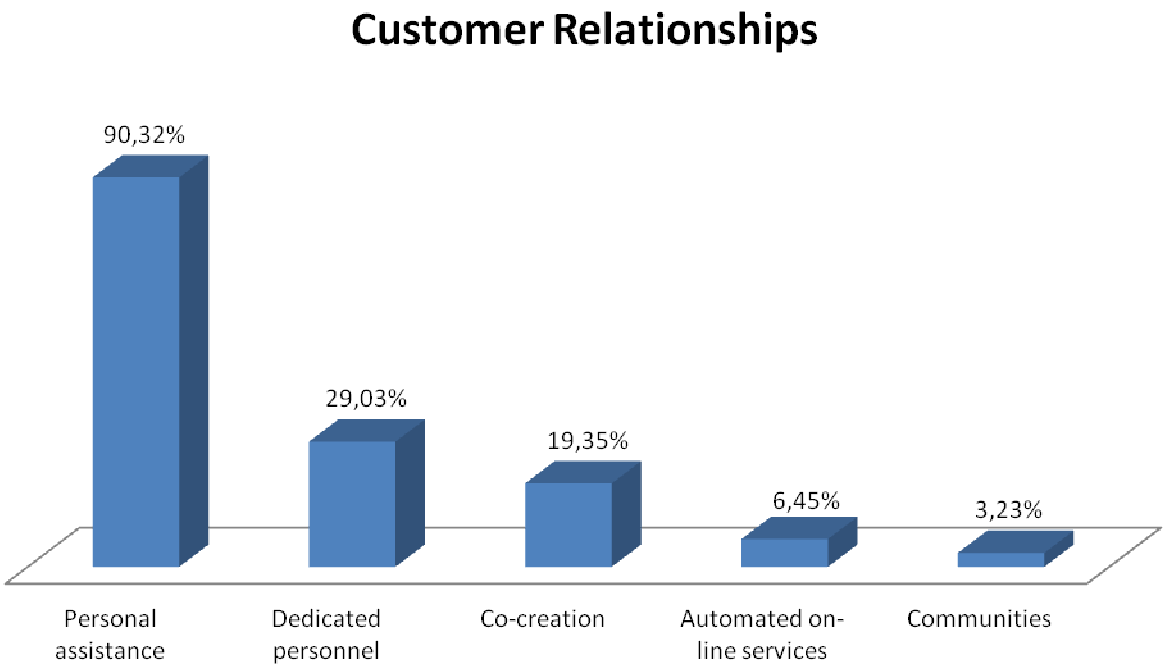
CUSTOMER RELATIONSHIPS

As shown in next figure 72 standard personal assistance is the most common relationship established with customers. 28 manufacturers out of 31 establish and maintain a standard (not dedicated) human interaction before and after sale; all the remaining 9.68% maintains a dedicated personal for every customer or group of them. 23%, higher than we expected, declared to dedicate specific personnel to all or some most relevant clients. This datum might be read as a consequence of a continuous research by firms for customization and service improvement, mostly because of an increasing competition. Often this costly assistance is not supported by adequate resources to effectively increase customization and service levels (we will study in deep this topic in next chapter).

Co-creation was adopted by approximately one-fifth. By the firm visits emerged that the most proposed common-creation relationships concern both particular requests of design modifications and, more rarely, after sale feedbacks to improve or modify products or services. Automated on-line services relationships are still far apart to be steadily established by manufacturers. Only two companies provide some on-line services (web assistance, real

time remote assistance often related to a CRM system) and one of them is the service leader in earthmoving sector. This kind of relationship is very effective for customer satisfaction and service improvement but it is adopted only by one tractor manufacturer. On-line services require big investments, often planned by firms and very few times really implemented, but they are indispensable for a strong increase in service quality. Communities relationship is perhaps one of the most cost effective systems but it was the less adopted. This relationship increases customer brand loyalty and provides assistance and problem solutions which raise customer satisfaction. Only the earthmoving leader established a widespread and effective community service with its clients, and, the same company was the only one to maintain every kind of relationship considered in our questionnaire.

Figure 72: types of customer relationship established and maintained.

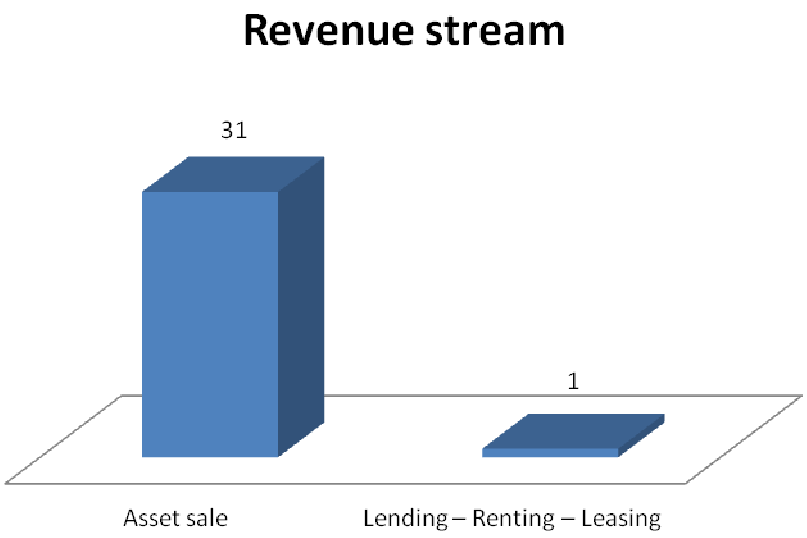


REVENUE STREAMS

This block helps to clarify how the service offer is proposed and it is strictly related to PSS classification (see chapter 1). The most evolved product-services are proposed with linked revenue streams: the result oriented presupposes a usage fee while the rental-sharing is

adopted with the corresponding revenue stream. This is why we expected the results in figure 73.

Figure 73: types of revenue stream.



The totality of the contacted firm is proposing a product-oriented PSS and consistently answered “asset sale”; the only firm (irrigation equipment producer) which is providing the rental service directly and not through dealers network, mostly thanks to its small dimensions and a local market request, chose also the “renting” option.

BUSINESS MODEL BACK

In this section we are going to analyze and expose the collected answers about the back part of producers’ business model. The back part of Osterwalder framework consists of 4 building blocks: Key resources, Key activities, Key partnership and Cost structure. This part concerns how a company organizes itself and its infrastructure in order to provide products or services to final customers.

KEY RESOURCES

By this block the most relevant assets of the firms are investigated and reported in figure 74. It was proposed a choice of 6 possible resources and was ask to companies' managers to choose two out six. 22 out of 31 companies, 71%, recognized their distribution network as one of the two most important assets to make their business model work. During the researches, by visiting and analyzing, it emerged that the distribution network is a key resource, not only to increase sales and reach final customers, but also to provide them several services with and higher quality standards. This datum highlights that the majority of companies considers it the key resource, but as we are going to show further (next paragraphs), companies do not fully exploit it to improve their service offers.

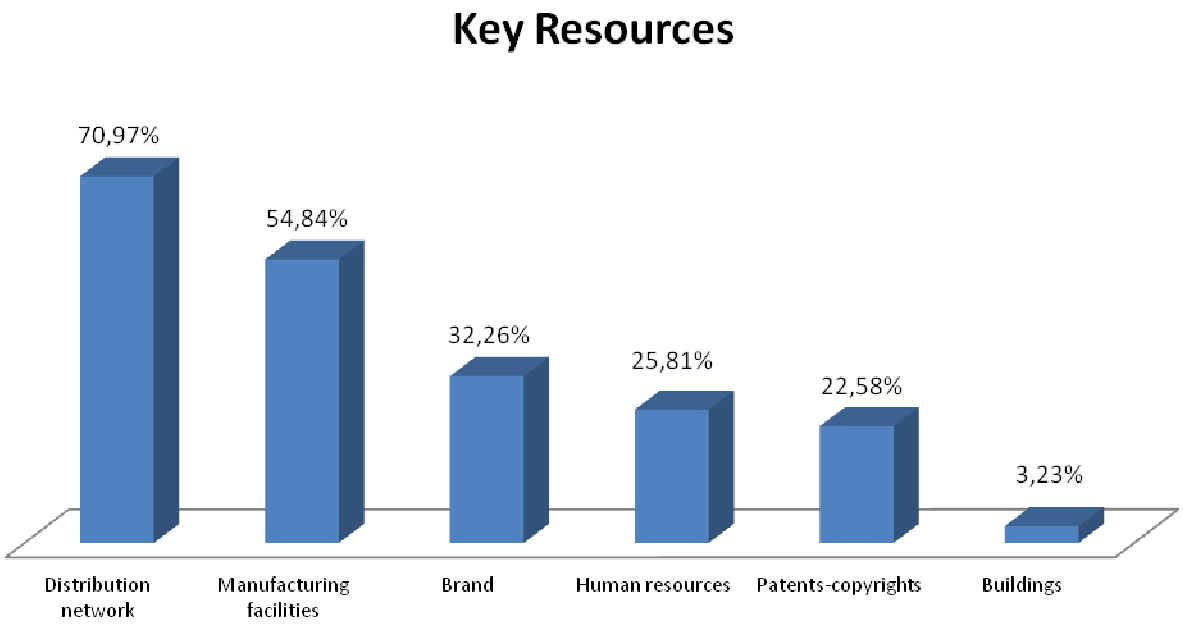
"Manufacturing facilities" was the second most chosen resource, by 55% of firms. This result is mainly due to the type of companies analyzed, manufacturing ones. Manufacturers obviously recognize their plants as indispensable resources. This datum is related to the next building block, and consistently connected.

It must be noted that distribution network is considered more important than manufacturing facilities. This datum might mean that companies' focus and core activities are slowly shifting from production to customer satisfaction and services, to be closer to clients by dealers: from products to product-service (see chapter 7).

About 30% gives much importance to its brand image and consider it an indispensable resource. This percentage is fully consistent with previous considerations exposed in the value proposition building block. Thus firms want to propose brand value and recognize it as a main resource for their business model.

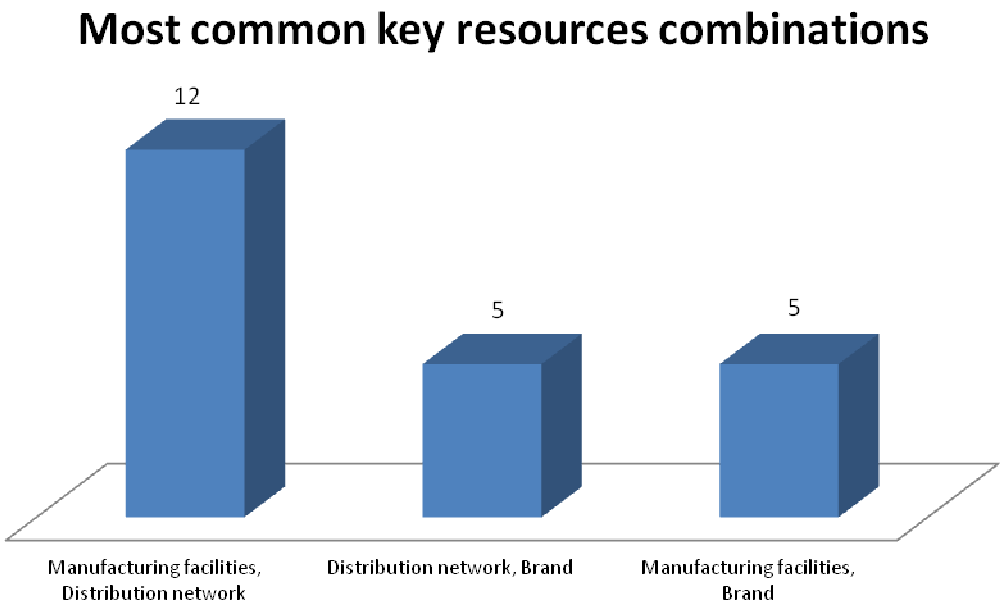
25% chose human resources, a low value but completely justified by still strong production focus of firms. Patents-copyrights, 7 out of 31, were chosen mostly by more technology complex machines producers, and indicate the present trend of technology evolution in the sector. No surprise, in agricultural machinery sector, that only one company considers its building as a relevant resource.

Figure 74: key resources to make their business model work.



As an ulterior confermation of what written above, the combination “manufacturing facilities and distribution network”, as shown in figure 75, is the most chosen couple among relevant company’s resources.

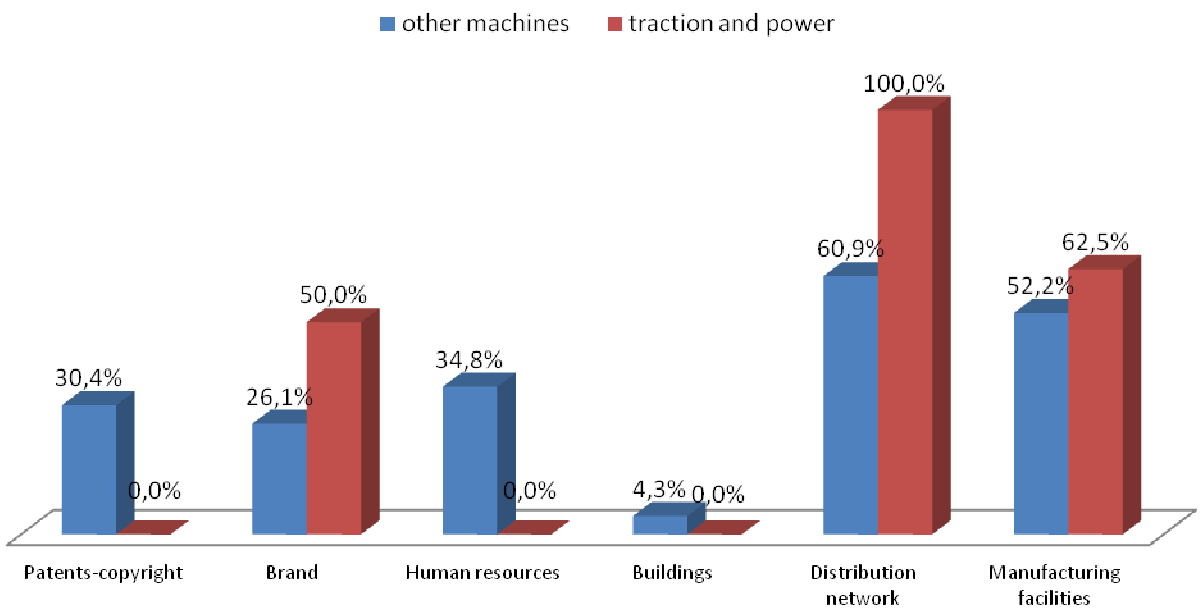
Figure 75: key reources combinations.



As shown previously, distribution network is considered the most important resource for agricultural machinery manufacturers. This result is common for traction and power (tractor producers) and other machines makers. According to every traction manufacturer the distribution network is one of the two key activities among our activities proposed. This 100%, also strongly confirmed by the firm visits, underlines the awareness of a key position in firms' business models, to deliver qualitetively products and services. Also other machines producers recognize it as a key resource but less than traction and power ones. This is due mainly because a part of equipment makers (13% see above figure 67) has not any distributors but simple customers or resellers considered as final clients. It has to be noticed that 50% of traction producers consider their brand as one out of the two most important firm resources. This datum is in contrast with the value proposition one, where 7 out of 8 traction manufacturers count their brand as one of the main three values they want to deliver to customers. The decrease might be explained by the high importance of manufacturing facilities for producers which were chosen 6 times as a key resource, of course coupled with distribution network. The good result of "human resources" for other machines, mostly if compared to traction producers, is easily explained by the smaller dimensions of equipment firms, where often the few employees work hardly together and directly for company's success.

Another important datum came out from other machines answers (figure 76): 30.4% chose patents and copyrights as a relevant key resource (no one among tractor producers). This spread has a clear cause related to one of the differences between tractors and other machines producers. Tractors, through many years of much competition and technological innovation, reached an advanced level of technology. Agricultural equipments are simpler machines, and for many years have had a basic level of technology, mostly mechanical one. In last few years there was an evolution also in their level of technology, and other machines producers started to embed advanced electronic technology in more complex products. For this reason, during this period of fast and competitive technological innovation, equipment producers consider their patents as main resources for their company.

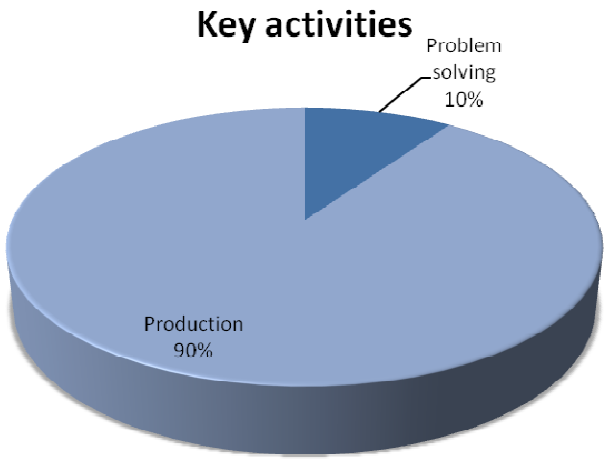
Figure 76: key resources by sector.



KEY ACTIVITIES

In this block it emerged a limit in analyzing manufacturers companies using the Osterwalder framework. The model gives here a radical distinction between “production” and “problem solving” activities but to individuate the key actions to develop of a service-oriented business the analysis must be analyzed more in detail. Obviously for their very nature of producers the majority of interviewed companies chose the “production” option. They recognize their role of producers and are clearly focalized on their core competence; otherwise the option “problem solving” means a detached attitude to the service provision. It could sound strange for a manufacturer company; this is why we expected the results in figure 77.

Figure 77: focus on production or problem solving?



Ninety percent of the firms consistently chose production as the key activity, it is surprising that three companies selected “problem solving” manifesting a strong disposition to service provision. It is important to underline that companies which are offering the best service standard chose the “production” option. This happens because they are focused on their core competence and the service offer is delegated to the distributors, it is provided a business function dedicated to the development of the dealer network. However speaking with managers in the case studies it emerged that the choice of “problem solving” here is not really inconsistent but attention must be however paid to production know-how.

In order to study in deep the activities that enable a PSS business model the most evolved companies were analyzed by case studies. As it was said before the activities of these companies are still focused on “production” activities and the “problem solving” actions are persistent the development of an efficient distribution network to which it is left the management of the service offer. For this reason the key activities of manufacturers company in order to implement a system of high standards service provision are oriented to the dealers’ support. More in detail the following activities has been identified:

1. The concessions to sale – provide services are granted to few distributors to ensure they manage a wide region. In this area the dealer can act as a kind of monopolist with the result that it can achieve a high turnover and then a relevant capacity to reinvest in service provision development

2. The dealers are forced to reinvest a fixed percentage of their operating profit to improve their structure of service provision and achieve the standards desired by the manufacturer company

3. It is implemented a scorecard with precise indicators to measure dealer's activities in order to reward the best performer and to help the ones with worst results in precise directions; in case of repeated low parameters the concession can be revoked.

4. It is implemented a structured function of agents in order to control and monitor dealer's activities in the national areas. The best practices found can be spread to the rest of the distribution network.

5. A central information system to support customers (CRM, continuous monitoring of machine's status in remote) must be exploitable by dealers to provide customized services to clients

6. To ensure high quality in the maintenance service provision the dealer must receive timely from the producer all the parts needed. It is essential to develop an efficient spare-part logistic to achieve this objective

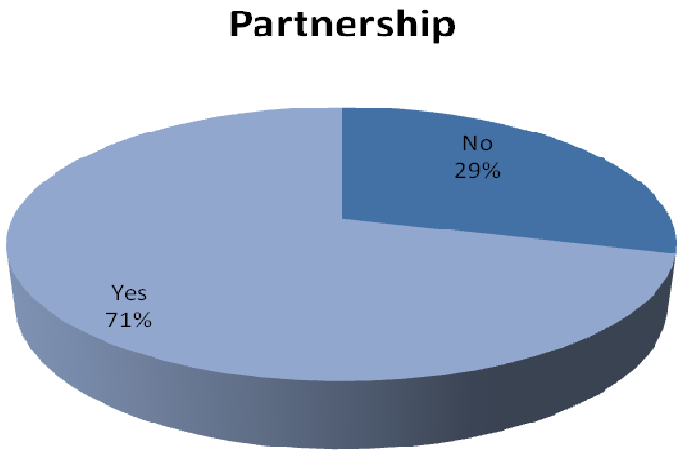
7. The development of a system of ongoing consultancy to dealers (lessons, e-learning) to keep them updated on new products features and related extendable services.

It is important to specify that in this block emerged a big difference between large producers and medium-small ones. These last two do not have the necessary bargaining power to impose to dealers the cited activities (moreover they often do business without a distribution network or through multi-firm distributors). The solution for them is to try to develop an efficient service provision for a local area (close to the production site) where they can compensate the lack of economic resource needed and develop a system of high-service standards only directly from the base but only for few customers. This is shown also in the previous data of figure 77 (the only companies that chose problem-solving activities are medium-small producers of machines).

PARTNERSHIP

In agricultural equipment sector partnerships could play a crucial role. It was repeatedly underlined above the great segmentation of the market, partnerships or acquisitions may allow big manufacturers to complete their product offer and may allow machinery producers to give service standards comparable to the one offered by tractors producers. Moreover there are several reasons to make partnerships in this sector, this is why this question could be better described through a cross analysis with the next question. What emerge from figure 78 is that companies seem to comply with the utility to make partnerships.

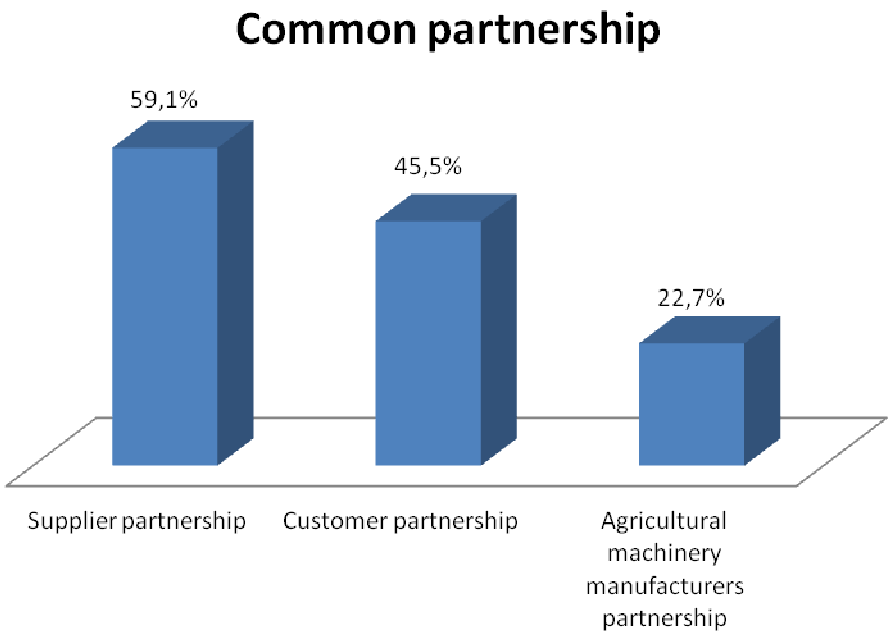
Figure 78: Did your company establish any key partnership?



The 71% of the interviewed firms made partnerships while 29% is still operating alone on the market. We asked to those companies without partners the reason of this choice and no one could see benefits from this operations, this sounds strange in a sector like the agricultural equipment one.

Analyzing the role of partners in companies business we can schematize the results by creating three categories: customers, suppliers and agricultural manufacturers. In figure 79 the data of this classification are reported:

Figure 79: diffusion of types of partnership.



It is important to specify that the percentages reported above are referred to companies which answered “yes” to the previous question. The majority of them made partnerships with suppliers or customers, several reasons are observed to make a deal with them. 2 Companies became partner of customers to analyze the market demand, 4 firms to test new machinery and a large foreign company said that important customers who have become partners are playing also the dealer role. Finally only 2 companies have cited the dealers as partners. It is interesting to focus on this last answer also because one of the leaders in service provision operating in earthmoving sector insisted on this topic. First we can say that a manufacturer can consider a dealer as a partner when the dimensions of this are quite relevant, moreover when a distributor become a company’s partner the objectives of the two are aligning, this push the dealer to become interested in producer’s activities and more prepared to be a consultant for the products-services. The company on the other hand is supporting effectively its distributor giving more help to improve its activities. This kind of partnership certainly brings benefits for both players. We visited the agriculture manufacturer which declared to made partnership with the dealer, they confirmed the benefits described but make the emergence of a problem: the lack of bargaining power with the dealers due to the low percentage of dealer’s revenues depending from the sale of their product. This is a common problem for machines manufacturers and is a major obstacle to entering into partnerships with dealers.

As for suppliers we found that partnerships are motivated by a sole reason: components and work-in-progress furniture. 13 Companies declare that they establish this kind of partnership.

Finally, it is very important to focus on partnerships between manufacturers. Five companies said they are working on this type of partnership, 3 tractors producers and 2 machines manufacturers, the aim of this policy may be to extend the proposal to customers giving a complete choice of products. The best example of this strategy is the one of an Italian tractor manufacturer became partner of an oriental company which is producing tractors with different powers. A different strategy, chosen by 2 machines and 2 tractors producers can bring to make partnerships: for a machines manufacturer, to become partner of a tractor company could bring several benefits. Discussing with managers in the case studies, this topic often emerged. In agriculture the tractor's role is to give power, in motion, to the end-effecter which is represented by the machine, there is an international standard to make possible the connection between all the tractors and all the machines but the increase of technology embedded in machines is now requiring evolved tractors with specific features to exploit all the functionalities. Moreover, to maintain these technologic equipments it is required a specific know-how that is impossible to find in multi-brand distributors. As written in previous paragraphs, analyzing answers on the channel building block we found some sole-agent distributors but mostly for tractors, when there is a partnership between a tractor and a machine producer the machine manufacturer will exploit the service structure of the tractor company receiving a service standard difficult to obtain otherwise.

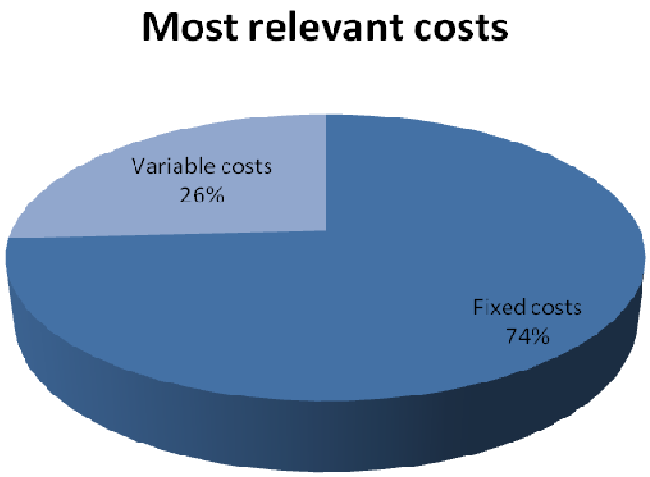
COST STRUCTURE

For a proper description of the cost structure in the agricultural machinery sector it is necessary to remember that the companies analyzed are inserted in a context of manufacturing where fixed costs related to production plants and machinery are generally higher than variable ones. As it is written before, the leaders in the service provision leave this activity and the related costs to the distribution network. For this reason their service – attitude and their service-oriented business models do not emerge by the analysis of the data in this block. On the other hand, small companies that provide services directly from their bases can sometimes result more "labor intensive" and achieve high levels of variable costs.

As shown in next figure 80, about 75% of manufacturers declared that fixed costs are the most relevant ones in their business model. This result is confirming what is written above about manufacturing companies.

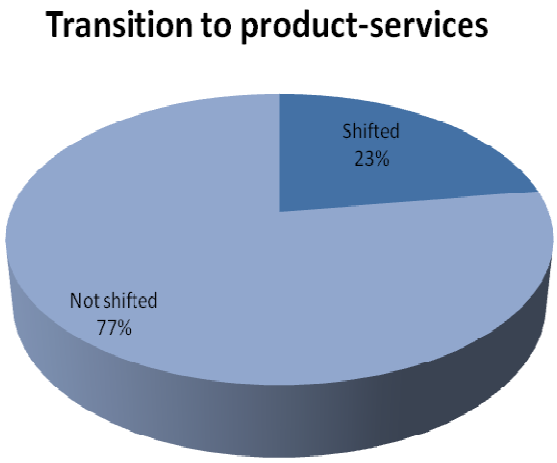
It is important to specify that in the visits made emerged that the majority of companies still consider maintenance services as necessary relevant variable costs and not as opportunities to increase customer satisfaction or to make ulterior profits. Many defined them as “a necessary evil” to satisfy customers. Because of this widespread way of regarding maintenance services, companies which want continuously to decrease their costs are tempted to reduce maintenance services and not to improve them.

Figure 80: most relevant costs in manufacturers’ business model.



With the aim of a subsequent analysis on the cost structure, it can be interesting to identify what companies transformed their offer from a basic asset sale to an integrated sale of a product and a service (in agricultural sector this is habitually the maintenance one). As specified before all the interviewed companies provide maintenance service with the sale of an asset (differences are primarily in the duration of this kind of contract). To begin the analysis it was asked to companies if they had started their business with the integrated offer product – service or, on the other hand, if they had added the service to the product to be more competitive. These data are reported in figure 81.

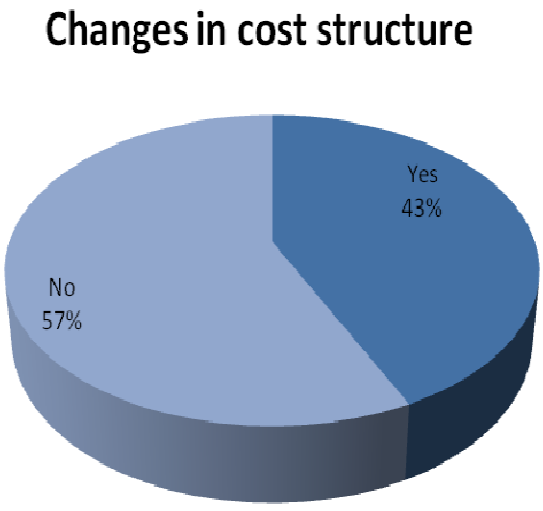
Figure 81: percentage of companies that added a service to a product (not starting their business with an integrated offer).



Once individuated these companies, the analysis focuses on the changes to the cost structure due to the introduction of the new service. As might be expected the companies that shifted to an integrated offer of product-service are only medium and small ones that provide directly the services from the production site. This because big companies, that are often more evolved in the service provision, force changes in their dealer's activities while they keep their typical manufacturers' shape.

To individuated firms, then, it was asked if they had noticed changes in their cost structure, the results are reported in figure 82.

Figure 82: Percentage of companies that noticed changes in the cost structure after a transition to an integrated offer product-service.



In this research there has been a telephonic contact with all the companies that made this transition. The first information that we obtained is that rarely is implemented a structured cost analysis which implies that these data are based on managers' sensations and lose scientific value. However, as we expected, companies confirms that the implementation of a new service implies the increase of variable costs but there are no relevant impacts on fixed ones.

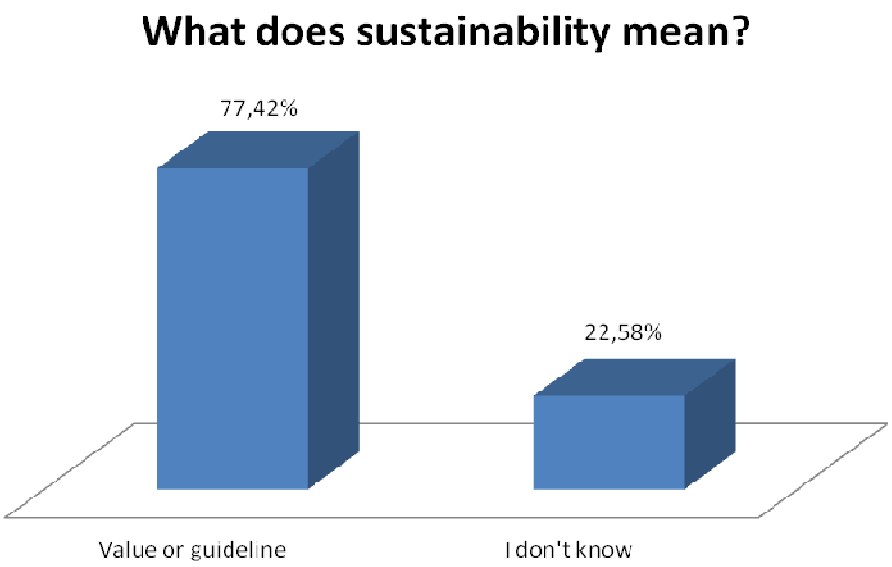
SUSTAINABILITY

By questions about sustainability it was investigated how much manufacturers consider and focus on it while providing products and services to customers.

All three kinds of sustainability (described in chapter 1.5) are not accounted as real goals or implemented guidelines by manufacturers. Very few firms consider sustainability as a pillar or an important value to concretely follow and observe.

It was analyzed what manufacturers think about sustainability and how they see it. 7 out of 31 firms do not know what sustainability means, about 23% (fig. 83). By firm visits it was understood that in this sector, paradoxically so close to nature, sustainability has not yet a crucial importance in business decisions. Some manufacturers, also some leaders in tractor production, consider it as marketing matter, "who is not green today?" or, in better cases, as an opportunistic way to reduce costs and use of raw materials.

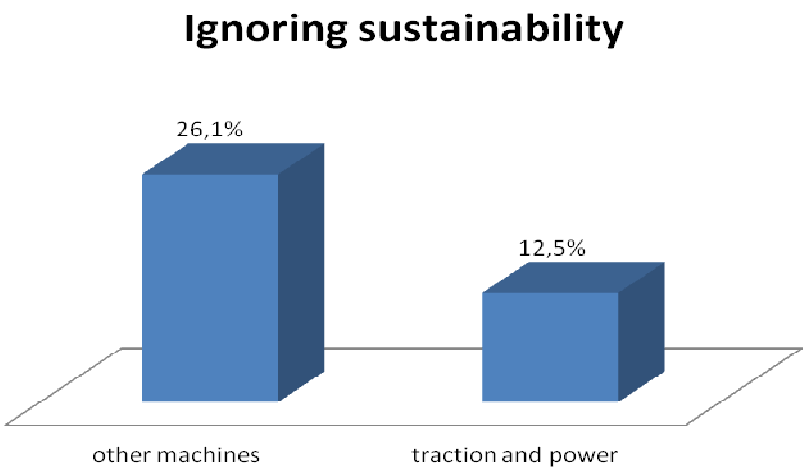
Figure 83: firms' knowledge on sustainability.



24 out of 31 manufacturers were able to give their definition, transmitting how they interpret it and sometimes try to implement (fig 83).

This datum is more relevant if analyzed for each sector (fig. 84). Other machines producers seem to be less interest in sustainability. This result might have different causes. Traction and power manufacturers see sustainability, mostly environmental, as a possible marketing lever, more than equipment producers do, but only 50% of them, (57% by considering only makers having a definition about sustainability), think that this lever may be an effective business opportunity. Moreover big tractor companies have a better structured organization to plan and devote resources to this not yet core business opportunity.

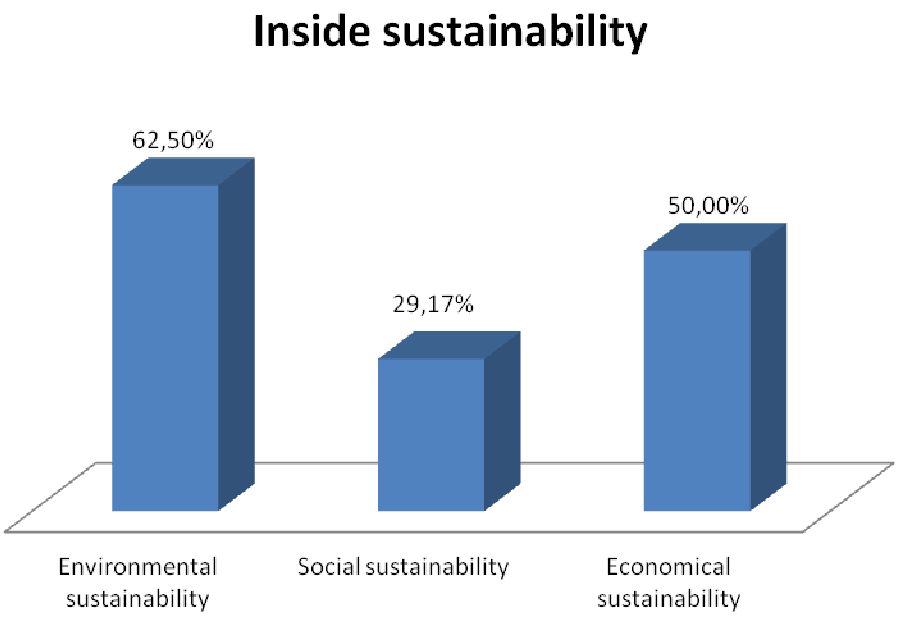
Figure 84: manufacturers ignoring sustainability by sector.



The 62.5% of companies knowing what sustainability means see it as an environmental matter (fig. 85). Very often, in common parlance, sustainability is associated exclusively to environment, and it is considerable that 37.5% of firms did not mention it in their answer.

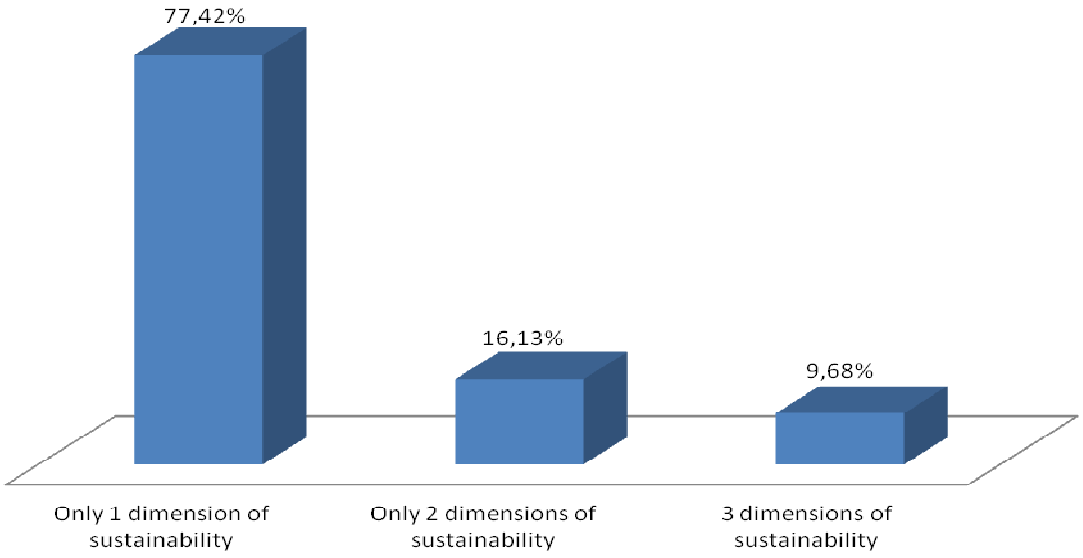
Half of interviewed considers the economical aspect of sustainability. This datum must be read by considering the strong economical crisis that involved also agricultural sector. Sustainability is seeing as ensuring an economical future and a sustainable growth to their company. Only 7 firms talked about social sustainability, and the majority of them considers it only as compliance and safety at work.

Figure 85: knowledge of each dimension of sustainability.



It is impressive that only 5 companies declare to know and to try to follow at least 2 types of sustainability, and only 3 firms all three dimensions (figure 86).

Figure 86: how many dimensions of sustainability manufacturers know.



In figure 87 it is quoted literally what companies responded to the question about sustainability influences on their business model.

Figure 87: influences of sustainability values on business model.

INFLUENCES ON BUSINESS MODEL

- "Design products complying with legislation"
- "Improve safety at work and production of green-equipments"
- "Produce green equipments to protect customers'health"
- "Achieve proper grow rate"
- "Reach customers in developing countries"
- "Specific project to improve product quality, listen to employers' point of view with prizes for good ideas"
- "In design and production"
- "It's primary"
- "Ensure survival in time of crisis"
- "Innovative sustainable offer"
- "Reduce environmental impacts in production"
- "Sustainability becomes the goal of the business model"
- "Our business model is oriented on service provision which brings with it social, economic and environmental sustainability"
- "Economical sustainability"
- "New models, new equipments, new market and so on"
- "Drives us to be more efficient and think more efficiently"
- "During the design phase and reducing consumption, ensuring economical sustainability to dealers"
- "In investment choices"
- "By using electricity from renewable sources"

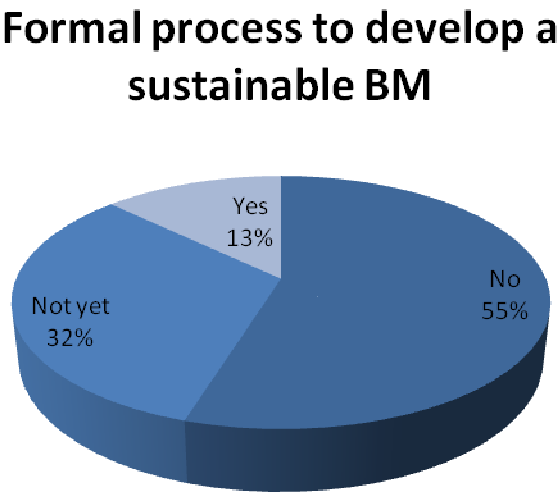
By analyzing these answers it came out that only few companies have a clear concept of what sustainability means. The answers are consistent with the ones to the previous question and the influences are limited to what sustainability mean for the company. Realistically speaking, analyzing these answers, it is clear that the concept of sustainability is not assimilated from the majority of the interviewed firms and some of them have not clear ideas even on the concept of business model. Only few companies demonstrated a complete comprehension of sustainability, one of them found an important link with the service offer which is actually innovative for a manufacturer company.

As shown in previous results, 20 out of 31 companies declared that sustainability affects their business model. It was also investigated if sustainable practices in their business models are regulated and part of formal processes.

Formalized sustainable practices are far apart more effective than simple optional and not widespread ones. 4 companies out of 31 have a formal process for developing a sustainable business model (next figure 88); only 4 out of 20 among manufacturers which adopt sustainable practices. A formalized sustainable business model avoids not sustainable practices and incentives behaviours and decisions that observe environmental, social and economical sustainability guidelines.

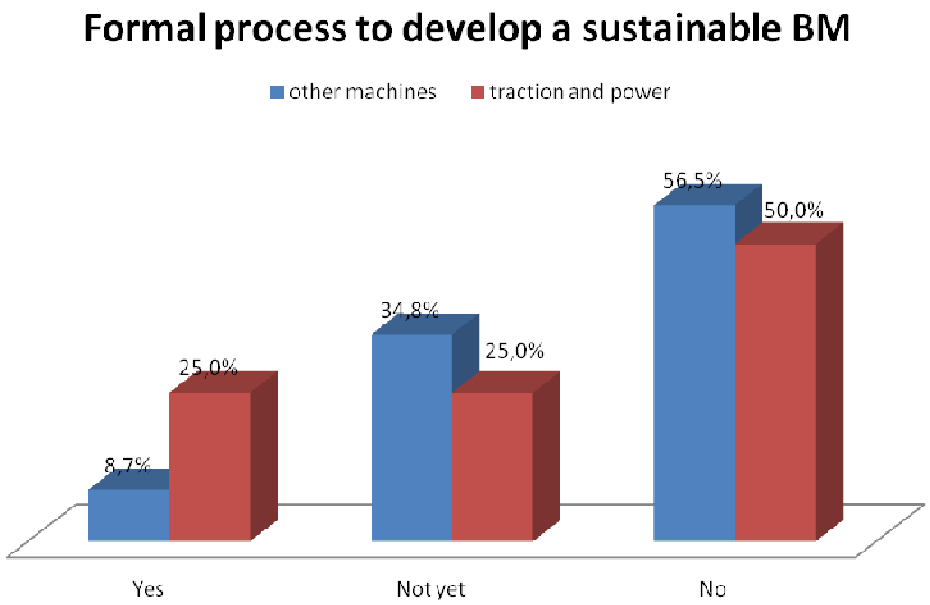
Among remaining 27 not adopting a formal process, 10 out of 27 do not have formal procedures yet but are intentioned to develop them; while 17 do not have formal procedures and do not have in their future plans the formalization of a process to implement a sustainable business model.

Figure 88: do producers have a formal process to develop a sustainable BM?



Only 8.7% of other machines manufacturers has a formal process for a sustainable business model (fig. 89). This datum is far apart lower than the traction and power 25%.

Figure 89:

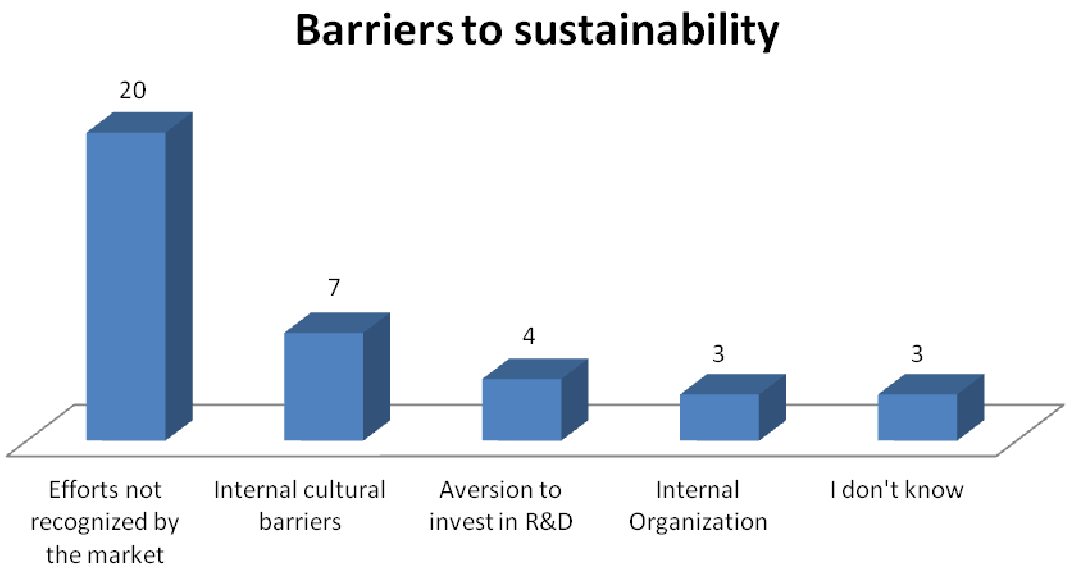


About challenges and barriers to the spread of sustainable practices (fig. 90), 20 out of 31 Interviewed companies, 65%, think that market does not recognize adequately extra economical efforts to implement sustainable initiatives. For companies market cultural barriers are the main reasons that impede investments in sustainable oriented innovation. By site visits emerged that agricultural market is widely considered by manufacturers as composed mainly of old and illiterate people. These features in many cases are more prejudices than argued judgments. Agricultural market seems really few interested in sustainable practices (more if reducing costs), but this market is having a strong generational change and the level of studies of farmers is steadily increasing every year (L'informatore agrario, 2012) and always closer to sustainable topics (as seen during a visit to a Norwegian machines manufacturer).

Internal mentality is considered the second biggest barrier to overcome to implement sustainable practices by 23%. Not only the market but often also the firms' management does not fully believe in sustainability. The last two reasons emerged from the interviews are about companies organizations (few flexible and not open to innovation), and the aversion to

invest in R&D. Respectively 13% and 10% these causes are again related to companies decisions and propensity towards sustainability and investments. Three firms, 10%, do not know what the main barriers are.

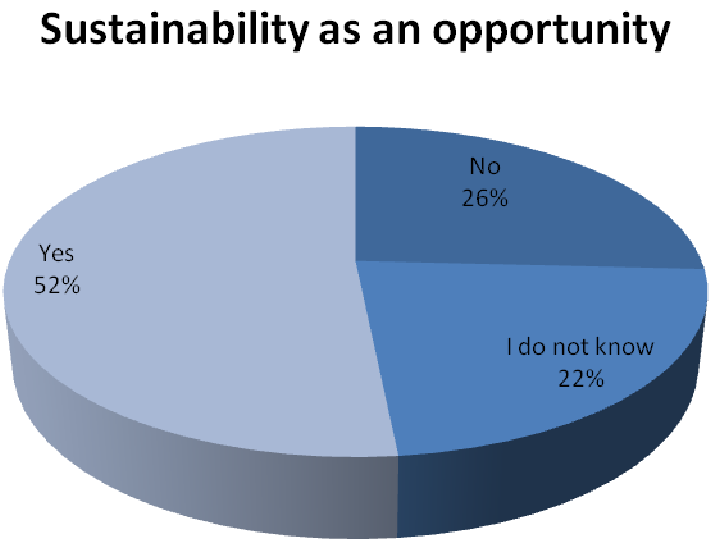
Figure 90: main barriers to sustainable practices spread.



About future sustainable challenges, the main one regards the market. The majority of companies, also the less sustainable oriented, want to change customers' needs and mentality to differentiate from other competitors by proposing new sustainable oriented machineries. Another pervasive challenge is about technology innovations to implement substantive sustainable improvements in products and production.

16 companies, 52%, recognize the value-creation potential of sustainability (fig. 91). This datum is lower than expected, more so if compared with the answers of previous questions. 20 companies, 65%, declared that sustainability influences their business model with different sustainable practices, but only 16 firms see sustainability as an opportunity for value creation. Not every company adopting sustainable changes in its business model really believes in them as value creator or business opportunities.

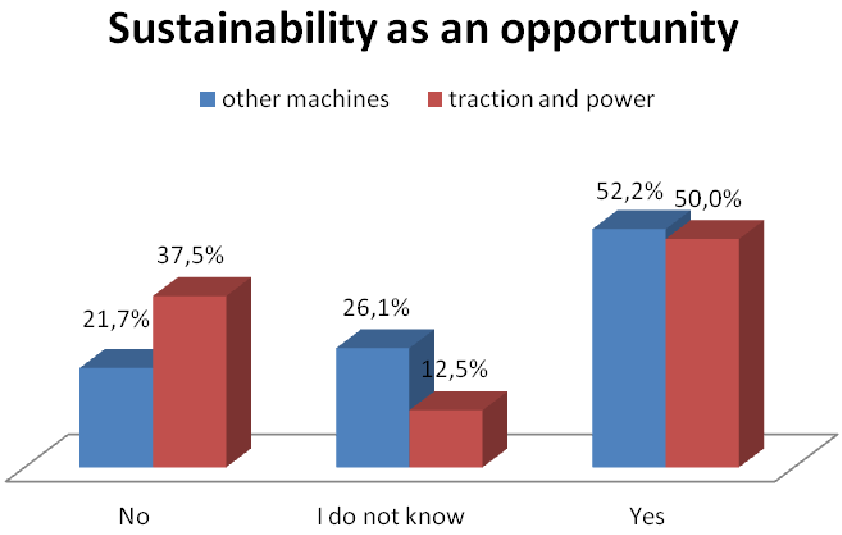
Figure 91: is sustainability a business opportunity?



8 firms, 26%, openly do not consider sustainability as a chance for value creation, and 7 declared not to have yet a strong idea about it.

In the next graphic 92, it can be notice that 37.5% of traction and power makers believe that sustainability is not a business opportunity. By deepening this subject during firm visits it was clear that sustainability is not yet an opportunity because customers do not consider it yet as an important matter (market cultural barriers).

Figure 92: sustainability as a business opportunity by sector.



6.2 Analysis of dealers

In next sections the area of the analysis is shifted to the distribution network and to the final user of agricultural machinery: farmers. This deepening seemed necessary to analyze the entire supply chain. Three dealers and two farmers with peculiar features were chosen for the study to consider a complete panel of samples, anyway it is reasonable to think that the core part of this research is represented by the analysis of manufacturers and the results emerging from the distribution network and farm investigation could be the starting point for new studies.

As it was said above, the results from dealers and farmers questionnaires were obtained by case studies. Three visits were made to dealers (one big tractor dealer, one medium dealer partner of a machine producer and the only Italian distributor of a large earthmoving company); then two visits to farmers were made, one to one of the bigger farm in Italy and another to a small one. In next paragraphs we give more attention to the reflections emerged with owners or managers, giving less importance to statistical data because of the dimension of the sample.

Dealer dimension

This block is to classify the business of the dealers. in Italy the majority of distributors is selling both tractors and machines, there are some cases of dealers selling only tractors but no case of exclusively machines distributors. This happens because the revenues obtainable from a tractor sale are much greater than the ones from a machine sale which is not sufficient, alone, to allow a dealer to sustain its activity. One interviewed dealer is focalized on tractors sale but it's still selling equipment, one is a leader in machine sales but, for the reason explained, could not give up selling tractors and, finally, the third one is selling earthmoving machines. To clarify the weight of tractors in dealer revenues we can report that even the distributor focused on machines is dependent from tractor sale for 50% of its revenues

As for the employers number these data are obtained: the dealer focused on machines sale is employing 7 people, the one focalized on tractors 37 in 3 different stores and finally the one focalized on earthmoving almost 1000 people in 40 branches. It could seem strange to compare with the other two a dealer with these dimensions but the service standard provided must be a reference point for a distributor which is trying to improve its service offer. Moreover in the visits emerged that an analysis on dealer dimensions is definitely relevant: the earthmoving producer implemented a strategy of distribution based only on a single

dealer for each nation to allow it to grow without competitors but on the other hand forced it to reinvest a fixed percentage of revenues in R&D. A similar strategy is implemented by the tractor producer which gave the dealership to the dealer interviewed; this company is asking for a minimum revenues value to keep the concession or sometimes is pushing distributors working in surrounding areas to merge together in a single company, this strategy is working properly abroad, specially in Germany, but is not taking off in Italy.

Dealer's concessions

The results of this block are linked with the reflections from the previous one, moreover we must say that in these years, firms producing tractors are beginning to extend their offer by producing some machines but they are still largely focused on their core products. This is why the two distributors operating in the agricultural sector are multi-firm dealers whilst the earthmoving one is a one-firm dealer. It is relevant to specify that tractor producers are not granting concessions to dealers which are selling other brands so the two agricultural machinery distributors are considered multi-firm but they are both selling a single tractor brand.

Percentage of the revenues coming from services

The fact that emerges first is the significant impact on revenues of the service provision if we compare to manufacturers companies. The bigger dealer is obtaining 20% of its revenues from services, the second one 9% and the third one 5.5%. Obviously this is because the dealers are managing the service provision which is seen by these distributors as an opportunity. This is not really common, in visits to manufacturers, managers often underlined that dealers are considering the repair shop as a cost and focusing all the efforts on sale activities.

SERVICE

Service offered

All three interviewed dealers propose product oriented services to their customers, and two of them offer also use oriented solutions.

The earthmoving distributor is the biggest and more service advanced one, and it is strictly related to its machines producer and supplier. By an accurate visit to its plants, we became

aware of all product-services proposed. This dealer offers all product oriented services (consultancy and maintenance) and a use oriented one (renting/sharing).

Consulting services are available both before and after the transaction process. It supports potential customers by proposing the best product-service solutions for them to reduce costs and risk of unavailability. In after sale activities the dealer continues to support customers in remote, by monitoring and avoiding stops and consequent breakdown cost.

Maintenance services are the most advanced in the market, interventions directly on the field in a few hours and spare parts available in 24 hours with the possibility of a replacement machine in much time-consuming reparations. This reseller offers a continuous monitoring service for every single machine in remote by GPS system and in real time thanks to a complex system of sensors embedded in almost every component to prevent faults and even wrong procedures. This advanced system, merged with the CRM system allows firm to offer a customized and high value consultancy and preventive maintenance service.

It was clear that, among all product-services provided by this earthmoving dealer, rental is the most relevant and innovative offer. The distributor started renting machines about 20 years ago, although strong initial market cultural barriers. Thanks to a steady yearly growth, this product-service is today a relevant part of the 20% of service turnovers of total revenues, and although the sectorial crisis, last years it has still grown. This offer meets the needs of customers and ensures continuous availability of machines, continuous monitoring, and free of charge spare parts. To provide this service, the distributor had to remodel a big part of its business model, but the result was a big step forward towards a higher customer satisfaction and higher profits.

The tractor dealer also offers a rental service, besides accurate consulting and maintenance services. During the visit in its base, it emerged that the parent producer company pushes and supports less strongly its distributors, but the same it makes resellers in condition to provide good quality pre and after sale services. There is a slighter link between resellers and the parent company compared to the earthmoving firm relationships.

Interviewed tractor dealer provides the rental service individually, without a concrete support coming from the manufacturer. Few other distributors offer it and the producer company (as it told during an interview) has not ever formalized the offering process and has not an official policy about it. This particular situation, merged with the dimensions of the dealer and the features of the market, caused a limited offer of this service, which although all difficulties satisfy customer needs and increases reseller’s profits.

The third dealer has a partnership and a good relationship with a machines (seeders, soil cultivators) producer company. It sells tractors and other agricultural machines, and provides all two product oriented product-services. Thanks to its focus on agricultural equipments it is able to offer good services of consultancy and maintenance interventions, both for tractors and for other agricultural machines. Few resellers focus so much as this dealer on agricultural equipment services, because of lower revenues than tractors sale. This case study was a good example of the difficult of small machines producers to communicate their service standards to the dealers to make them available for customers. The interviewed reseller, also thanks to its geographically position (few hundreds meters from equipment producer company), was the only one to be able to offer to customer all services proposed by the machines manufacturer, and in an effective way. For market reasons it does not provide a rental service.

Help from manufacturer companies

This block is to observe what is the role of the manufacturer companies in these excellent examples of distribution activities but seen from the dealer's point of view. As for maintenance service all the dealers are satisfied of the help received; basically there are two main activities that can improve maintenance service: an efficient spare part logistic service and an ongoing consultancy on how to maintain properly the machinery produced. Often are organized lessons to explain the new improvements on products, the most common failures found and how to repair them. This activity is becoming increasingly important because of the technology improvement in the machineries, and it allows the dealer to provide an excellent consulting service.

All the producer companies standing behind the interviewed dealers are providing the activities cited, this is why all these three are achieving high standards in their service offer for product oriented PSS.

There is another type of help observed in two dealer visits and confirmed by case studies of producer companies: it is guaranteed the exclusivity to sell products in a wide area. This action is to allow the dealer to grow without competitors and to increase dealer's loyalty to manufacturer company.

It was never observable explicit help to push evolved types of services such as rental or total care but in two cases on three it emerged that manufacturers companies encouraged the implementation of a rental activity even forcing the dealer in one case. As it's said above two distributors are effectively renting products, for the earthmoving dealer this activity has been

strongly recommended, for the agriculture sector one everything started with a owner's idea and now he is denoting a lack of help from the manufacturer company. Speaking with the earthmoving machines dealer which is leader in Italy for rental activities it emerged that it is necessary to develop a kind of rental know-how to sustain this activity without losses, this is why some training to the dealers from the producer company are suggested. In the end we don't have to forget that it is necessary a great financial power for a proper rental activity (in this moment the earthmoving machines dealer immobilized almost 400 million € in the rental fleet) this power is obtainable thanks to the producer company which gave the exclusive to sell its product for all the Italian territory.

In the end we must specify that not only help is coming from the producers: these benefits must be consistent with some guarantees, in both the visits with bigger dealers, some imposed restrictions were found. Manufacturers force them to reinvest a fixed part of the revenues every year and minimum service standards are always required; the tractor producer company developed a system of inspectors (two every six dealers) to constantly monitor dealers standards.

Revenue streams

Consistently with the services provided the dealers interviewed have a proper revenue stream system. It is important to specify that a product oriented PSS implies a good cooperation between the producer and the dealer: the manufacturer is selling the product-service so there is an asset sale that brings with it a fee to exploit maintenance and consultancy services for a period. The asset is sold through the dealer which is having a percentage of the transaction cost and this is why distributors are paid through asset sale; moreover producer companies often pretend customers to go to their official dealers for ordinary maintenance to provide them the agreed extraordinary maintenance, this mean a periodic oil and filter change where the customer pays the dealer for a service through a usage fee.

The two dealer interviewed that are offering the rental service are consistently paid through "Lending – Renting – Leasing" so with a fee to temporarily granting someone the exclusive right to use a particular asset for a fixed period. It could be relevant to know that these fees are in both cases monthly.

RENTAL – TOTAL CARE

Product offered for rental

The earthmoving dealer provides the rental service for the full line, all products bought from the producer. It rents always the last version of every machine with full optional and services. Its effective rental management system is strictly related to its second-hand market; all rented machines after an optimal rental use of three years must be sold to maximize profits. After three years of rental use all machines need to be replaced with new ones because of their steadily growing maintenance interventions and thus costs. The second-hand sale allows dealer to maintain a competitive level (compared to purchase) of rental prices.

The tractor reseller offers the rental service only for its tractor fleet. It has also a parallel second-hand market and thinks that this service does not have profit for other agricultural machines.

Barriers and challenges to the spread of rental-total care

In this block is investigated the dealers' point of view on the possible diffusion of evolved services in agricultural machinery sector. It is interesting to compare the answer of the dealers operating in this field with the answer of the earthmoving machinery distributor where rental has spread quickly in last years.

Both dealers working in agriculture immediately spoke about cultural barriers, in their opinion the farmer is very possessive about his machinery and it would be a sacrifice to renounce his own fleet. This argument was subjected to the earthmoving machinery dealer which is widely recognized as a model for this service provision and he declared that the same problem has occurred to them in the past. They overcome this aspect with a massive consultancy action; before the spread of rental they gave lectures on possible advantages coming from this service to their largest customers which recognized the possibility of a lower total cost. Nowadays, before every transaction with customers, they still offer this consultancy service, holding a meeting where all pros and cons of a rental solution are explained. This is how they could overcome the cultural barrier.

Some economical barriers were individuated by the agricultural sector dealers. One of these is a feature of this business: seasonality. Going deeper on this topic it is understandable that this could be a stimulus to the spread of rental if we look from the farmer's point of view which needs a machine for a limited period, not using it for the rest of the year. From the dealer's point of view, seasonality could be a constraint: a big economic power would be

necessary to maintain capital assets so relevant. On this topic we discussed with the earthmoving machinery dealer and emerged that a coefficient of utilization has been identified: almost 65% of a year time the machine should be rented to maintain competitive prices. Discussing with agricultural dealers it seemed possible to reach this value, there is the possibility to use the same machine in the same area to work on several crops so the machines are needed in different periods, moreover if the market covers a large national area the climatic difference allows farmers to use the same machinery in different periods.

A second economical barrier to the rental spread is due to the phenomenon of the “operated equipment rental”; as it’s said above, this can be considered as a form of outsourcing and is largely developed in agricultural sector for some specific machines, especially combines. This service anyway was born because of the need of skills to drive evolved machines and there are few possibilities that in the future all the farmers will learn how to manage these technological machines so there is a concrete obstacle for the rental of these products. The agricultural dealers declared that the business of result-oriented services is now too complex for them, moreover they do not want to compete with the contractors that now are good customers. This is why dealers are focusing their use-oriented service actions on tractor rental where they effectively recognize a growth and the possibility for a larger business.

6.3 Analysis of farmers

As for manufacturers and dealers, we analyze in detail the answers to seek relevant pieces of information for further studies.

Farm dimensions:

Farms of different dimensions were interviewed to observe singular needs in a big company and in a small one. For this reason a big and a small farmer were carefully selected and visited to improve the sectorial analysis, and to understand also the final customer point of view about agricultural services. The big farm has been individuated because it was diffusely cited in an article on an Italian newspaper as one of the largest in North Italy. It is employing 15 people, the small one only 3.

The question about cultivated acres is to clarify the dimension of their business; the big farm is composed of 740 hectares, the small one of 40. It could be interesting to compare these data with the average dimension of Italian firms which is around 7.4 hectares.

Because of this difference in dimensions the two farms are forced to produce different products; the big one is began his activity with an extensive farming which requires a consistent machines fleet and large extensions, it is mainly producing cereals (corn, soy and barley) and tobacco. The small farms is producing through intensive agriculture mainly lettuce and strawberries; this kind of business needs an extremely efficient exploitation of soil and machines making use of new technologies to survive on the market.

About units of their agricultural machinery fleet, the big farm owns 21 tractors, 2 combines, 2 earthmoving machines and an undefined number between 50 and 70 of agricultural machines including 2 customized harvesting machines for tobacco. The small farm's fleet is composed of 4 tractors (one high power and 3 medium tractors) and 19 machines.

SERVICE

Both the farmers need maintenance services, one of them, the small one, bought a tractor-maintenance product-service; they also declared that resorted to a consultancy service to exploit technological tractors and the big one also for the combines. It is interesting to observe that both of them are receiving an outsourcing service from a contractor, the big farm because of a lack of know–how on sod seeding activity (from 2002), the small one in seeding activity too. The small farmer exploited once the rental service, considering it useful but too expensive.

The two interviewed farmers declared to be satisfied of the service standard received, they are both exploiting maintenance and consultancy services, the product-oriented product-service implies a periodic maintenance which is properly provided by the dealer, moreover, for extraordinary repairs, the distributors implemented an emergency service that in 24 hours time provides a solution for the breakdown. The small farmer exploited once the rental service because of a lack of power capacity during the plowing period, this solution satisfied the user even if he complained of the price.

USE/RESULT ORIENTED PSS

As specified above, the small farmer rented once a high power tractor, both of them are usually asking for outsourced activities from contractors. The rental service occurred for a lack of power capacity; this reason has been observed in dealers visits too and is one of the most found drivers to the spread of this service. The high power in fact is needed in a limited

period only for the plowing activity which requires more powerful and expensive tractors to move much soil; the seasonality of this activity is a relevant driver for the rental diffusion.
The outsourcing activity occurred for different reasons: the lack of know how. The big farm carries on the sod seed activity from 2002 but this requires specific agricultural machines and skills that are outsourced to the contractor, they declared to be satisfied of this service. The same reasons (a lack of specific machines and skills) drove the small farmer to outsource the seeding activity in which new technologies are increasing the know-how needed to completely exploit them.

The results emerged from the analysis of the previous farmers' questions are consistent with the answers to the one about barriers and challenges to the spread of rental or total care services. The two farmers are exploiting outsourced services and they do see the possibility for the spread of these activities for the reason cited above that the increase technologic level of new machines will force farmers to learn new skills rather than outsource the activity. It is observed a difference between the two farmers' opinions on the spread of the rental service. The big farmer declared that a big agriculture producer always prefers the acquisition of equipment because of the available economic power; there are two main reasons to this opinion: a lack of knowledge on total-cost concept and the price level of agricultural equipment rental nowadays. The small farmer is considering the possibility of exploiting the rental service but he declared to need more explanations on the total cost concept.

6.4 Cross-analysis

In this paragraph the different strategies adopted by tractor producers, machine producers, dealers and farms are studied in detail. The results emerged from the analysis of main building blocks are crossed together to individuate consistent strategies and moreover to identify which ones are the most effective in order to provide high standards of service provision. As for the previous paragraphs, more attention is paid to manufacturers sectors but a detailed analysis is conducted also for dealers and farms.

6.4.1 Traction and power – combinations between building blocks

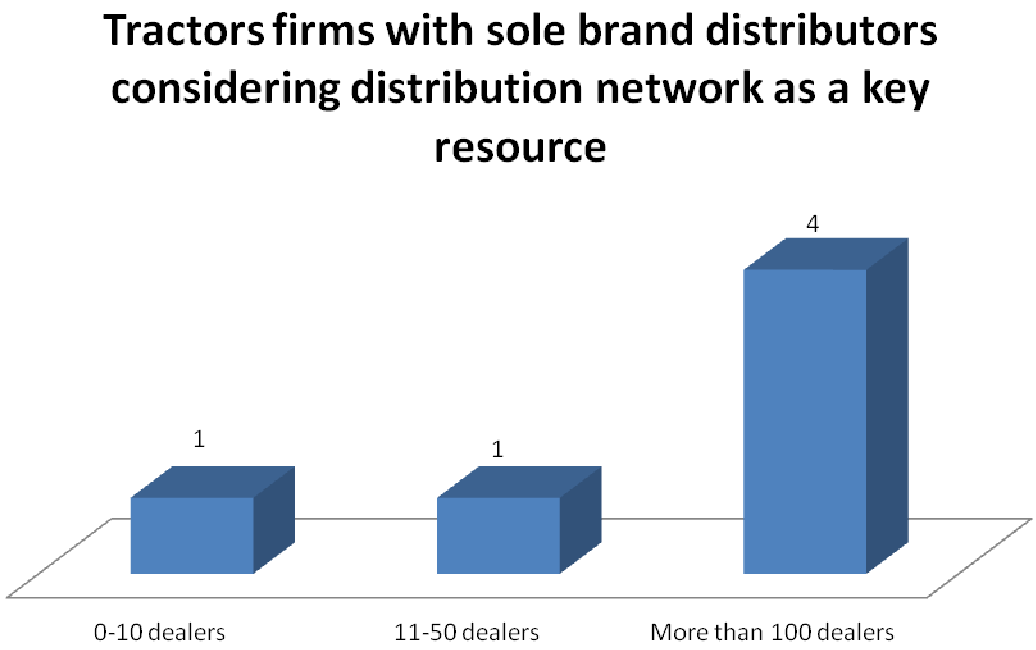
In this section a deep cross-analysis, inside traction and power sector, will be shown. Two or more building blocks will be merged to extrapolate important data for following analysis.

Key resources – channels

Only two out of eight traction and power companies, choosing sole brand distributors among their channels and considering distribution network a key resource, have less than 50 dealers (fig. 93). Manufacturers adopting sole brand distributors have a higher bargaining power on dealers than other companies have. The only two manufacturers, a tractor leader and the earthmoving producer, focused on their distribution network and having few sole agent dealers (with high bargaining power and more easily controlled), are able to offer standardized services (through distributors) recognized by customers as higher quality ones.

The earthmoving company is unquestionably the service leader and its exclusive dealer has more than 20% of revenues coming from services. The big tractor producer, which is reducing and merging its distributors, it cannot be considered yet a service leader, but it has from 10% to 30% of service revenues and by increasing its power and control on dealers it is noticing higher revenues and customer satisfaction.

Figure 93: tractor manufacturers having sole brand distributors and considering their distribution network as a key resource.

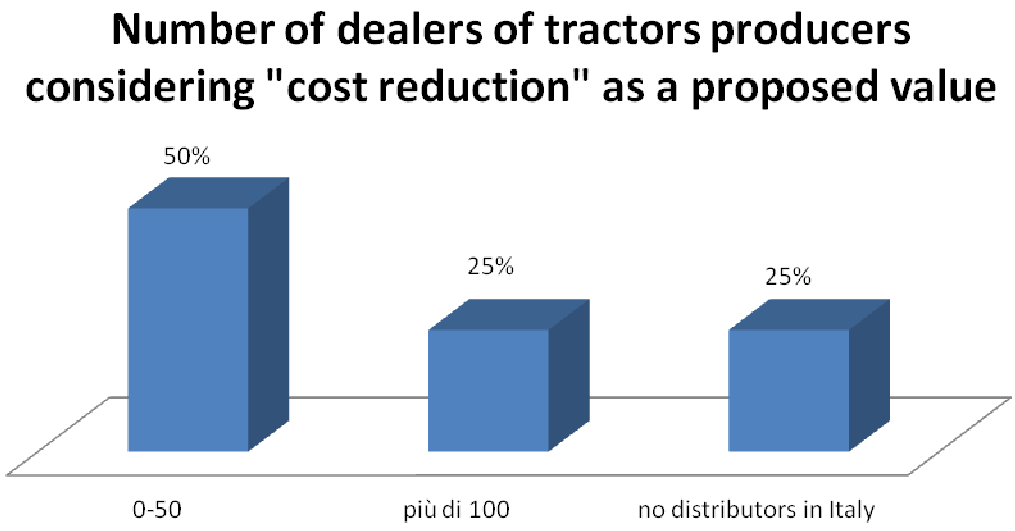


By site visits it emerged that the other 4 companies, still focusing on distribution network, in most cases have lower service revenues. They face clearly more difficulties to control services offered by dealers and reach lower levels of customer service satisfaction.

Value proposition – channel – relationship

This cross study is focused on the front canvas of Osterwalder work; the aim of this analysis is to observe the consistency between the value proposed and the way it is delivered; in addition it is possible to identify the best practices in this section of the business model. As specified above, the values “customization” and “cost reduction” were identified as service-oriented ones, the second one is linked with the total-cost concept and it shows a predisposition to evolved service provision. To confirm this we observed that the highest standards in service provision were achieved by a company that chose the couple “customization – cost reduction” but it is the only one. The value “cost reduction” is chosen by four out of eight tractor producers and they all declared to invest energies in improving the service provision. In figure 94 it is shown how these companies are delivering their values.

Figure 94: number of dealers of tractor makers which chose “cost reduction”.

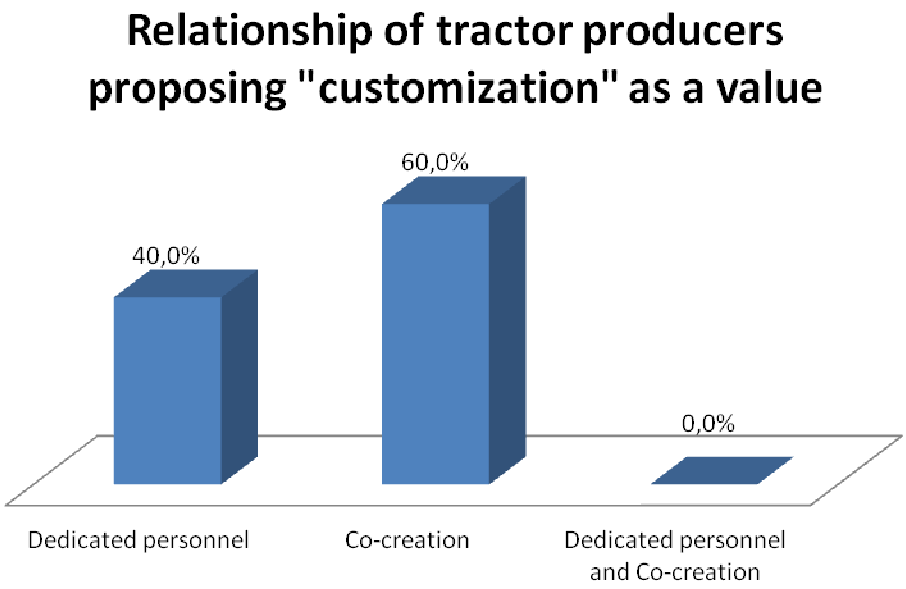


These data highlight that those companies which are focusing on service provision are providing services trough few qualified dealers. In the specific, the leader in service offer numbers only one distributor; another company, which is investing in these years in increasing the service standards, reduced the number of its dealers to less than 50. In the case studies analyzed it emerged a defined strategy that drove companies to decrease the

dealer's number to monitor their business and to allow them to operate in a wide area to grow and invest in service provision (this topic is deepened in next paragraphs).

The combination enounced of value propositions and channels is recognized as the more efficient in service provision and to prove this we can observe that is adopted by the providers of the highest service standards among the interviewed firms. As for the relationships, it emerged that the totality of the tractor producers are working with personal assistance which is considered indispensable to grant a proper service provision; moreover the recognized best practice has developed a on-line community to facilitate communications between customers and to improve the relationship level with its customers.

Figure 95: types of relationship with clients of tractor makers proposing "customization".



Another interesting result (see figure 95 above) comes out by merging kinds of relationship with customers with traction and power producers proposing "customization". Only 40% of interviewed companies, of 5 choosing "customization", have some dedicated personnel for its clients, and 60% offers a co-creation system, to involve customer in designing and personalizing the product. No one offers these two customized tools together. It is important to dedicate some personnel at least to the most relevant customers to increase their satisfaction and quality of offers. A co-creation system is indispensable to know what clients really need and in which way, and to offer a high quality level of customization as a proposed value.

6.4.2 Other machines – combinations between building blocks

Now some answers will be crossed to analyze relevant pieces of information coming out from other machines questionnaire.

Partnership with other companies – key resources – Firm dimension

Among 22 identified partnerships only 5 are directly between agricultural manufacturers. 2 out of 5 are between a machines producer and a tractor maker. By site visits one was studied in deep both from the tractor side and the machine one. As written above the tractor maker is mainly led by the achievement of a full line offer portfolio in establishing a tractor-machine partnership; while the machine producer usually seeks to increase its revenues (improving its marketing image, being sponsored by a tractor) and its bargaining power on dealers through a tractor-machine deal.

Only one out of 23 interviewed machines producers had a sale and production deal with a tractor manufacturer. By visiting this company it emerged that they noticed a tangible rise of bargaining power on dealers after the partnership and a slight quality service increase. From a deeper cross-analysis it came out that the only machines producer which established a partnership with a tractor manufacturer is the only big one (revenues up 40 million €) that chose both distribution network and patents as key resources (see next table). This coupled choice reveals a new interesting aspect. In a tractor-machine partnership the level of technology, number of patents and the amount of R&D investments are key elements in tractor manufacturers' choice of their other machines partner. Moreover also a relevant firm dimension is necessary, not only for a good starting market share, but above all to ensure a proper production capacity level.

Tab 19: Characteristics of machine producer company achieving a partnership with tractor manufacturer

FIRM DIMENSION	***KEY RESOURCES***	***PARTNERSHIP***
More than 40 million €	Distribution network , Patents-copyright	with a tractor producer
More than 40 million €	Distribution network , Brand	
More than 40 million €	Manufacturing facilities, Brand	
7 - 40 million €		
7 - 40 million €		
7 - 40 million €		
7 - 40 million €		
7 - 40 million €		
7 - 40 million €		
7 - 40 million €		
Less than 7 million €		
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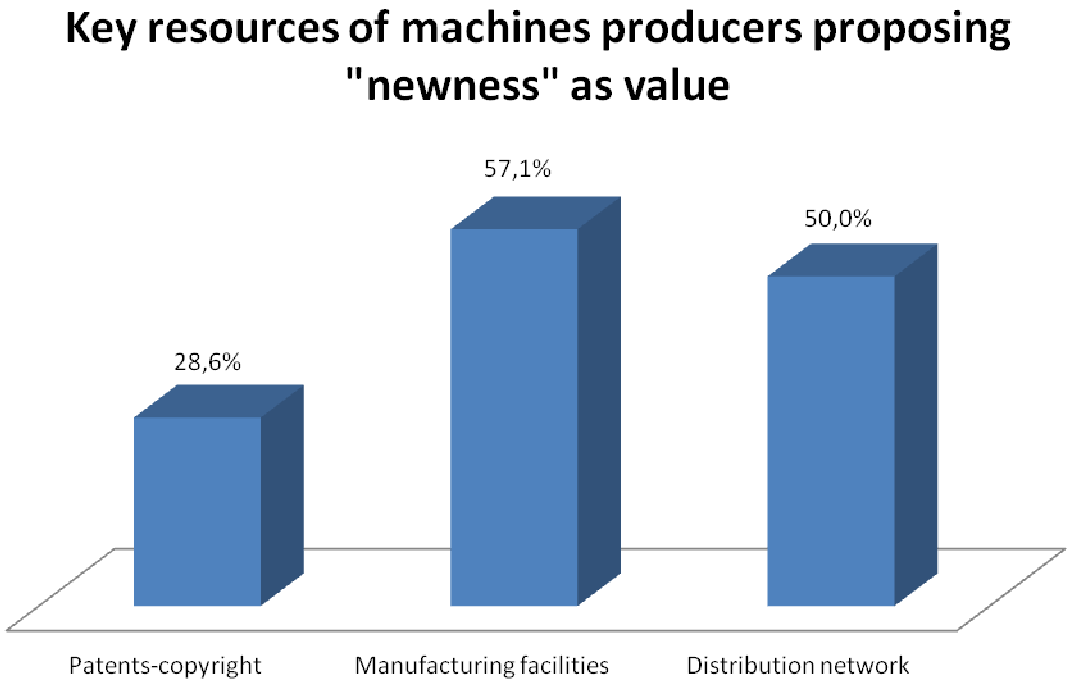
Less than 7 million €		

Key resources – value proposition

A relevant datum, coming out from the resources-value proposition cross analysis, is that only 28% of manufacturers which propose newness as a value have patents as a key resource. This result means that there is incongruity between own resources to propose value and the main value they want to transmit to customers. By firm visits emerged that it is really important for machines producers to effectively invest in research and development, mostly because, as shown previously, only the most technologically advanced manufacturers have the appeal to obtain a fruitful partnership with a tractor maker, necessary to develop a quality after sale service for these evolved products.

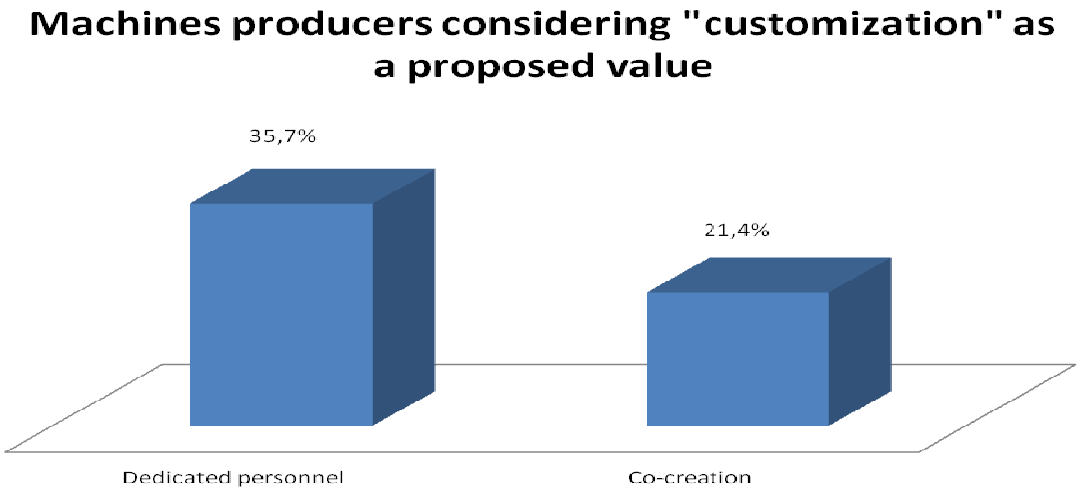
Figure 96:



Value proposition – Channel - Relationship

By making a cross analysis between the value proposition and the relationship building blocks it is possible to highlight that although 14 out of 23 companies declare to consider customization as a value only 21,4 % of them is establishing the co-creation relationship (see fig. 97).

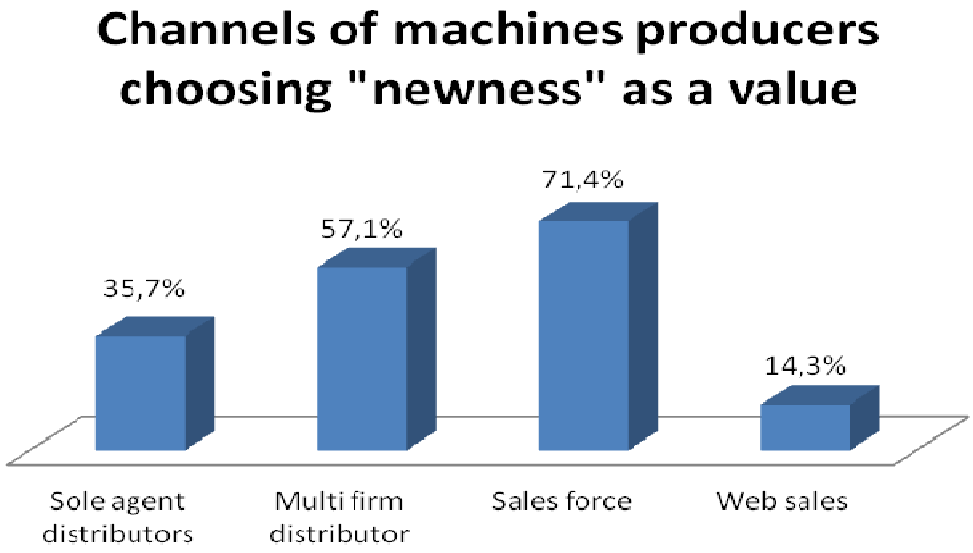
Figure 97:



From these data it is observable that 35.7% of the companies proposing customization value provide dedicated personnel; in the case studies emerged that this type of relationship is primary to obtain an effective customization so it is reasonable to say that firms choosing this service-oriented value should make efforts to develop proper relationship.

Relevant data are emerging from a deeper analysis made on channels. As we previously said, 14 out of 23 machines producers chose newness as a value, this implies an increasingly technological level of the products which will require specific maintenance; to grant the expected service standards dealers must be very competent on the products released and this can happens especially in sole agent distributors. In figure 98 it is observable that few companies are reaching customers through this channel.

Figure 98.1: channels of machines producers choosing ""newness" value.



These data are highlighting that machines producers are still focused on sales activities more than on service ones. Here it is to be reminded the lack of bargaining power of these companies on dealers that can explain the low percentage of sole agent distributors but, as previously said, the partnership with tractor producers could bring the after-sales network development that technologic equipment surely need.

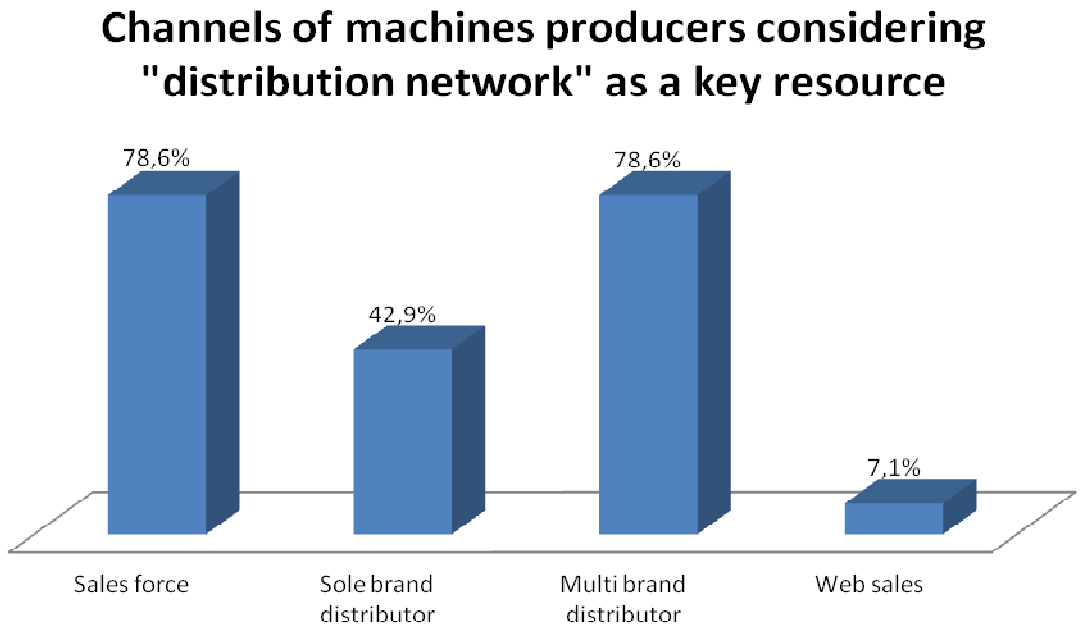
Key resources – channels

By taking into consideration the 14 other machines manufacturers which consider the distribution network a key resource, only 42% has sole brand distributors. Distribution network is one of the most significant resources to make the business model work, but it is as much important to be able to control it and to decide the standard quality level offered through it.

As written previously, sales force (79%) is important to increase sales and to be close to the customer, but it is ineffective in service offerings. It is the same about multi brand distributors (used by 79%); it is possible to reach locally the customers but not to impose their own level of service to the dealer (for the low bargaining power). Web sales (7%) are also ineffective for after sale service offers without some local controlled distributors.

The most effective channel to influence distributors is the sole brand one. A sole brand distributor is a dealer which sells only one machine brand for a kind of products. It can retail more brands, but only for different types of product; in a nutshell it cannot sell direct competitors' goods. It is difficult for other machines makers to have some sole brand distributors because of low sales and market shares of a very competitive sector. An effective way, mostly for advanced technology machines producers, might be to establish a partnership with a tractor manufacturer, which often, 75%, has some sole brand distributors, and anyway has a higher bargaining power on dealers.

Figure 98.2: Channels of machines producers choosing "distribution network as a key resource".



6.4.3 Dealers cross-analysis

As specified above, the dealers' interviews are a deepening with the purpose to validate the comments emerged from the manufacturers analysis; It is interesting, in this context, to describe the results of a crossed analysis among dealers' answers.

Dimensions – percentage of the revenues coming from services:

What emerged here is a positive correlation between these two dimensions, the three distributors declared the data in next table

Tab 20: cross analysis of dealer: dimensions-revenue percentage from services

DIMENSIONS	REVENUE PERCENTAGE FROM SERVICES
1000 Employed - 580 mln € Revenues	**20 %**
37 Employed - 17 mln € Revenues	**9 %**
7 Employed - 5,2 mln € Revenues	**5,5 %**

These results are explainable with the investments oriented to the development of the service offer possible for larger companies. In the dealer visits there has been a deepening on this topic, the distributors interviewed declared that they are forced from manufacturers companies to improve their service standard to keep the concession to sale. This implies that a fixed percentage of the revenues must be reinvested to increase the service provision level; in a long-term vision this brings to the result emerged: an efficient service standard that becomes a relevant source of income, if it is related with the decrease of product sales in western Europe it can be concluded that a service oriented strategy will ensure an easier subsistence on the market for the dealers.

Percentage of revenues coming from service – service offered

As expected, a multiple service provision can increase the percentage of revenues coming from services, the data are reported in next table:

Tab 21: cross analysis of dealer: revenue percentage from services-service offered

REVENUE PERCENTAGE FROM SERVICES	SERVICE OFFERED
20 %	**Consultancy – Maintenance - Renting**
9 %	**Consultancy – Maintenance - Renting**
5,5 %	**Consultancy – Maintenance**

The two dealers offering the rental service obtained better results in terms of revenues, it is important to specify that the largest distributor have been forced by the manufacturer company to implement an efficient rental service, the other dealer which is providing rental has been recommended to offer it but left free to decide. It could be interesting to identify from where the difference between the larger dealers is deriving. In the first distributor, the rental service is active from more than ten years and the management developed skills to make it a relevant source of income; moreover this dealer operates in earthmoving sector where the rental solution is well considered as an efficient alternative to the acquisition. The second dealer is developing this service-strategy for less years and he is facing relevant cultural barriers to the spread of rental in the agricultural sector (see previous chapter on farms); This distributor declared anyway that revenues from rental service are increasing in the last years and forecast even better results for the next years.

Help received from manufacturer companies - Revenues - percentage of the revenues coming from services:

In paragraph 6.2.1 emerged that manufacturers companies can develop different type of activities to help dealers in their service provision, we tried to cross these with distributors operative results and the data emerging are reported in next table:

Tab 22: cross analysis of dealer: manufacturer's activities – dealer's revenues - revenue percentage from services

MANUFACTURER'S ACTIVITIES	DEALER'S REVENUES	PERCENTAGE OF REVENUES FROM SERVICES
1. Efficient spare part logistic service 2. Ongoing consultancy on new products 3. Exclusivity guaranteed for Italian territory 4. Forcing the rental service	580 million €	20 %
1. Efficient spare part logistic service 2. Ongoing consultancy on new products 3. Exclusivity guaranteed in a wide area 4. Encouraging the rental service	17 million €	9 %
1. Efficient spare part logistic service 2. Ongoing consultancy on new products	5,2 million €	5,5 %

The data in this table highlights the differences among the dealers; all the distributors are receiving an important help for the spare parts management and on new products information, these two aspects allows the three of them to implement an efficient provision of the maintenance and consultancy services. The first two dealers received also different types of help, it is interesting to focus on the grant to exercise the business on a wide area (entire Italy for the first one), this choice is oriented to the development of the dealer and it's based on the idea that larger organizations can provide more efficient services. The data obtained showed that this strategy resulted efficient to the development of evolved services, the exclusivity provides the conditions to increase the dimensions of the dealer and with it the necessary economic power to sustain the rental service. In fact it is observable that the distributor to which is guaranteed the exclusivity on the Italian territory has been forced to develop an efficient rental service.

These data are providing precious information for the development of a service-oriented business model; in the agricultural sector as well as in the earthmoving it is observable that the highest service standards are provided by large, organized dealers and there are some common actions implementable by the manufacturers companies that can push dealers to increase their service level.

6.4.4 Farms cross-analysis

This cross-analysis is proposed with the aim of highlighting some farm's features which can influence the rental activity; precisely it is interesting to observe if this service could be related to the dimension of the farm or to the products grown.

Dimensions – rental/outsourcing activity

The answers obtained in the case studies are schematized in next table:

Tab 23: cross analysis of farms: dimensions-rental – outsourcing activities

DIMENSIONS	RENTAL - OUTSOURCING ACTIVITIES
740 hectares – 15 employers	Never rented anything, often exploited outsourcing
40 hectares – 3 employers	Rented a tractor once, often exploited outsourcing

These data highlight the cultural barriers cited in the previous paragraph, the larger farm see the rental option as a prerogative of small firms which, in its opinion, are forced to exploit this service because of a lack of economic power, on the other hand he regularly made use of outsourcing services for seeding and harvesting activities but this is due to a requirement of specific know-how which is necessary to drive technological machinery.
In the small farm interview it emerged that the tractor hired was rented because of the necessity of a high - power machinery in a limited period (during ploughing activity) and this service was exploited to avoid the acquisition of an expensive tractor. The outsourced activities are utilized, as in the big farm, because of a lack of know how in the use of specific machines for the planting activity.
From this cross analysis emerged the importance of a consultancy action to instruct farmers on the concept of total cost and, to push the spread of the rental service, to exploit the opportunities gave by the seasonality of the agricultural business. Moreover it is to be

highlighted the massive utilization of outsourcing services from contractors; with a well - provided consultancy service it would be possible to train the farmers to the use of complex machines and transform the outsource in rental with the possibility of penetrate a market which now is exclusive for contractors.

Products grown – rental/outsourcing activities

This analysis is to find correlation between the product grown (the agricultural strategy) and the rental/outsourcing activities, the result obtained in the two case studies are shown in next table

Tab 24: cross analysis of farms: product grown -rental – outsourcing activities

PRODUCT GROWN	RENTAL - OUTSOURCING ACTIVITIES
Extensive agriculture: cereal, tobacco	Never rented anything, often exploited outsourcing
Intensive agriculture: lettuce, strawberries	Rented a tractor once, often exploited outsourcing

The Extensive agriculture requires a massive use of machinery and a larger fleet while the intensive one is oriented to an extreme soil use on smaller extensions with fewer machines needed. The data emerged from this analysis are not highlighting any evident correlation between the strategy adopted and the provision of rental services; the exploitation of outsourced activities is observable in both cases because of the necessity of specific competence to use some kind of machinery so at the moment the rental service is limited to traction and power products, these kind of machines are utilized by both the firms interviewed and are necessary in all the agriculture strategies considered. For these reasons it is observable the possibility for the spread of rental service both in extensive and intensive agriculture.

7. BUSINESS MODEL PROPOSALS

In this chapter the results emerged from the case studies and the collected data are revised to propose business models for agricultural equipment producers in the Italian market. From the analysis of the data received it emerged that, in order to develop effective business models, there is the necessity to cluster companies in three groups with a specific business model for each cluster. In the following paragraphs are proposed three business models: one for tractors producers, one for other machines producers with revenues over 40 millions € and a last one for other machines manufacturers with a limited turnover. The structure of the proposed business models is following the framework of Alexander Osterwalder but, as specified before, the model has been partially adapted to fit the sector considered. The structural segmentation of the canvas is maintained but some modifications were made to the potential solutions identified by Osterwalder in the main building blocks. By doing this, we created a new model, specific for the niche market considered, adoptable by all agricultural machinery producers operating in the Italian territory. Several solutions, depending on the dimension and on the equipment produced, are proposed for every building block of the business model.

The solutions are based on best practices found in case studies and consequent our proposals merged by analyzing the opinions of several interviewed managers. Moreover the proposals relies on the considerations emerged in the fourth chapter on market trends and on the literature analysis of PSS.

The declared aim of the business models proposed is to increase the number of service offered and the achievement of high service standards; for this reason product-service solutions were studied and are here encouraged. All the frameworks suggested are service oriented strategies that strongly support a sustainable oriented innovation (see chapter 1).

7.1 TRACTORS PRODUCER BUSINESS MODEL

In this section a business model for tractor manufacturers is proposed. As written before, the business model is focused on the improvement of the service offers and service quality to lead tractor producers toward the implementation of a sustainable Product-service system.

The purpose of this work is to develop a strategy in order to propose a new view of service provision that may become the success factor in tractor producers market. The following business model canvas can be adopted by all tractor producers operating in Italy. A unique model is proposed because of the many similarities within this sector composed exclusively of few very large tractor makers.

The dealer network is the means to reach locally customers and to provide them products and services. Producers should be able to control and impose quality service standards to their distribution network. The vertical integration with dealers for manufacturers is too costly, organizationally complex and there is a high risk of losing the focus on core production competences.

Below an alternative solution to increase firm's control on dealers and develop them to empower the service provision will be proposed.

CUSTOMER SEGMENTS

As specified in the previous chapter the agricultural machinery manufacturers are developing their business in a niche sector, they are operating in a business to business sector where each machine is an asset exploited to produce value.

In the tractor area of interest, anyway, three main segments of customers were individuated and interviewed in the farms case studies:

- Large farms adopting the extensive agriculture, large use of tractors and machines and quite high economic - bargaining power on producers.

- Medium / small farms, adopting the intensive agriculture, limited use of tractors and economic - bargaining power.

- Contractors, their business is focused on tractors and machines exploitation, they are autonomous workers delivering a total-care service to farms and are the only purchasers of some kind of evolved machines, obviously they are larger buyers of tractors too.

To deliver attractive solutions of products – services specific actions for every segment are suggested; from the analysis in the previous chapter it is observable that these different customers need customized offers.

Large Farms

Large farms farm can exploit a quite relevant economic power and for this reason they often prefer the acquisition of an asset more than a service-use offer that seems more expensive in the short term. Tractors producers should focus efforts on a **product-oriented service of maintenance** and on a **consultancy service** to indoctrinate these farms on the total–cost concept. The willingness to spend of large farms can bring easily to a massive adoption of the maintenance product-service if it is recognized a possible save in the long term. Moreover this segment developed a strong barrier to the adoption of rental service, they may consider this option only when recognizing an effective advantage in terms of savings; this can become a good business but it depends on dealer's capacity to provide the service at a reasonable cost. The help actions to the distribution network by producers are deepened in the channel block.

Medium and small farms

Medium and small farms showed a higher predisposition to the **rental service**. The lack of economic power to buy expensive high-power tractors brought this segment to consider often the possibility of a rental service. The tractors manufacturer's efforts oriented to this evolved **use-oriented service** must be drove by this segment. The business opportunity of the rental activity is exploitable most of all in this customer segment and for this reason dealers must be taught on the topic.

Moreover the **maintenance service** connected to tractors is attractive also for this segment which seemed to be ready for the adoption of a model that decreases the total cost in the long term; obviously a parallel **consultancy service** must be developed.

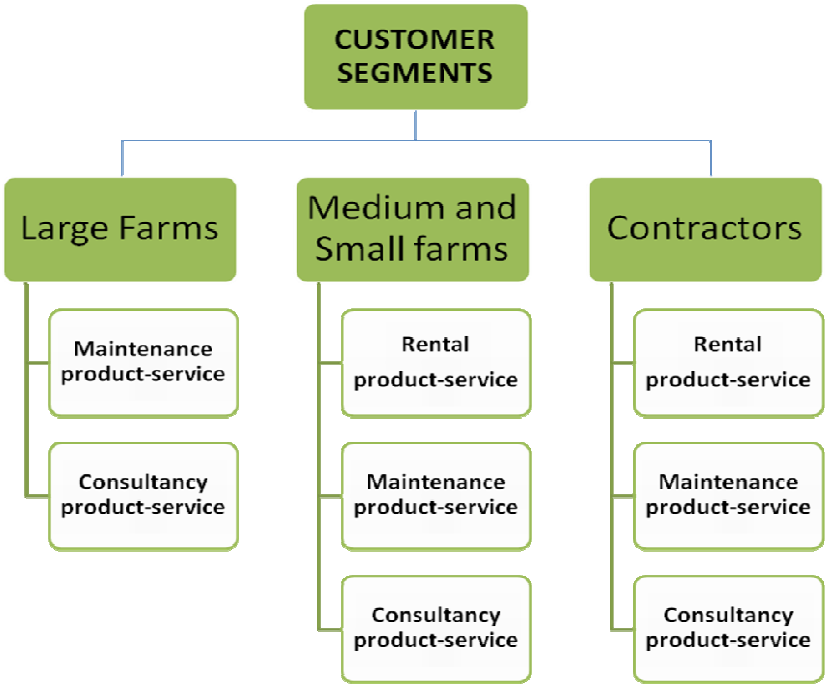
Contractors

The contractors segment must be carefully considered by tractors producers. Indeed the intensive exploitation of tractors suggests the adoption of **maintenance product-service** that is already diffused in this customer segment. Moreover the contractor segment can be comparable to large farms for the cash flow availability so the economic barrier can be easily overcome.

Unlike the large farms case, contractors may consider the **rental option** too. This because the considered segment needs to keep always updated the fleet and the long-time rental can represent an effective solution to achieve this goal reducing the total cost.

A last consideration for this category is to be done. Actually contractors are providing total care services to farmers. So the advantages coming from partnerships with them are to be measured. To favour their activity a massive spread of service exploitation in the sector can be required and, with a well developed service structure (i.e. the dealer network) this can bring economic benefits to tractors producers too. Nonetheless, only tractor producers dispose of their own dealer network, this is why they are the only manufacturers of the sector that have the bargaining power to convince contractors to make partnerships. The aim of the partnership may be to strengthen the brand (in case of high service standards provided) and to maximize revenues from the contractors segment.

Figure 99: Tractor producers customer segments building block.



VALUE PROPOSITION

Service provisions are of course at the centre of a service oriented business model. Indeed, the development of an innovative service provision structure can be envisioned for the business model success.

Main service offers for tractor producers are:

- multi-year total care maintenance packages,
- free and paid pre and after sale consulting services,
- rental service (without operator).

In the other sections every service offer is deeply described. Herein the values behind services and enabling high quality service provisions are illustrated.

A tractor manufacturer has to focus mainly on some values to develop an effective service-oriented business model. The choice of the right values to propose to customers is a crucial point in the implementation of every business model.

Customization is a relevant value to increase service quality and customer satisfaction. The value of cost/risk reduction can be expected to be another leading factor for offering solutions. Product-service solutions are in general fostered to this end. To spread their product-services firms can use their brand image, strong for tractor producers, to associate product quality to service quality. More precisely, through product-services, the manufacturer should mainly transmit the customization, the cost/risk reduction, and the accessibility values, and effectively communicate them through its brand image to make a client a faithful customer.

Today the majority of companies declare to be already customer oriented (5 out of 8), but by analyzing in deep every case study it is clear that the company's focus is not yet on clients.

To be customer oriented in a service oriented business model it is essential to offer different customized kinds of product-service for every macro segment of customers. As written before, three main kinds of clients have quite different needs, and nowadays no analyzed tractor producer, even the most customer-oriented, has a specific product-service offer at least for each macro segment.

Customization

For large manufacturers it is quite impossible to allow any type of personalisation in production phase for specific requests of few customers. It is much easier to **involve customers in design phase**, co-creating the product-service, in order to encounter clients' needs. Not every interviewed tractor manufacturer involves most important clients in the design phase. Furthermore, considering sustainable development, it is important to give a

central role to the main stakeholders in design phase. Indeed this is quite relevant in order to drive a **sustainable oriented spread of services in the agricultural sector.**

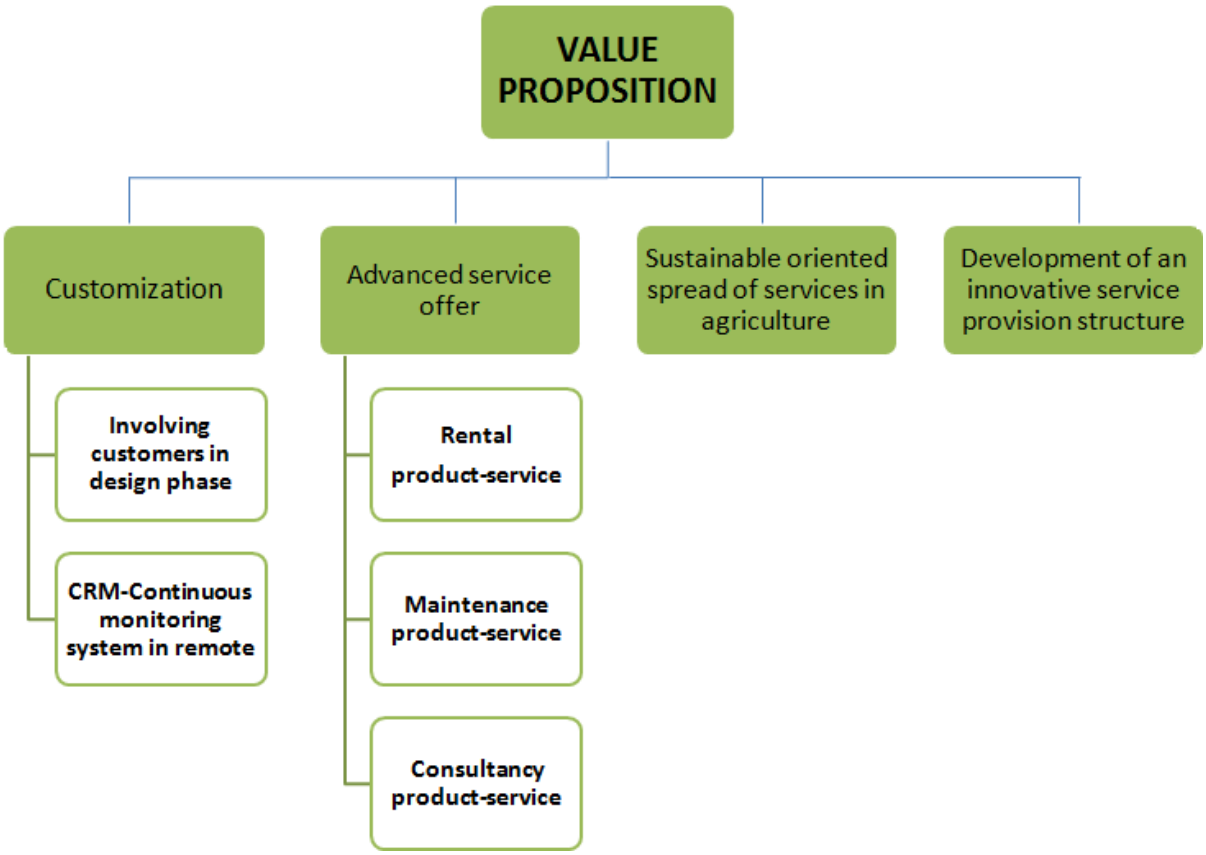
Apart organizational matters, in order to reach a high level of customization, manufactures need information tools to provide specific services to clients when they need. Only one interviewed tractor producer had an active **customer relationship management system (CRM)**, and everyone had enough economical resources to implement it. This system, integrated with a continuous monitoring one, through embedded sensors in each tractor, would enable companies to provide a high quality customized after sale service. As seen in the world leader earthmoving case study, an integrated **CRM-continuous monitoring system in remote** provides customers a personalized real time consulting system on technical conditions of each machine to prevent maintenance interventions and thus to reduce costs and risks.

Advanced service offer

Other two crucial values are cost and risk reduction. Manufacturers can focus **on long lasting "total care" maintenance packages** to increase their profits from services and to reduce customers' costs and risks. As emerged during interviews to farmers, mostly to the big one, customers are willing to pay a periodical fixed fee to avoid possible not expected extra costs coming out from reparations and machine unavailability. Total care maintenance packages ensure revenue streams not only directly to manufacturers, but also to dealers, by imposing periodical obligatory inspection fees to customers, provided by distributors, to renew the temporary coverage. Only one interviewed producer had a long lasting 5 years system of cost/risk reduction by total care maintenance, but anyway not much customized.

Another effective product-service offer to transmit cost and risk reduction value is the **rental option**. Renting also provides customers, mostly small ones, accessibility to expensive or few used machines. This offer, explained further in detail, should be provided by dealers directed by specific manufacturers' policies. In any case, direct consultancy has a crucial role to propose customers the best customized cost/risk reducing offer; thus an effective **consulting service**, as the one adopted by the earthmoving service leader, seems necessary.

Figure 100: Tractor producers value proposition building block



CHANNELS

The case study analysis highlighted the role of this building block for an efficient service oriented business model in the agricultural machinery manufacturers sector. As it is said above, the distribution network is the channel to reach the customers but is also the scope where managers of the service provision are located.

Tractors companies are realizing in this period the importance of providing high service standards to their customers so they are focusing efforts on the development of the distribution network. The relevant bargaining power on dealers is a prerogative of tractors producers and for this reason the majority of the manufacturers adopted the sole agent distributors as the exclusive channel. This choice is explainable with a main reason: to

develop a unique system of high quality service provision. Customers must be sure to find some defined standards when they receive services from any dealer of a distinct brand.

The case studies underlined the concept that companies monitor frequently their customer satisfaction and realized clearly which service standards need to be reached; nonetheless they understood that there is a lack of efficiency in the provision of such service standards caused by distributor's unpreparedness.

To identify the policies to develop an efficient service provision the strategies of some tractors producers were analyzed and the best practices were chosen as "good" models to repeat. More precisely, several actions to influence dealer's activities are recognized as the drivers to obtain high service standards. In summary it is observed that the leaders in service provision establish a fruitful collaboration with their dealers network from which both of them obtained significant advantages.

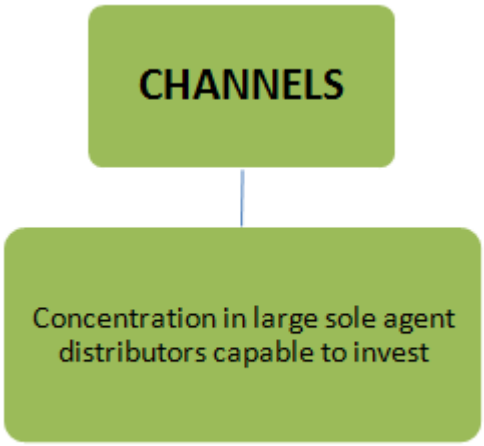
In order to make this kind of partnerships the dealers, acting as distributors, must achieve relevant dimensions. Moreover, the system implemented with dealers must be continuously monitored with an appropriate balance scorecard; and, last but not least, an active promotion of maintenance and consultancy services should be provided by manufacturers. These elements – the control and balanced scorecard as well as the promotion of maintenance and consultancy services – are respectively a key resource and a key activity, in order to boost the channel's effectiveness. These elements will be focused in later sections of the business model

Concentration in large sole agent distributors capable to invest

Dealers must dispose of the economic opportunity to invest in services development, especially to provide the rental service.

The strategy to obtain this kind of power is to give distributors the exclusivity to work in a wide area in change of the insurance that a fixed part of their revenues must be reinvested in service development. In order to do this it is possible to withdraw concessions to worst dealers or to encourage distributors to merge in a single company; this solution effectively worked in Germany but is still refused in the Italian territory.

Figure 101: Tractor producers channel building block



CUSTOMER RELATIONSHIPS

Below are described the most relevant kinds of relationship for tractor producers, having concern with their customers. Dedicated personnel, Customer Relationships Management system, co-creation in the design phase and communities are the most relevant issues emerging at this block.

Dedicated personnel

It is important to establish and maintain a steady relationship with customers to provide them some effective high quality services. For tractor manufacturers it is essential to have professional human interactions with clients **through dealers** in order to increase their satisfaction. The distributors should have some **dedicated personnel**, mostly for the largest customers. Dedicated personnel provides services more effectively, mainly consulting services, both pre and after sale. Some **fixed staff** increases client's loyalty and, above all, enables company to understand directly and quickly market needs.

Customer Relationships Management system with continuous monitoring

Of course companies can dedicate some personnel only to few large customers, and this relationship has a considerable cost. An effective way to reach every customer and to establish and maintain a steady relationship with less human resource-consumption is by information automated services. As written previously, a CRM system, better if integrated

with a continuous monitoring one, is indispensable to establish a customized relationship with every farmer.

The implementation of information systems is a high cost investment for every firm, but mostly in this service demanding market, it would give back some priceless increases of service quality and customer satisfaction.

A best practice observed in case studies is to have **a direct contact with the final user of the tractor** (not trough the dealer) to measure the farmer satisfaction about the machine in use and the service received. This relationship, **by means of the web channel**, is useful **also to monitor dealer's activities**.

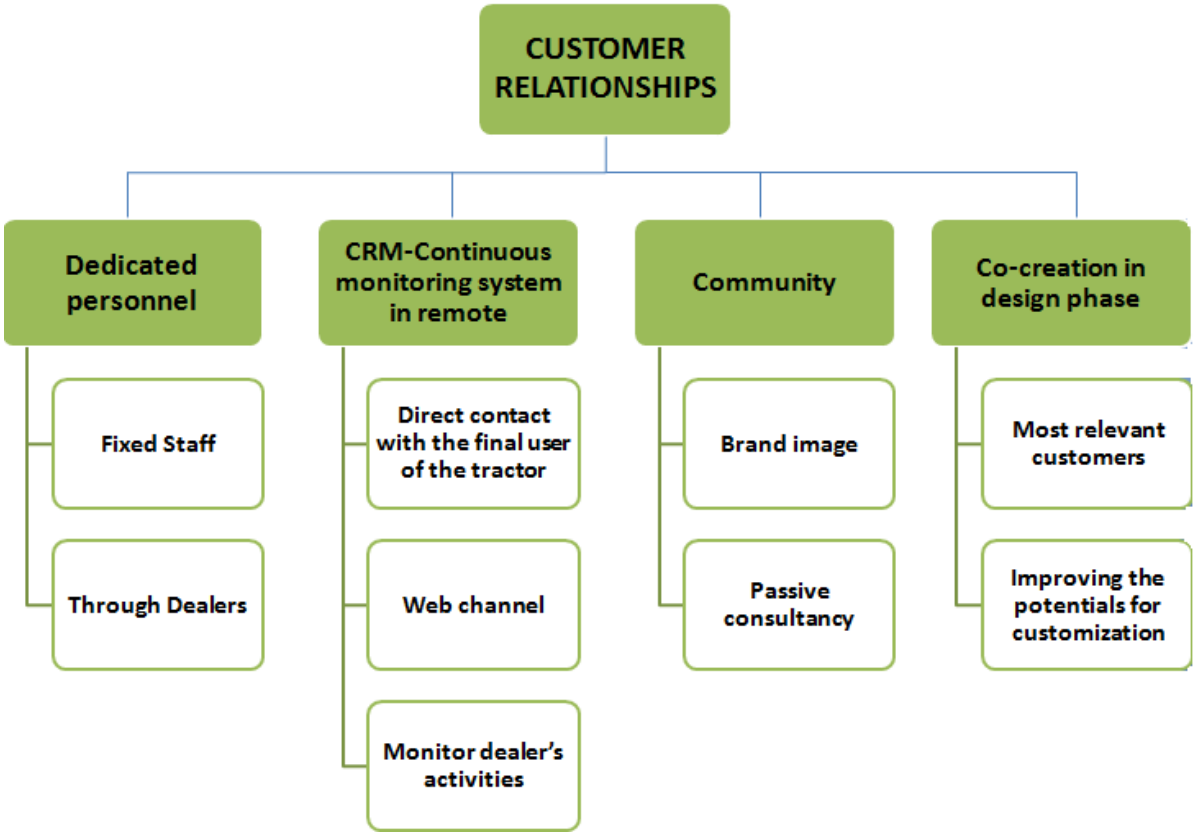
Community

Another means for a steady and quality relationship is the community. Creating a firm community empowers the **brand image** and increases customers' loyalty. Manufacturer can provide **passive consultancy** by an information platform community, both through own communications and other clients advices. The community is not only a way to increase brand loyalty or to provide a customer/dealer e-learning service, but also to receive useful clients' feedback on product-services.

Co-creation in design phase

Co-creation is a high value both sides relationship, but difficult to be established diffusely with clients. As it is said above, this is an effective but expensive tool in product-service design, and it might be implemented, according to Pareto logic, with main relevant customers. This relationship helps **improving the potentials for customization**, at least for most relevant customers.

Figure 102: Tractor producers customer relationships building block.



REVENUES STREAM

This block is strongly related to the services provided by the company. Offering **different streams means that different services are provided**. To specify it is observable that the "asset sale" revenue stream implies the purchase of a product, the "usage fee" and the "subscription fee" the exploitation of a service and the "lending – renting" the provision of the rental service.

Asset sale

Most efficient business models that where analyzed in case study are leaving the service provision to the dealers network, this is why **manufacturers companies' incomes derive mostly from the "asset sale"**. It is significant to specify that in event of the absence of total care maintenance packages a relevant source of income is the spare-part sale, an asset sale from which the dealer is gaining a percentage.

Subscription fees

It is important to specify that the adoption of a product oriented service as **total care maintenance package** implies a further revenue stream for the manufacturer company: the subscription fee. This is a suggested solution for service oriented tractors producers: the sale of an asset can be expanded with the sale of a maintenance service for a fixed period in change of a subscription fee. The **results obtainable are positive for manufacturers and for customers** that can forecast their total costs. At the same time, to grant this service the producers requires an ordinary certified maintenance (oil and filter change) that is provided, in change of a usage fee, by distributors which are consequently gaining from this solution.

Another possible revenue stream, coming from a subscription fee proposed directly by the producer, it is the advanced consulting service offered through the implemented CRM-continuous monitoring system. For the earthmoving service leader, this type of technology was a very profitable investment and above all a priceless service for customers which recognize high value to real time consultancy (to reduce costs by avoiding incorrect machine use, or to prevent failures).

Dealers' revenues

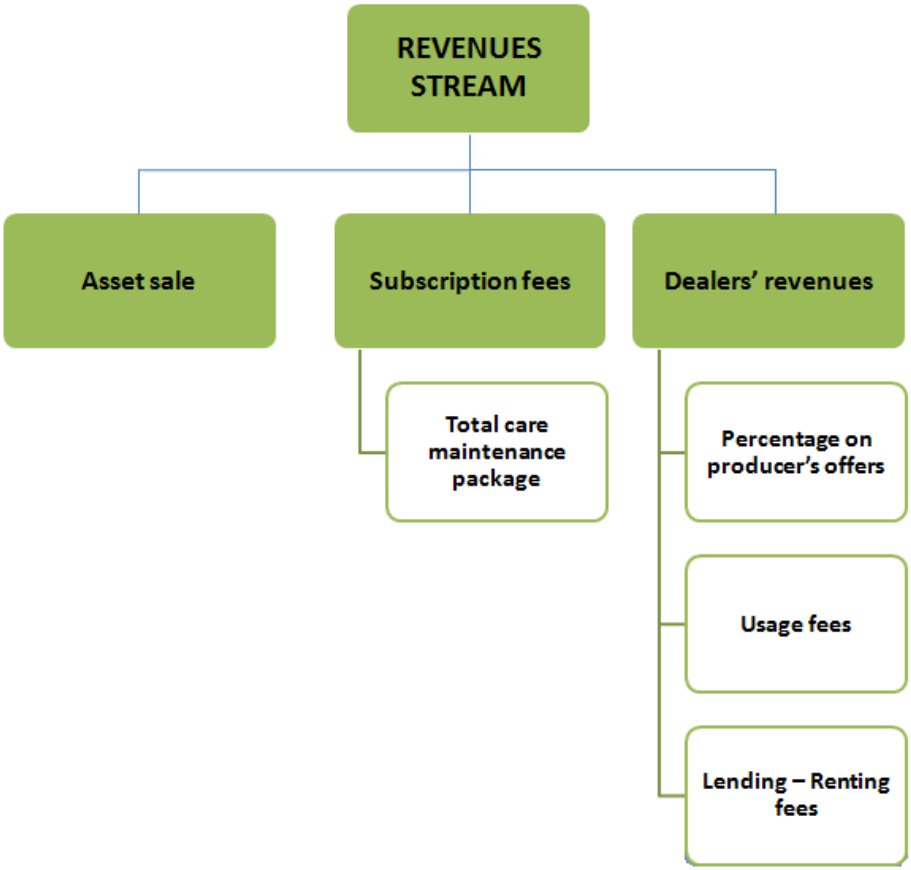
Distributors of evolved tractors manufacturers compose their revenues with a percentage on the offers implemented by the producer:

- A fixed percentage on the asset sale
- A fixed percentage on the subscription fee for total care maintenance packages

Moreover they exploit their role of direct provider of services by gaining through other fees:

- **Usage fee** for the provision of the ordinary certified maintenance (oil and filters change) that enable the total care maintenance package
- **Usage fee** for some advanced consultancy services provided (continuous monitoring in remote)
- **"Lending – renting"** fee in case of the offer of a rental service.

Figure 103: Tractor producers revenues stream building block



KEY RESOURCES

For producers, manufacturing facilities are usually the main key resources. In a service oriented business model the production plants are still important elements but they are not the main ones. As written before, to deliver effectively products and mostly services, the distribution network is the crucial resource for tractor producers. The dealer network is the most important resource in a product-service system business model. Tractor makers have to focus on their network by using the leverages described in the "key activities" section.

Manufacturing facilities

Production plants and machinery represent the fundamental resource to produce tractors and are an **essential resource to definitely play a role in the sector**. For this reason it is impossible do not consider this resource in this building block. On the other hand, in order to develop a service oriented business model the focus must switch on the service area.

Distribution network

As specified in the channel block, tractor producers have the necessary economic and bargaining power to develop effective partnership with dealers. these relationships are in order to **exploit the distributor's activity to provide a standardized service level**. It was observed in the case study that a strong relationship bring the dealer to become a sort of extension of the producer connecting it to final customers.

Dealer development function

It is essential for tractor producer companies to have a service oriented organizational resource: a **formalized internal division completely focused on services**, composed of service managers and a fulltime dedicated team to empower service offers. By visits and case study it emerged that nowadays this service oriented business function is **still not present in many companies**, and it is not yet a central resource. Another organizational resource should be implemented. This new function has to employee dedicated resources in order to develop and manage the distribution network and to push the empowerment of service provisions; the introduction of a new business figure, the "dealer development manager" is required.

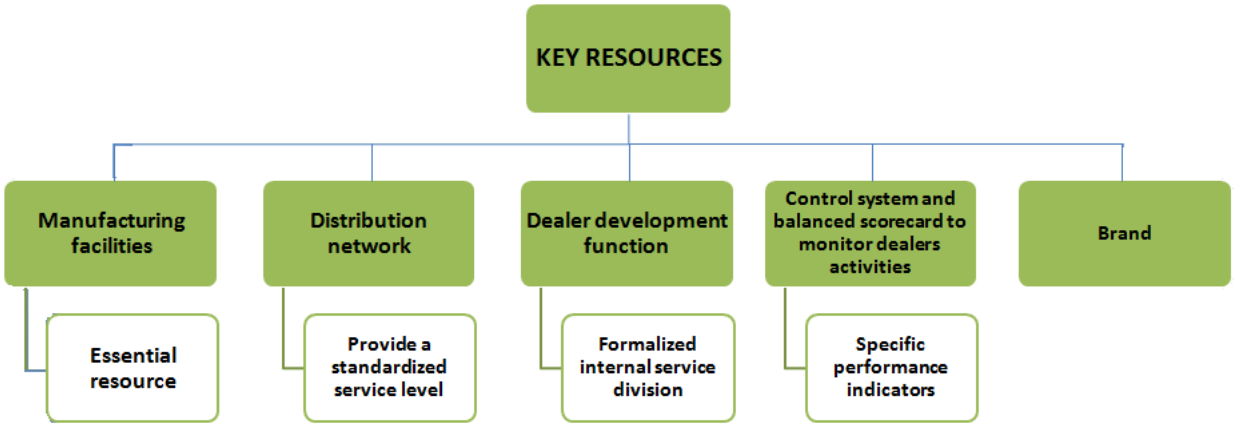
Control system and balanced scorecard to monitor dealer's activities

A control system must be implemented to monitor and supervise dealer's activities. It was observed that leaders companies developed a structure of direct agents that are constantly monitoring dealer's businesses; it is organized also a balance scorecard with **specific performance indicators that must be achieved and acts as motivations for distributors**.

Brand

The Brand is essential to give the perception of excellence to final customers. This business model is driving the producers to develop high standards of service provision that must be achieved by all the sole agent distributors responding to manufacturers. **The distinctive image gave by the brand must be exploitable by all the dealers**. The clients must know that, referring to a company's dealer, he will obtain defined standards of service.

Figure 104: Tractor producers key resources building block



KEY ACTIVITIES

Manufacturers companies must focus their efforts on production activities. It is necessary that a company which is producing technologic, expensive and sophisticated assets as tractors does not loose the core competence of the production know-how. This statement is not inconsistent with service oriented business models because, as it is said above, the service provision must be managed by large, competent and proficient controlled dealers. It is fundamental, anyway, an attention on problem solving activities to support the dealer network in its business. In order to do this, the key activities enabling an efficient service-oriented business model are the sequent:

Distribution network development

1. **The concessions to sale – provide services are granted to few distributors** to ensure they manage a wide region. In this area the dealer can act as a kind of monopolist with the result that it can achieve a high turnover and then a relevant capacity to reinvest in service provision development

2. The **dealers must be forced to reinvest** a fixed percentage of their operating profit to improve their structure of service provision and achieve the standards desired by the manufacturer company

3. It is **implemented a scorecard with precise indicators** to measure dealer's activities in order to reward the best performer and to help the ones with worst results in precise directions; in case of repeated low parameters the concession can be revoked.

4. It is implemented **a structured team of agents in order to control and monitor dealer's activities** by weekly visits in the national areas. The best practices found can be spread to the rest of the distribution network. In a case study was identified that every six dealers two agents are employed (one to support the service provision and one to monitor activities)

5. A **central information system** to support customers (CRM, continuous monitoring of machine's status in remote) must be **exploitable by dealers** to provide customized services to clients

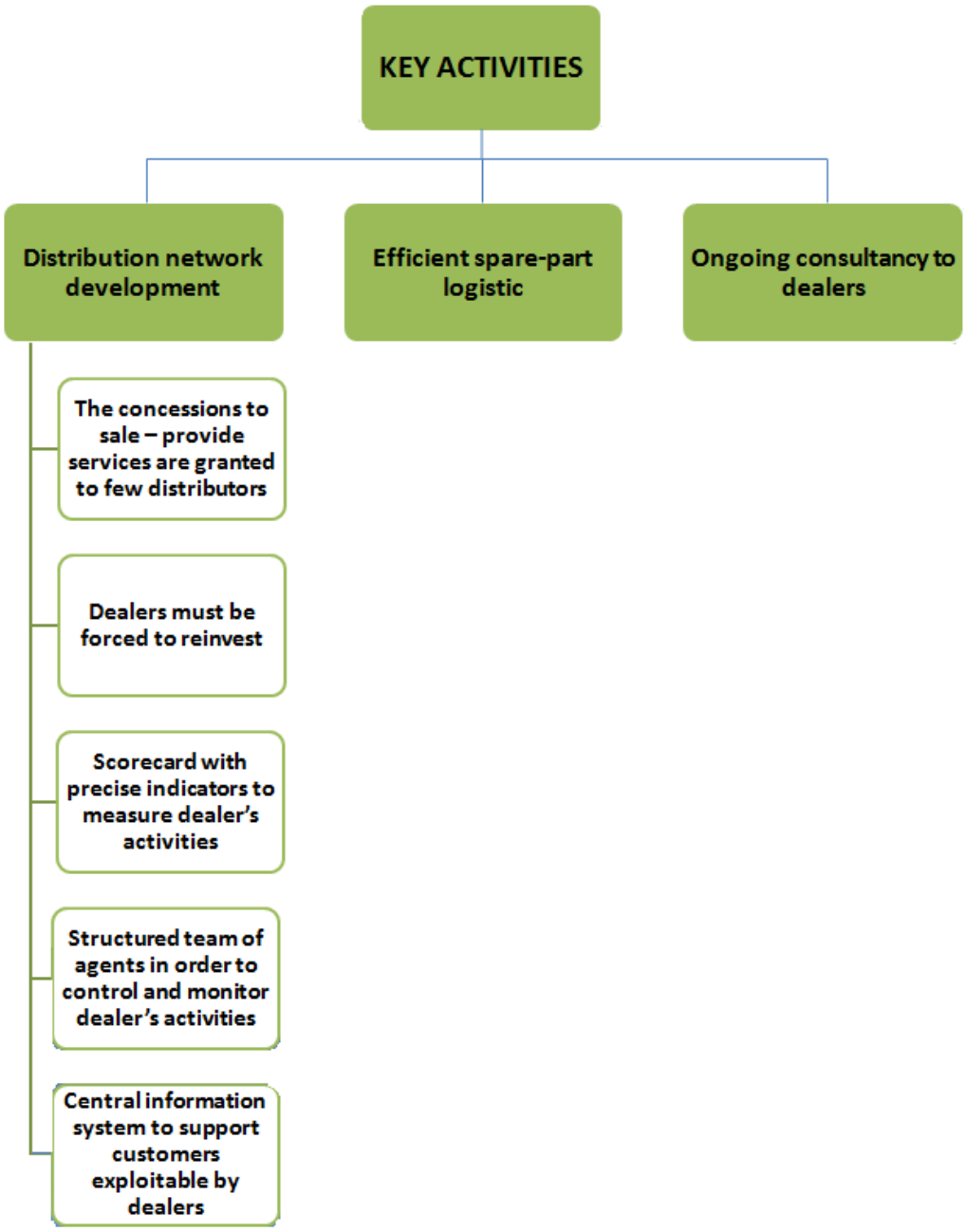
Efficient spare-part logistic

In order to ensure high quality in the maintenance service provision the dealer must receive timely from the producer all the parts needed. It is essential to develop an efficient spare-part logistic to achieve this objective

Ongoing consultancy to dealers

The development of a system of ongoing consultancy to dealers (**lessons, e-learning**) is essential to keep the dealers updated on new products features and related extendable services.

Figure 105: Tractor producers key activities building block



KEY PARTNERSHIPS

This building block is more relevant for other machines producers, but it might be also for tractor manufacturers a source of more revenues and increase of service offers. Besides

partnership with suppliers of components or with customers for testing and designing, the main kind of deal to increase service business is with other agricultural finished products manufacturers. A key partnership is with dealers, by considering them as producers' direct, but not final, customers; this relationship was deeply described in the "channel" section.

As written previously, there are two possible types of partnership involving finished products producers: between two tractor makers or between tractor and other machines manufacturers. The tractor-other machines one is less important for a service oriented business model. Some interviewed tractor producers established key partnerships mostly with other tractors makers to propose a full line offer of tractors of different power. This sale and production deal involves an Italian and a foreign maker (a Korean one in an analyzed case study) because of Italian antitrust obstacles for anticompetitive partnerships among national makers. A tractor-tractor deal does not imply direct improvements in service offering ability. It might even move the firm's focus from products proposition with a high level of internal know-how to less known and fewer core offers; with probably even negative effects on service quality.

Partnerships with other machines producers

An interesting kind of partnership is instead the tractor-other machine producer one. This deal is due mainly to reach a full line offer of different agricultural equipments, often required directly by the market. The tractor-other machines partnership is quite different from the tractor-tractor one. The tractor is a power generator mainly employed to drive and use another working machine. Because of a technology increase of advanced agricultural equipments, mostly an electronic one, it is required a connection and communication between the tractor and the equipment to exploit fully all new benefits and functions of the machines. This technological increase brings new needs of services also for the equipments, services strictly related to the connected tractor. For a better product-service to customers (as the ISOBUS service to control the machine by the tractor computer, or the GPS to set plan work guided by satellite) tractor makers need to propose some technological compatible machine, and relative services. It is important for a tractor manufacturer to choose the right machine partner. Relevant features that should drive the choice of an equipment producer are:

- **Advanced technological level of machines** and thus firm's focus on newness and on patents as key resources.

- A **good market share**; market has to appreciate machines maker's products.

- A **relevant dimension** and thus a sufficient production capacity.

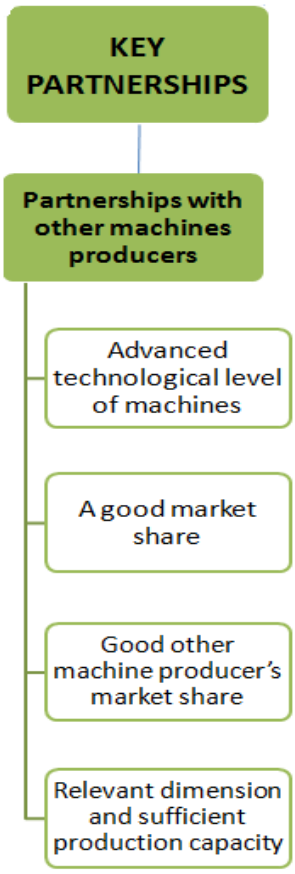
The tractor manufacturer has to decide how to exploit the other machine producer's brand image. A common practice by tractor producers, in few found tractor-machine partnerships, it was to sponsor and support the sale in its own distributors' stores. Other two practices are advised to propose high quality services from the technological tractor-machine interaction, recognized by customers:

- Re-branding equipments and propose directly pre and after sale services, if machine producer does not have a strong brand image.

- Associating and putting beside the two brands and propose its own pre and after sales services, if equipment maker has a strong brand image recognized by loyal customers.

In any case it is very important for tractor manufacturers to train dealers also on other machine maintenance and consultancy services to offer standard high quality product-services to customers.

Figure 106: Tractor producers key partnerships building block



COST STRUCTURE

Tractors producers are perfect examples of capital intensive companies in which fixed costs are definitely higher than variable costs. The suggested service oriented business model does not imply a relevant change in the company's cost structure. Moreover it is observable that the actions oriented to a service development require low investments to implement a formalized internal division and to improve the spare-parts logistic and the relationships with the dealer network. The cited investments are all influencing fixed costs but with a limited importance compared to the values of a manufacturer company.

To conclude it is interested to observe that the advised business model implies a relevant change in the dealer's cost structure; the development of new services with higher standards entails a massive increase of variable costs and limited effects on fixed costs but the larger dimensions allow distributors to grant a greater financial security.

The service oriented business model proposal for tractor producers is summarized in the canvas in fig 107:

The Business Model Canvas: **Tractor Manufacturers**

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
❑ With dealers ❑ With other machines producers	❑ Distribution network development ❑ Spare parts logistic ❑ Consultancy to dealers ❑ Production	❑ Development of an innovative service provision structure ❑ Driving a sustainable oriented spread of services in agriculture ❑ Customization ❑ High quality total care maintenance solutions ❑ Pre and after sale advanced consulting services ❑ Rental service	❑ Dedicated personnel ❑ Continuous monitoring on machine's status ❑ Co-creation in design phase ❑ Communities	❑ Large farms ❑ Small farms ❑ Contractors
	Key Resources ❑ Distribution network ❑ Dealer development function ❑ Brand ❑ Manufacturing facilities ❑ Dealer control system		Channels ❑ Large sole agent distributors capable to invest	

Cost Structure	Revenue Streams
❑ Capital intensive firm's cost structure	❑ Subscription fees from total care maintenance packages ❑ Asset sale of tractors and spare parts ❑ Rental revenues: fee to dealers linked to the period

Figure 107: Business model canvas for tractor producers

7.2 OTHER MACHINE PRODUCERS BUSINESS MODEL

In next paragraphs two business models for other machines producers are proposed, one for small and medium manufacturers, and one for large producers. It was considered necessary to create two different proposals for two different types of machines manufacturers. From previous analysis and case studies, it emerged that, inside this sector, the firm dimension is a discriminating factor for the success or the failure of a service-oriented business model.

Large producers, revenues over 40 million €, in contrast to small and medium ones (less than 40 million €), have much more resources to propose more evolved services and to implement a more advanced service oriented business model.

Both proposals are described in detail below, with emphasis on key sections.

7.2.1 LARGE MANUFACTURERS (More than 40 Million € Revenues)

Other machines large producers have an international dimension with branches in all the developed countries and a bargaining power that give them the possibility of several actions on the market.

By the literature and case studies analysis it emerged that, as for tractors producers, other machines manufacturers have to plan strategically the supply of services, but the standardized supply process has to be managed exclusively by dealers, which are the closest to the customers. As said previously, in agricultural machinery distribution, dealers are autonomous product-service sellers that have sale deals with producers. In order to control service provision, other machines manufacturers, as well as tractors, has to control or at least to be able to influence dealer's service conducts. Equipment sales are a small part of dealer's product and service revenues, which are composed of tractor sales for more than 50%, and the remaining 50% is composed of all other machines sales.

For these reasons equipment producers should make sale and distribution partnerships with tractor producers to increase control and bargaining power on distribution network, and thus to be able to provide high quality services to customers. Large manufacturers, in contrast to small and medium ones, have the potential to establish and maintain this type of partnership; in a tractor-machine deal, machine producers must have a relevant production capacity to sell their products associated with numerous tractor sales. Moreover associated other machines have to have a good market share and an evolved technology level to offer customers the best advanced products. As written in the previous sections, on the other hand tractor producers are willing to have a partnership with an evolved other machine producer in order to offer a full line of agricultural machinery and for the always more necessary technologic integration and compatibility between tractor and other machine, to offer advanced levels of products and services. Small and medium other machine producers do not have these needful features to establish a steady partnership with a tractor maker.

Moreover, in contrast to small and medium ones, large producers have bigger economical resources to invest in service development, a larger market that justifies these needful investments, and, last but not the least, they produce more technologically advanced machines which really need evolved services and justify a service-oriented business model implementation for a really profitable service market.

CUSTOMER SEGMENTS

The adoption of PSS business model is profitable and avoids the risk of the service paradox (see chapter 1) only when is proposed in prepared markets. In developing countries there is an increasing need for agricultural machinery and in that segment is still more profitable the focus on sale actions, for this reason in developing countries it is not suggested the adoption of service-oriented business models. As for niche markets the reduced dimensions of the segments do not justify the economical effort to develop an efficient service structure and this is why it is not recommended a PSS business model focusing on this segment. The business model proposed is valid for all the different segments individuated in developed countries, specific actions for each segment are suggested.

Large farms

In these firms is observed a relevant worry about the unavailability risk. The prevailing mentality is that to avoid this risk the best solution is the acquisition of the agricultural machine. The possibility to penetrate this segment with evolved services (use–oriented or result-oriented) depends on the ability of the service provider (the dealer) to persuade the customer that the service can be offered satisfying all the needs. Obviously, in order to this a massive consultancy service must be provided.

This segment moreover seemed ready to the adoption of total care maintenance packages, this attitude must be exploited by producers with a coherent provision of maintenance product-service

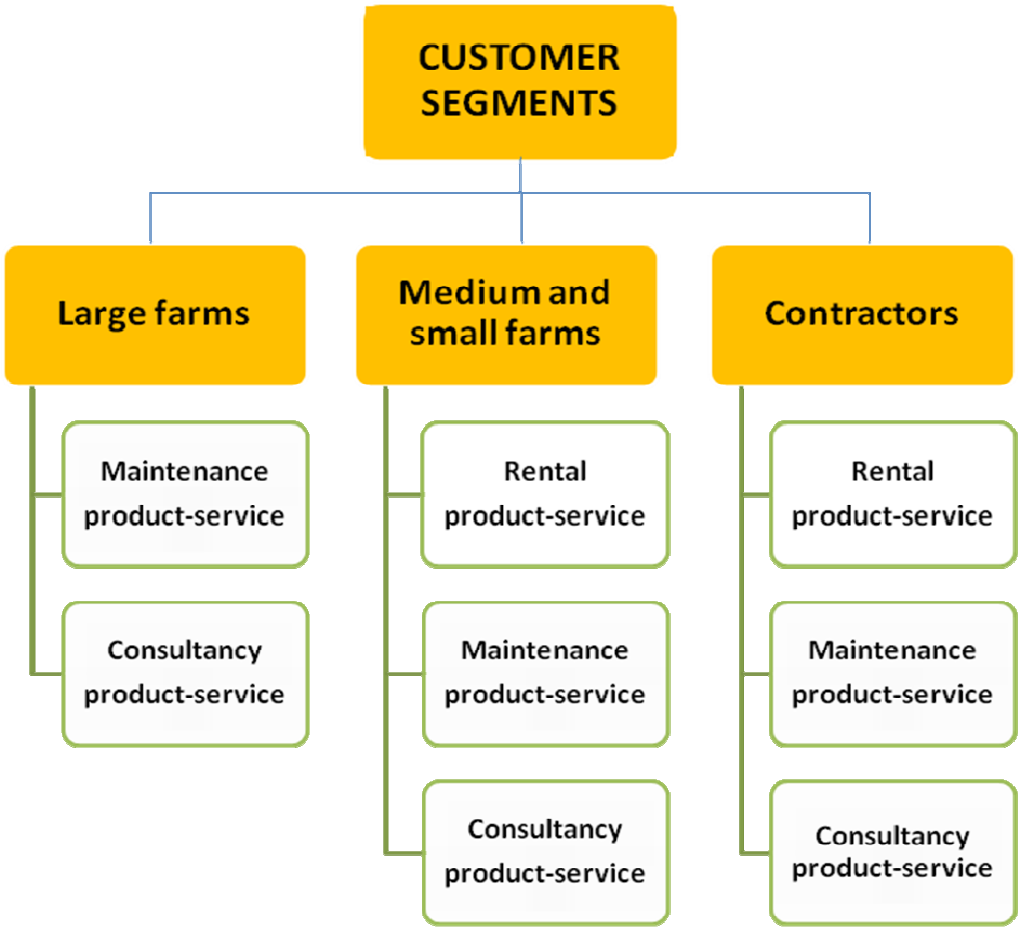
Small farms

In these firms, the worries on unavailability are hidden by economical problems. Moreover the acquisition of a seasonal machine is seen as an excessive spending; this lever can be used to encourage the use of rental to which it seems that they are ready. It was found that for economical reason this segment is refusing the maintenance total-care packages but with some consultancy on total cost concept this barrier can be overcame.

Contractors

As for large farms, this segment is characterized by relevant worries on unavailability. The development of an accurate and timely rental service can drive contractors to a greater use of evolved services (moreover because of their need of an updated fleet). These customers are to be considered very relevant because they offer a credible alternative to the hire option for small and big farms; the possibility to make machines available to contractors trough the rental service can represent a big impulse to the spread of services in the whole agricultural sector.

Figure 108: large producers of other machines, customer segments building block



VALUE PROPOSITION

The main value proposed with this business model is an **effective and efficient service provision**, with the purpose of reducing the total cost for customers in the long term and with the **ambitious goal of transforming the agricultural sector in a business where services are successfully exploited**. According to Osterwalder framework it is interesting to see what values must stay behind this model. In the large producers of machines sector the way to achieve this business model is particularly tortuous because of the lack of bargaining power on the service provision network, so first they must offer values in order to control this structure.

In this work repeatedly came out the necessity of a developed distribution system to ensure evolved services, and the only segment that can achieve the bargaining power to manage dealers is the tractors producers one. For this reason large manufacturers of machines must propose principles oriented to an efficient service provision but first of all they have to offer **attractive values that can bring to collaborations with tractors manufacturers**.

Production of innovative technological machines

The economic possibility to invest in research and development is bringing in the machines sector numerous product improvements in these years, the attractiveness of new machines is growing because of the effective help that these products can bring to customers when new technologies are embedded. **The "newness" value is the key to reach fruitful partnerships with tractors producers** when it is recognized a helpful innovation in the machines produced, moreover it is essential to link advanced machines with a strong brand. This value must be recognized from farmers but at the same time from tractors manufacturer to encourage partnerships actions.

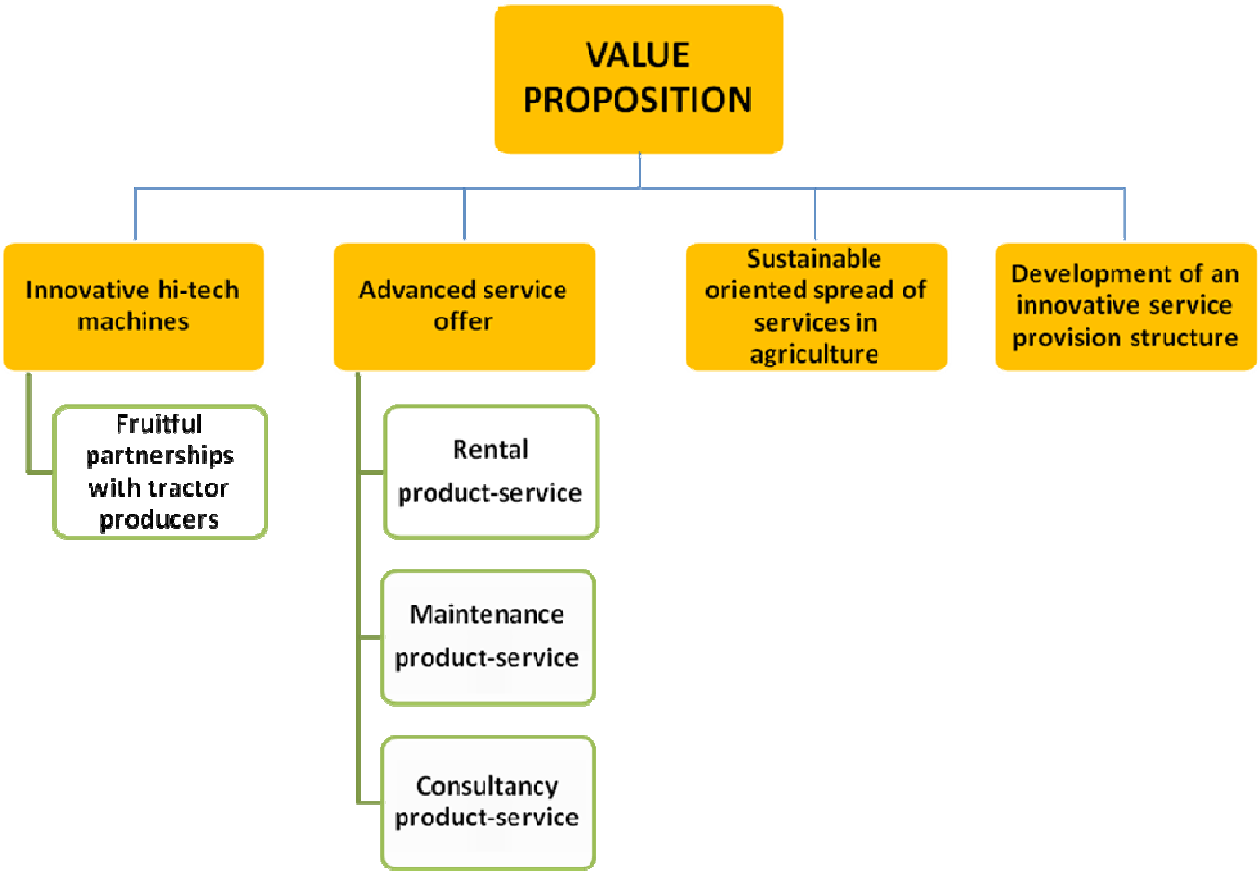
Evolved service provision

Once this fundamental partnership is achieved, large manufacturers of machine have all the resources needed to develop a service provision system comparable to tractor producer's one. The services offered are:

- multi-year total care maintenance packages,
- free and paid pre and after sale consulting services,
- rental service (without operator).

Moreover it is necessary an increasing focus on service provision because of the high technological level of the machines; for what emerged in the case studies the most significant value behind an evolved service oriented business is the "cost/risk reduction". The customer orientation is aimed at obtaining actual economic advantages for clients. In the long term an efficient service provision brings clients to tangible savings.

Figure 109: Large producers of other machines, value proposition building block



CHANNELS

The crucial role of the distribution network has been repeatedly underlined in the previous paragraphs, this aspect is to analyze in deep also for large producers of agricultural machines.

The dealers must manage the service provision and have to be enabled to do this in the best possible way. They must receive specific trainings on products and focus their business on the development of services for a single brand. The manufacturer's actions to help distributors in their improvement are described in the **key activities** building block. However it emerged a difficulty – not observed in the tractor segment – in controlling dealer's actions.

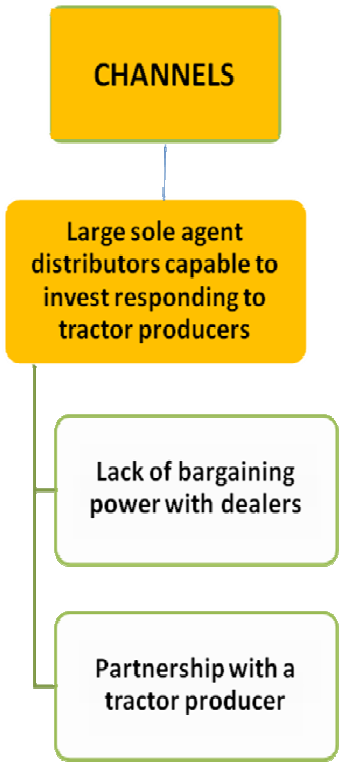
Large sole agent distributors capable to invest responding to tractor producers

In large producers of machines sector was found that the **lack of bargaining power with dealers** and the limited brand image can not allow actions in order to influence in a determining way the size of the dealer. For this reason a **partnership with a tractor producer** which is managing in an efficient way its distribution network seems essential if high service standards are to achieve.

The point is that it is primary to keep distributors under control (which is possible for firms operating in this sector only through partnerships with tractors producers) to proceed with successfully actions of service provision improvement.

The provision of evolved use oriented services is depending on dealer's dimension and capacity, the rental service should be encouraged and pushed but only distributor's ability can ensure a successful spread. For this reason is suggested the partnership with tractors producers very mindful on dealer development topic.

Figure 110: Large producers of other machines, channels building block



CUSTOMER RELATIONSHIPS

The agricultural sector, by its very nature, requires the human interaction as an essential relationship; usually final users develop this kind of rapport with dealers. This implies that distributors are regularly representing the company even if they are not employed. For this reason dealers must become loyal to a brand and transmit a positive image, actions in order to do this are strongly recommended. Sometimes, as it is said for tractors producers, a direct contact, by web, with final users can be helpful to understand perceived values and to monitor dealer's activity.

Dedicated personnel

As seen for tractors producers, in the agricultural sector some dedicated personnel is absolutely necessary, especially for large customers. The **dealers network must provide this resource**, obviously the staff has to be prepared.

CRM with continuous monitoring on machine's status in remote

Large producers of machines can not develop straight relationships with customers in the way small producers do so they must exploit their greater economical power implementing a Customer Relationship Management system and a continuous monitoring solution by **web channel**. Case studies highlighted that this service helps to develop a **direct relation with final customers** and can represent a competitive differential for producers with a relevant investment capability.

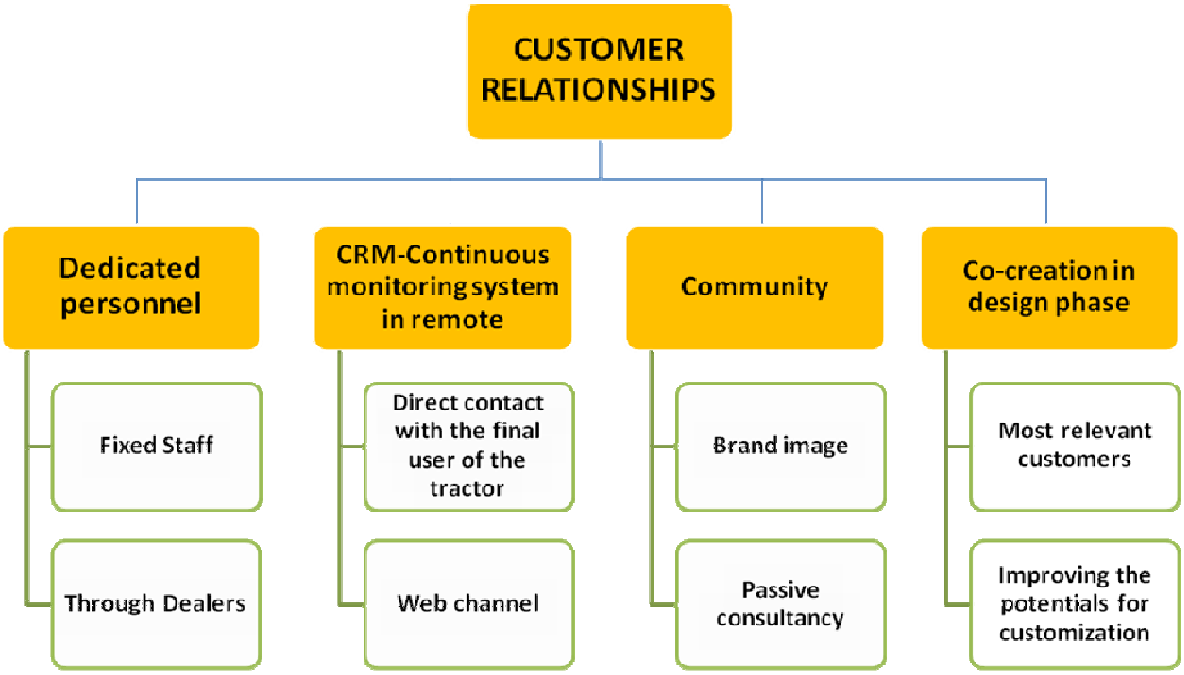
Communities

Large producers can exploit the brand to build up their own communities; it was seen in case study that the aim of this instrument is to develop a useful **passive consultancy** system and to strengthen the trade mark image.

Co-creation in the design phase

Finally it is relevant to underline that co-creation is more difficult to implement for large producers than for medium – small firms. This because of the low flexibility of high rate production but this must be compensated with a high attention to customer needs in the **design phase.**

Figure 111: Large producers of other machines, customer relationships building block



REVENUES STREAM

The model proposed provides two different types of revenues for large producers of machines coming from the acquisition of the products while the profit obtainable from the provision of services is left to the dealers.

Asset sale

Obviously the asset sale (machines and spare parts) remains the main revenue stream for manufacturing producers. It is to specify that, in case of total care maintenance packet, producers renounce to the revenues coming from the spare part sale in change of a subscription fee when customers purchase the asset.

Subscription fees

The revenue is coming from the purchase of a **total care maintenance package**. These multi-year advanced solutions are sought by farmers, mostly big ones and contractors, to reduce mainly their breakdown risk thanks to quick interventions or machine substitution, and to avoid unexpected extra maintenance costs. The solutions are offered directly by producers through dealers, which retain a small percentage of revenues. Moreover, distributors make profit in the same ways described for tractor producers. The revenues coming from the sale – service provision to other machines do not exclude the ones coming from tractors but are added. For this reasons the type of incomes are the same:

Dealers' revenues

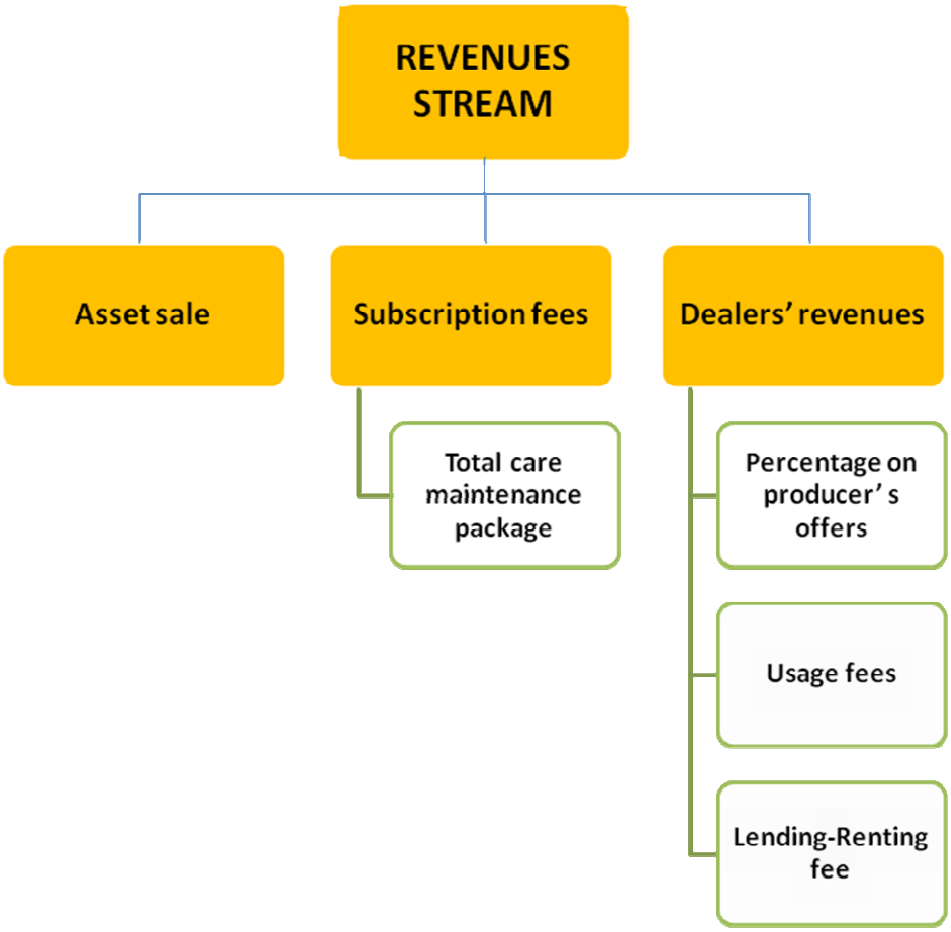
Distributors of evolved tractors manufacturers compose their revenues with a percentage on the offers implemented by the producer:

- A **fixed percentage on the asset sale**
- A **fixed percentage on the subscription fee** for total care maintenance packages

Moreover they exploit their role of direct provider of services by gaining through other fees:

- **Usage fee** for the provision of the ordinary certified maintenance (oil and filters change) that enable the total care maintenance package
- **Usage fee** for some advanced consultancy services provided (continuous monitoring in remote)
- **"Lending – renting"** fee in case of the offer of a rental service.

Figure 112: Large producers of other machines, revenues stream building block



KEY RESOURCES

To implement a service oriented business model, large companies should focus on some crucial key resources. As written previously the distribution network is a key element for delivering effectively services to customers.

Distribution network

Few other machine manufacturers, also large ones, have sole agent distributors, and also the ones which deliver through sole brand dealers have difficulties to control distributors' actions because of their low bargaining power. For these reasons companies should empower their distribution network by establishing sale and distribution deals with tractor

producers. Even if this resource is not directly controlled by large producers of machines it is considered fundamental to develop the proposed business model.

Manufacturing facilities

In order to establish key partnerships, big other machine producers have to focus on their manufacturing facilities to ensure **high production rates**, indispensable to associate at a national level their products to tractors. Focusing on manufacturing facilities is also essential to produce high quality products, necessary for a tractor-machine deal, as well as company's patents.

Patents

A key innovation in other machine technology is **creating communication and integration systems** to allow farmer to communicate and control the machine directly by the tractor's computer. Companies **focusing on R&D** and on this type of patents are the most sought by tractor producers. These resources should be crucial for every other machine large producer which seeks to successfully develop its service offers.

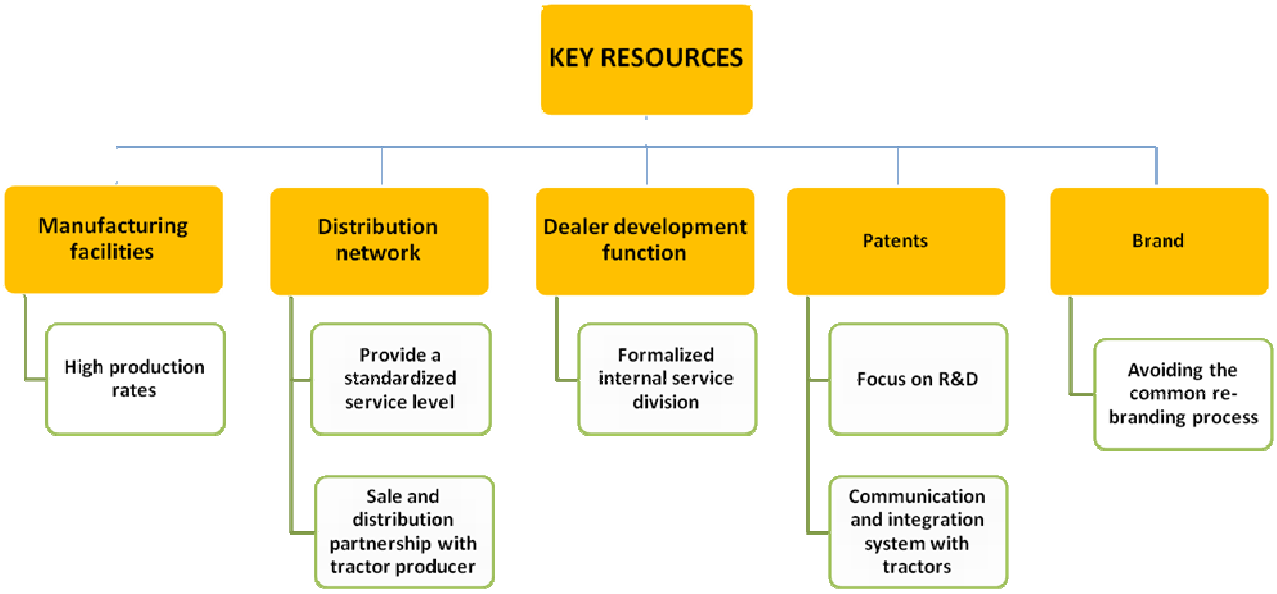
Brand

Brand image is also important to achieve a tractor-machine deal. A strong brand might be associated to the tractor one, **avoiding the common re-branding process**; otherwise the efforts in order to develop the service offer may not be recognized by customers.

Dealer development function

Finally, in a service oriented company, on the wake of what is described for tractor producers, it is indispensable a **service oriented function**, managed by a dealer developer manager and with a staff of service managers, in order to empower the quality of provided services.

Figure 113: Large producers of other machines, key resources building block



KEY ACTIVITIES

The two main activities (production and problem solving) proposed by the Osterwalder framework are analyzed in deep to identify the actions for a successful service-oriented business model.

Production

The production know-how is the **core competence** for a manufacturer company. Moreover the agricultural machines sector (especially large producers) is continually developing new products with evolved technologies embedded. For this reason relevant **investments in research and development** must be considered and, in the production process, the design phase must be competently managed considering crucial the customer needs. Large companies furthermore spend lot of resources in production plants and machinery so the

efforts have to be focused on an efficient and effective production system, leaving the service provision to the distribution network.

Establishing partnership with tractor producers

This business model suggest producers to do not provide complete evolved solutions directly to the customers but to develop a service oriented strategy to put dealers in the position to offer the highest service standards. What emerged from the case studies is that evolved services are provided by dealers which developed a service vision and considering service activities profitable for their business. Large producers of machines must reach these evolved distributors – always responding to tractor producers - to offer them their support in order to develop competences in services provision to their machines. The features necessary to establish partnerships with tractor producers, and consequently exploit their distribution network, are described in the **key resources** building block

Once this kind of partnership is achieved it is crucial to make this business model work to develop two activities to support the dealers. These actions are valid for large producers as well as they are for tractors manufacturers:

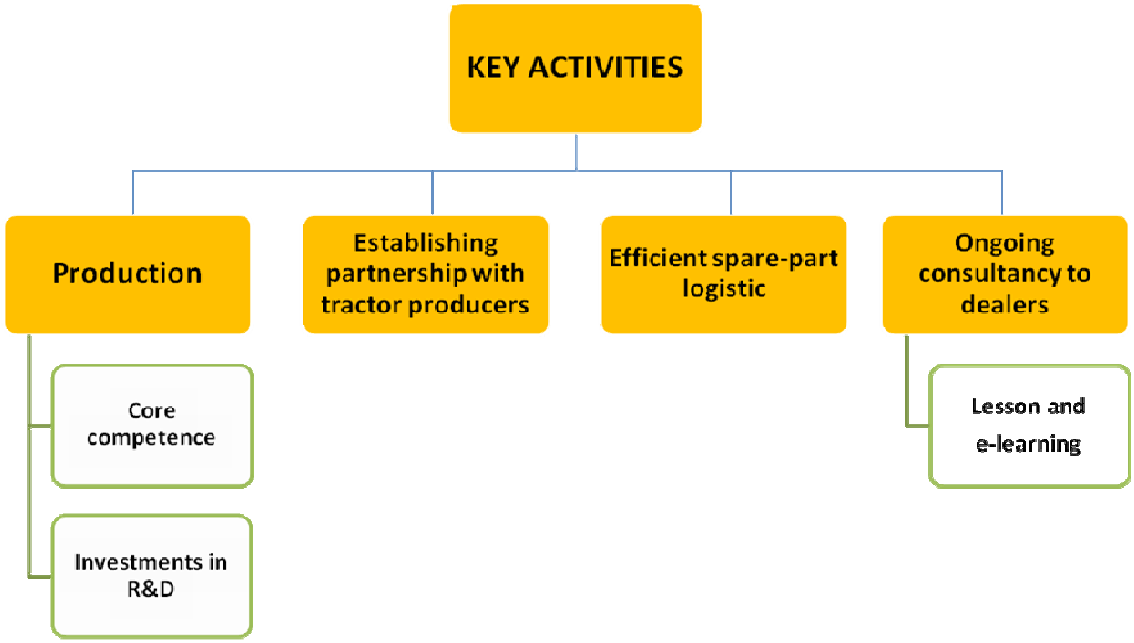
Efficient spare-part logistic

In order to **ensure high quality in the maintenance service** provision the dealer must receive timely from the producer all the parts needed. It is essential to develop an efficient spare-part logistic to achieve this objective

Ongoing consultancy to dealers

The development of a system of ongoing consultancy to dealers **(lessons, e-learning)** is essential **to keep the dealers updated** on new products features and related extendable services.

Figure 114: Large producers of other machines, key activities building block



KEY PARTNERSHIPS

As anticipated above, partnerships have a key role for other machine large producers to implement a PSS business model. Two main types of collaborations were indentified and should be established.

Partnership with tractor producers

The most relevant kind of deals is a sale and service distribution one with a tractor manufacturer, as widely described in previous blocks. The distribution network exploitation is essential to provide high quality product-services to customers. The only way to control and influence dealers is to increase producer economical importance and own bargaining power on distributors. By visits and case studies it emerged that the most effective strategy in order to achieve this aim is to establish a steady partnership with a tractor producer. A tractor-machine associated sale would give the opportunity to impose higher service standards (maintenance, consultancy, rental) to dealers, by exploiting the tractor makers power on them.

Tractor and other machine manufacturers are not direct competitors. As written in the previous tractor section, also tractors are willing to establish a deal with other machine makers to achieve a full line products offer and to exploit the new service business potential coming from the integration and communication between the tractor and the physically connected machine.

Partnership with hi-tech suppliers

In order to achieve a deal with a tractor maker, other machine large producers must have resources to become attractive. It is important to have a proper production capacity and high quality technologically advanced products. An effective strategy to ensure this attractiveness is establishing fruitful deals with hi-tech developers to bring **radical improvements** to products.

Partnership with dealers responding to tractors producers

Once the fundamental partnerships cited above are established, in order to effectively build up a service oriented business model, is essential to begin a fruitful collaboration with the dealers reached. The activities and the relationships to develop with distributors are explained in the **key activities** and in the **channel** building blocks.

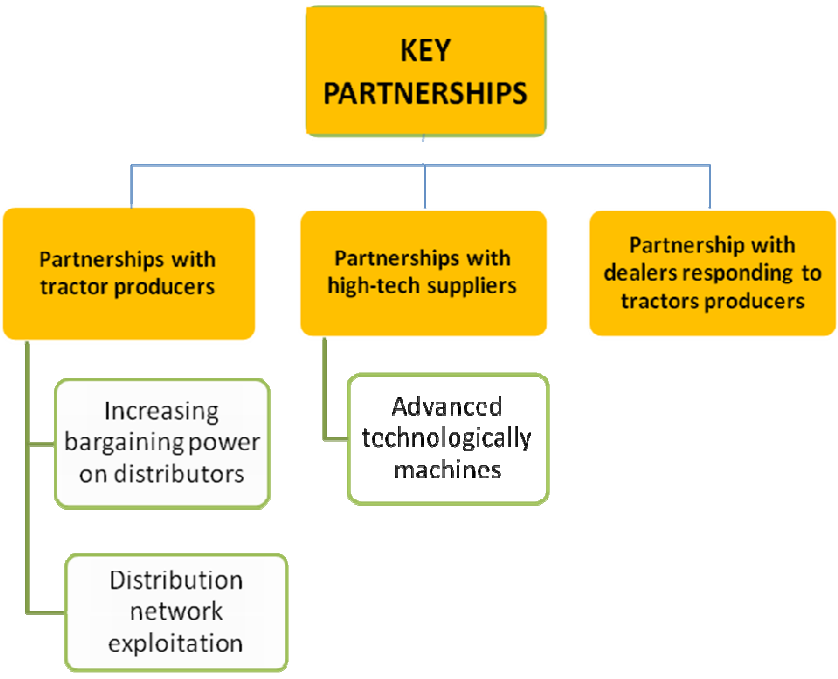


Figure 115: Large producers of other machines, key partnerships building block

COST STRUCTURE

As for the tractor producers segment, the large producers of agricultural machines are capital intensive companies with fixed costs definitely higher than variable ones. The service oriented business model proposed does not imply a relevant change in the company's cost structure, the activities suggested (empower the spare part logistic, establish an ongoing consultancy on dealers, create an internal function for the dealer development) impact on the fixed costs more than on the variable ones. Moreover, as said for tractor producers the dealers which must provide the services are forced to radical changes in their cost structure. Higher investments in personnel and machines and a structured service provision increase both fixed and variable costs but the larger dimensions ensure financial solidity.

In next canvas the business model proposal for other machines large manufacturers is summarized.

Figure 116: Business model canvas for large producers of other machines

The Business Model Canvas: **Other machines large producers**

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
❑ With tractor producers ❑ With hi-tech suppliers ❑ With dealers responding to tractor producers	❑ Establishing partnership with tractor maker ❑ Spare parts logistic ❑ Consultancy to dealers ❑ Production	❑ Development of an innovative service provision structure ❑ Driving a sustainable oriented spread of services in agriculture ❑ High quality total care maintenance solutions ❑ Pre and after sale advanced consulty ❑ Rental service ❑ New hi-tech products ❑ Customization	❑ Dedicated personnel ❑ Continuous monitoring on machine's status ❑ Co-creation in design phase ❑ Communities	❑ Large farms ❑ Small farms ❑ Contractors
	Key Resources ❑ Distribution network ❑ Brand ❑ Manufacturing facilities ❑ Patents ❑ Dealer development function		**Channels** ❑ Large sole agent distributors capable to invest responding to tractors producers	

Cost Structure	Revenue Streams
❑ Capital intensive firm's cost structure	❑ Subscription fees from total care maintenance packages ❑ Asset sale of machines and spare parts ❑ Rental revenues: fee to dealers linked to the period

7.2.2 SMALL AND MEDIUM MANUFACTURERS (Less than 40 Million € Revenues)

As written in the forth chapter the other machine market is very different from the tractor one. Only 60% (4 billion in 2010) of total Italian agricultural machinery revenues are for other machines sales. In Italy there are about 2750 other machines manufacturers (approx. an average of 1.4 million € revenues) and most of them are small ones (less than 7 million €). As emerged by researches and case studies, the seven interviewed medium producers having revenues between 7 and 40 million €, had actually an average of slightly over 7 million €, about 15 million €. Moreover for many products the market is widely controlled by very big manufacturers (more than 100 million € revenues).

By researches and case study analysis it was clear that small and medium other machines producers, in contrast to large ones, do not have enough economical resources, human resources, or products that need evolved service offers, to implement an evolved service oriented business model. Small and medium makers, mainly because of their low production capacity, are not able to establish partnerships with tractor producers, and thus they will never be able to exploit a developed distribution network to deliver their product-services.

Because of this lack of resources and market needs, it is not possible to suggest an evolved PSS business model for small and medium other machines producers.

However in the following sections it is presented a service oriented business model that helps companies to offer some services despite the structural deficiencies found.

CUSTOMER SEGMENTS

The agricultural segments considered for tractors producers (small-medium farms, large farms and contractors) are to be considered also for machines producers, moreover it is relevant to specify that these small producers are centring their business on niche sectors where large producers don’t focus their activities. For this reason foreign farms in developing countries can represent a profitable market.

More in detail the differences among diverse segments are reported here:

Niche sectors

Small producers of machines should focus their effort on those markets where large producers do not have relevant economic interests. The organized structure of large producers can achieve service standards unreachable by small producers. For this reason niche markets with **specific needs** not yet satisfied can represent a good source of income for small producers.

Small – medium local farms

The limited capacity and the numerousness of small producers of agricultural machines force them to consider a **local area** to do business with this segment. Only farms close to the production site represent a profitable segment for small producers, the **lack of a structured network** is a constraint to the development of a significant service oriented national business. Nearby the production site, anyway, there is the possibility to develop a high standard of service, even more customized than the one of the large producers. To these local customers **total care maintenance packages**, and the **rental service** can be offered.

Large local farms

The same reasons that restrict the development of a large service-oriented business in Italy for small farms are still valid when this segment is considered. Only large farms sited nearby the production site represent a gainful segment for small producers. To these customers it is possible an evolved service provision even if, as seen in tractors and large producers sections, large farms developed strong barriers to the exploitation of the rental service. In order to offer evolved services to this segment it is advisable the provision of **total care maintenance packages**. Advanced consultancy services can be provided but it is to say that the lack of economic power in order to invest in a Customer Relationship Management and in a system of continuous monitoring in remote is a constraint to reach high technological levels.

Contractors

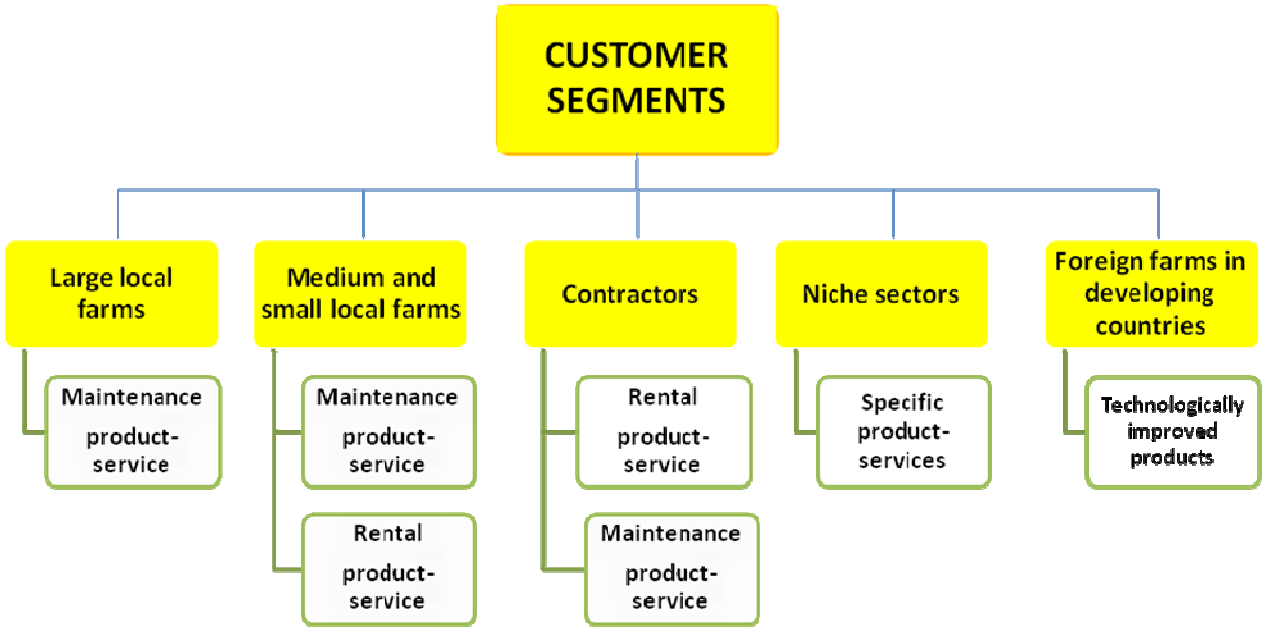
This segment is the hardest to penetrate for small producers, the intensive use of machinery typical of this activity requires an evolved product-oriented service provision which is difficult to provide because of the lack of a developed network. Only simple products with a low service necessity can be attractive for contractors but the sale of these products can not represent a long-term profitable strategy. An innovative way to penetrate this segment may be the **offer of customized use-oriented services for local contractors and customized**

total care maintenance packages. On the wake of what is said in the tractors segment, it is to specify that contractors can obtain important advantages (updated fleet, savings on maintenance) from the exploitation of the **rental service** and they also overcome easily economic barriers. Small producers with a service-attitude can focus their efforts on this segment but are bound by dimension to a local area, in order to do this the development of an internal service structure appears necessary.

Foreign farms in developing countries

This segment is largely the more profitable for these producers, mostly because in developing countries the **incremental innovation** proposed are definitely more attractive. The benefits obtainable from these machines in backward agricultural sector are relevant and furthermore the needs of basic after-sale services, easily provided by local structures, are the strongest impulse to the spread of small producers' business in developing countries. Large distance and the need for low-technological products are strong barriers to the development of a profitable service-oriented business in these countries.

Figure 117: small and medium producers of other machines, customer segments building block.



VALUE PROPOSITION

Small and medium other machines manufacturers, mainly because of the lack of resources, are not able to offer advanced services. Service proposals are: **direct maintenance solutions to local customers**, **free pre and after sale consulting services**, **local rental service** (without operator). In the other sections these offers are illustrated in detail. Below values enabling service provision are described.

Incremental mechanical improvements

Small and medium should focus mainly on newness value to implement the proposed PSS business model. Newness is the main value for this type of producers. Aiming at designing new products, which **improve performances or reduce costs of use**, may help small companies to survive in a very competitive sector composed of thousands of small firms and which is affecting a period of decrease of revenues. Because of the technological simplicity of products usually offered by small and medium manufacturers, producers should focus mainly on mechanical improvements, also small new ones that satisfy customer needs. **Particular improvements to machines for niche sectors** are advised, to avoid the high sectorial competition and to sell also abroad their quite unique machines.

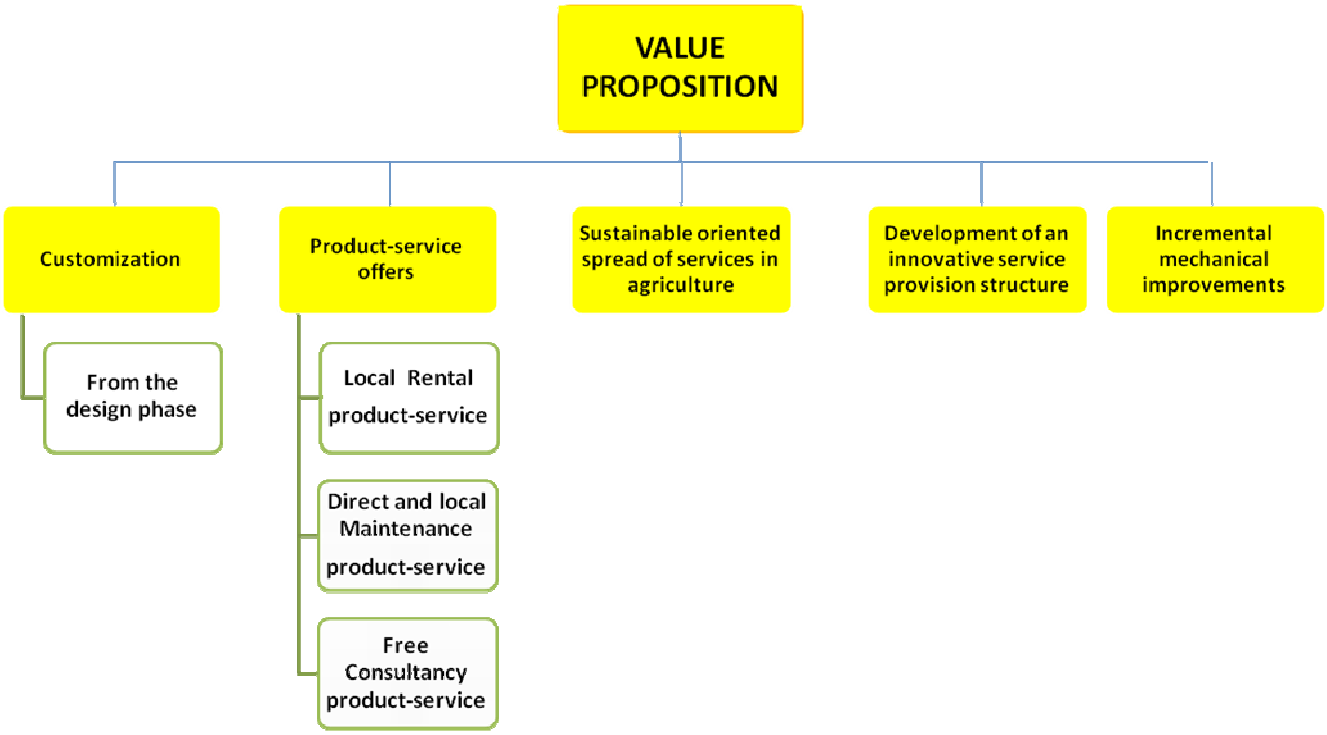
Customization

Another important value to focus on is the customization. Small and medium producers should exploit their **higher flexibility**, due to simpler processes and less production rates, in order to encounter requests of personalization of products and services. A **deep customization from the design phase** helps to propose also relevant value for customers as performance improvements and cost reduction.

By questionnaires it emerged that many producers chose the price value. Some products, also the simplest ones, are produced by large manufacturers. Focusing on price for standard products and services might be a bad choice for the low competitiveness due to the higher economies of scale of bigger producers. Small and medium producers should privilege differentiation to price, by focusing on newness and deep customization.

To conclude it is to say that case study highlighted a good ability to innovate of some small producers. In many cases, thanks to patented original ideas these small manufacturers succeed even to reach both developed and developing markets, overcoming the strong national competition.

Figure 118: small and medium producers of other machines, value proposition building block.



CHANNELS

The limited electronic innovations in these products imply a reduced need for after-sales services; for these reasons is not justified the development of a structured dealers network (there is no opportunity to make relevant profits from the service provision). It may be possible to offer increased service standards in case of a partnership with the owner of an efficient distribution network (only tractors producers) but the limited capacity of small companies is an important constraint to the establishment of collaborative relationships with large producers.

Sales force – web – multi brand distributors

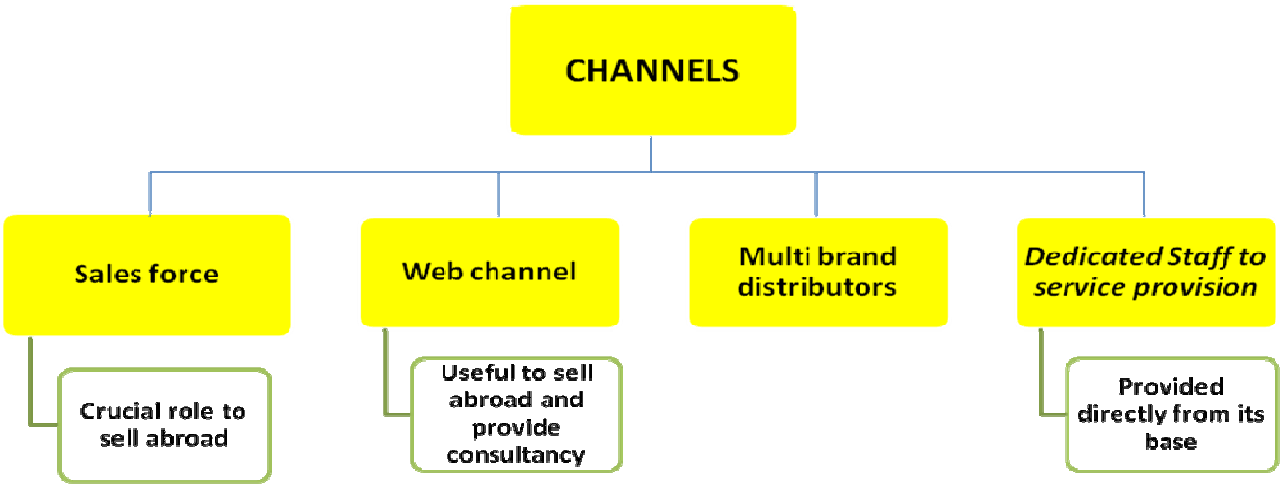
The focuses on asset sales of small producers advice the adoption of a capable team of sales agents with the **crucial role of selling abroad**. Moreover this propensity for foreign markets suggests the development of an efficient web channel; case studies underlined the

increasing effectiveness of this canal that is **largely exploited even in developing countries**. In order to expand their asset-sale market, small companies can exploit the multi brand distributors channel. Their limited economic and bargaining power is not sufficient to reach the market through sole agent distributors which can provide services more specific for the machines. As it is said above, the after-sales area is often neglected by small manufacturers also because of the limited need for service of the machines produced. Anyway it is necessary an important consultancy service; it emerged that foreign customers usually need an initial explanation of the machines to productively exploit them. This service must be provided by prepared agents but also the web channel, in special cases, can supply this requirement.

Staff dedicated to service provision

The situation is different for the Italian local market. The company can **provide directly from its base the services required** such as total care maintenance packet and a basic consultancy service. In this case the standards are higher also because of the close relationships established with these customer segments. For the regional market moreover it is possible to provide evolved services from the production site. Some case studies highlighted the opportunity of developing a rental service that is managed directly by the manufacturer company. Anyway the offer of a use-oriented service from the base implies the **development of an internal activity that is not core** and must be carefully managed.

Figure 119: *small and medium producers of other machines, channels building block.*



CUSTOMER RELATIONSHIPS

The most important type of relationship to provide services is through human resources. As written in chapter 6, 13% of interviewed other machine producers do not have any distributors, and this 13% is composed of only small and medium companies. The other 87% has distributors, but 78% of these firms have multi-brand dealers with a very low control on them, and only 35% (most of them big makers) have sole agent distributors with little control because of the low dealer's percentage of sales from equipments. For these reasons small and medium machines producers should relate with customers directly by own human resources.

Personal assistance to local customers

Companies have to be steadily close to local clients. Their proximity to local customers must be exploited with **frequent direct contacts** with them. Moreover it is important to show a personal assistance at least once also to furthest clients.

Some dedicated personnel are not recommended for the scarcity of human resources in small and medium firms and the high costs not justified by high revenues. The human interaction is also relevant for consulting services.

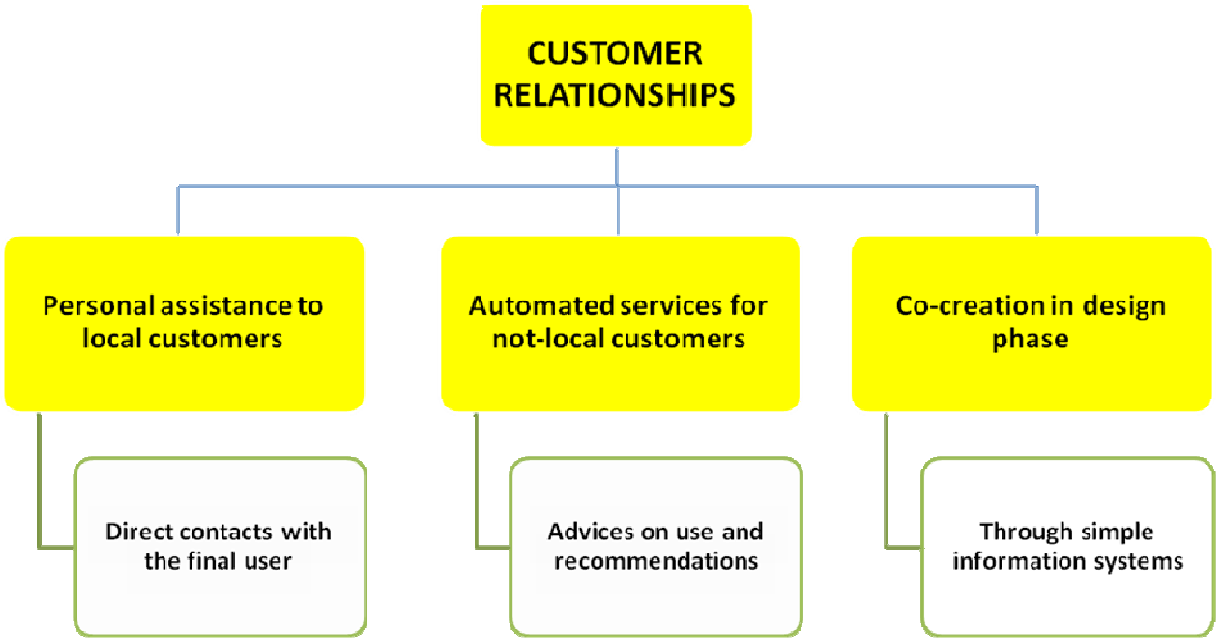
Automated services for not-local customers

After the first personal contact with further customers, information technologies and automated systems, also simple ones, are to exploit in order to interact in real time with clients, and to **provide them advices on use and recommendations**.

Co creation with customers in niche sectors

The co-creation relationship, as said previously, is important in the **design phase** for a personalization service. Moreover the effectiveness of this activity is empowered by the fact that is provided to niche sectors with specific needs. This tool should be diffusely used also **through simple information systems**.

Figure 120: *small and medium producers of other machines, customer relationships block.*



REVENUE STREAMS

The revenue streams are strictly linked to the service offered. In these sale-oriented companies the most widespread method of payment is consequently the “asset sale”. Small producers find difficulties in the implementation of an after-sale structure to provide services (the limited service need of the products does not justify from the economic point of view the development of a distribution network). Moreover the maintenance service is often provided from small repair shops or directly from the customers themselves.

The consultancy service is always provided for free, it is a common practise in the agricultural producer sector, a way to make customers faithful and a strategy in order to ensure that clients make better use of the products increasing customer satisfaction. No revenue streams come from the provision of this service.

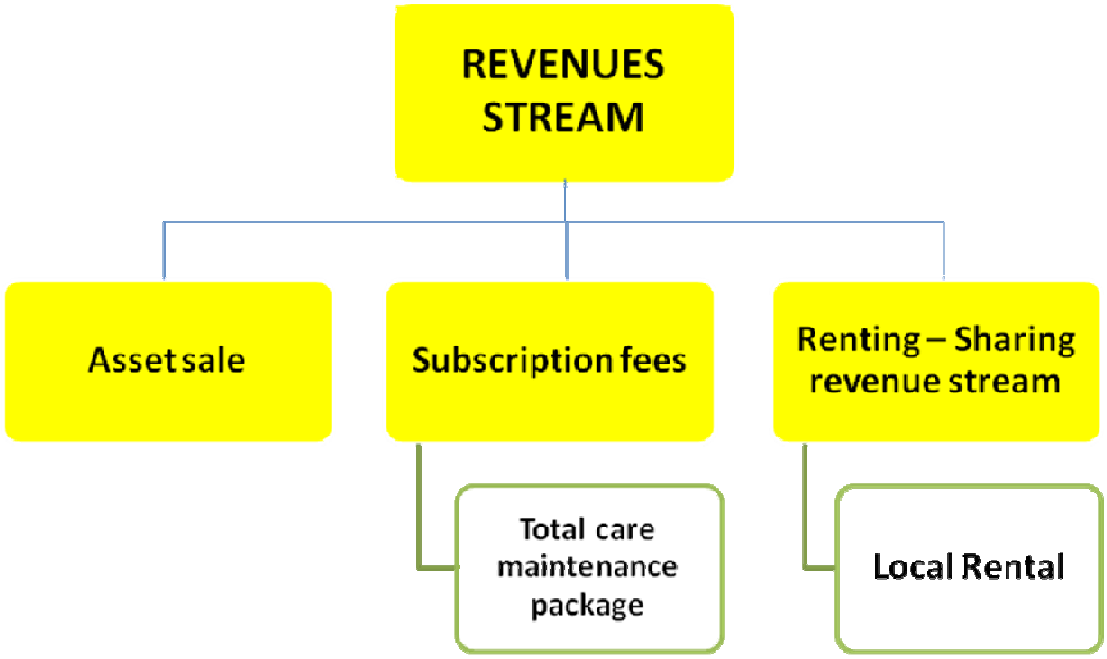
Renting – Sharing revenue stream

Case study highlight a relevant difference with the tractors producers sector. The absence of a distribution network implies that the rental service must be provided from the base – production site (it is not recommended for foreign customers). This means that small producers can exploit the “lending – renting” revenue stream that in other sectors is left to the distributors.

Subscription fees

The **total care maintenance packages** imply a subscription fee added to the asset sale. it is important to specify again that to implement this kind of service an **internal repair shop** must be developed.

Figure 121: small and medium producers of other machines, revenues stream block.



KEY RESOURCES

Medium and small companies are employing less than 250 people (the average value of the sample considered is around 35 employees), in this kind of firms the value added from the human resources appears more clearly.

Human resources

As it is said above, small producers often do not exploit the dealer network or there is the impossibility to control distributors, for these reasons human resources must play a relevant role in the interaction with customers. An efficient **team of sale agents** is required and, on the other hand, **maintenance technicians** must be prepared for the provision of the service to local customers or to foreign customers by web. Moreover human resources must generate the ideas, technological and mechanical innovation, that ensure the survival of the company.

Patents

These ideas must be protected with proper means, for this reason patents represent fundamental resources for small producers. These companies often focus their trades on innovation especially on the ones dedicated to niche sectors; it appears evident that the **exclusivity obtainable** with patents is primary to do this kind of business.

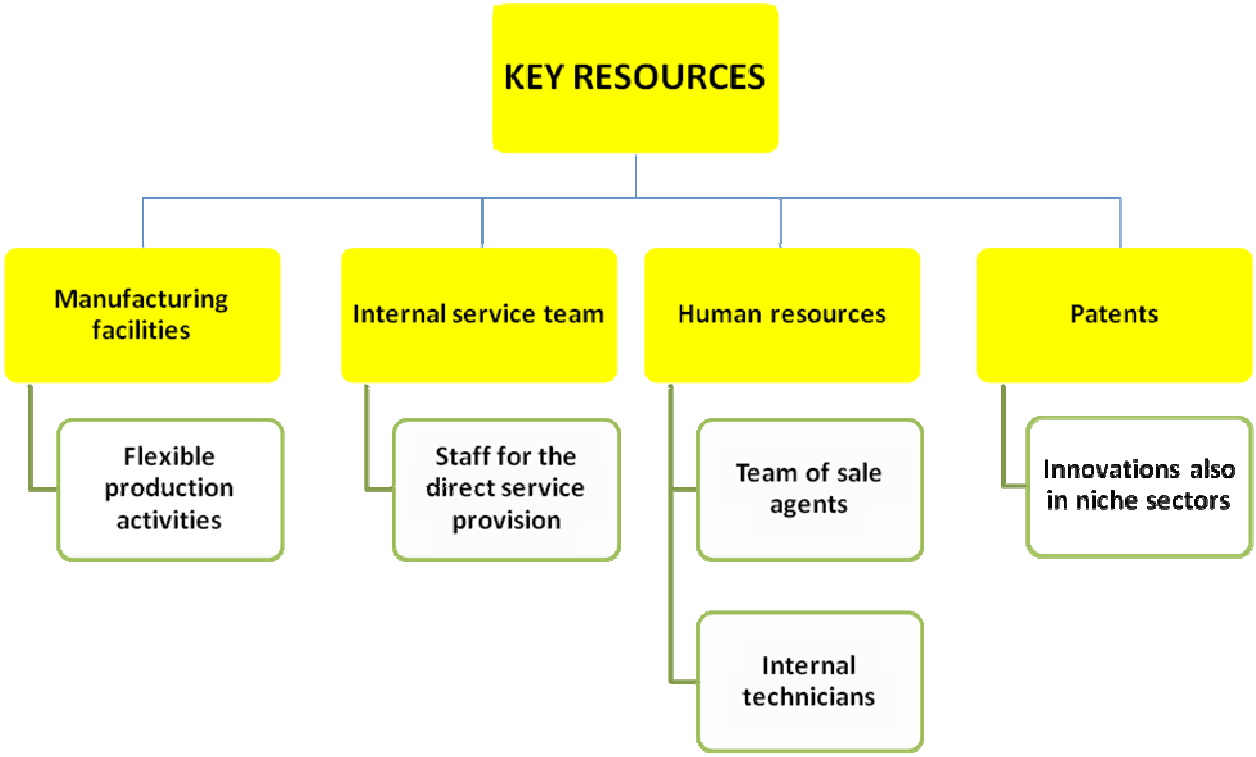
Internal service team

For service offer development, it is important the presence in firm of an **organized staff of for the service provision**. This business role is often absent in small and medium firms for the limited human resources, but it is indispensable to plan and manage service propositions.

Manufacturing facilities

Finally it is significant to focus on own manufacturing facilities. The quality of the product must be high and to achieve this aim the production know-how has to remain in-house. Moreover the customization required by local customers or by niche market clients is obtainable with **flexible production activities** that must be managed in the base.

Figure 122: small and medium producers of other machines, key resources block.



KEY ACTIVITIES

For other all machines manufacturers is obviously important to maintain their own production know-how. The quality of products is essential in a very competitive sector as the agricultural equipment one, and thus it is not recommended the always more diffused delocalized production (frequently noticed in visits and case studies). As already said, it is also appropriate to structure the production activities in order to admit a high degree of personalization in design and production phase.

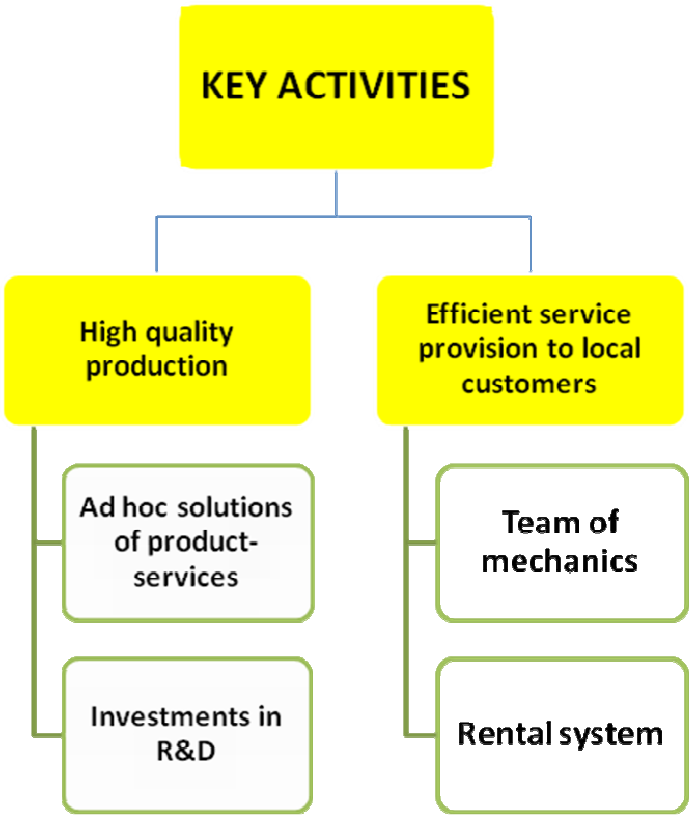
High-quality production

In this very competitive sector the quality of products has a relevant role but it reached already a very high level; the differentiation allows to increase own market share by improvements and technological ideas which solve customers' problems. Small and medium companies should exploit their higher flexibility and focus on solving problems through **ad hoc solutions of product and services** offers for niche groups of clients. These small groups very often are not served by big companies because of small revenues compared to the high fixed costs of production.

Efficient service provision to local customers

Large companies having direct sole brand or multi-brand distributors often delegate problem solving to their dealers. This is not valid for small and medium firms. The limited capacity to invest in the service provision force this company to offer services only to local customers. In order to do this they must develop a **team of mechanics** able to maintain products sold to narrow clients and a **rental system** to offer machines to local penetrable segments.

Figure 123: small and medium producers of other machines, key activities block.



KEY PARTNERSHIPS

Partnerships with suppliers are very difficult for the little use of components and raw materials due mainly to the low production rates and simple bill of materials.

Partnerships with customers in niche sectors

Companies should focus on partnerships with customers, mostly the ones belonging to niche sectors, in order to improve their personalized products - services quality and to receive some significant feedback from the market.

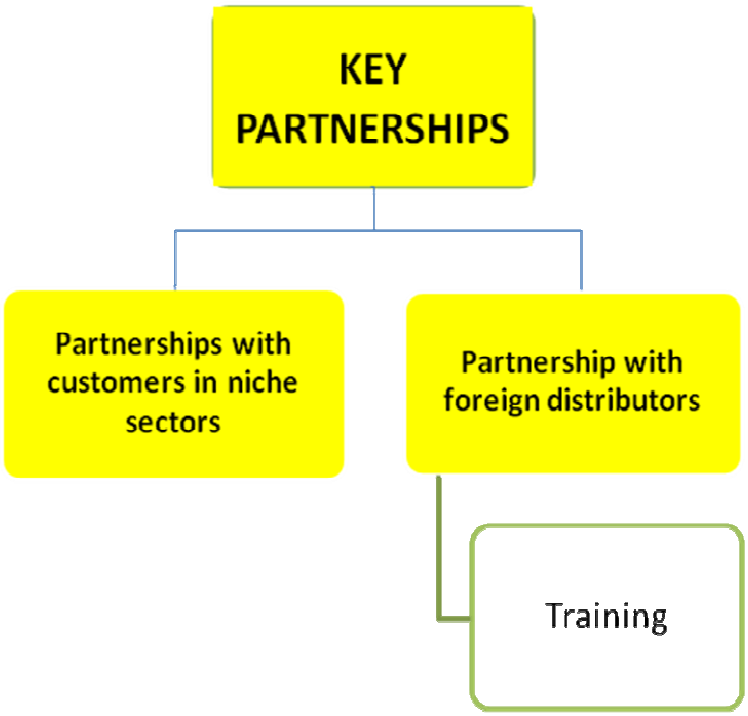
Partnership with foreign distributors

The distance separating the producers from foreign customers is requiring the establishment of deals with foreign or very far distributors. It is essential to **train them**, in order to provide maintenance services to clients abroad or difficult to reach.

About partnership with tractor or other machines producers, companies would obtain higher service standards by deals with tractor makers. This partnership, for low production rates, seems to be possible only locally and directly with single tractor dealers and not with manufacturer, and exclusively for companies producing high quality niche products locally in great demand.

During visits and cases study analysis, some partnerships were found between small or medium not competitive agricultural equipment producers. The aim of these deals is exclusively to increase the sale rates by trying to reach a machine full line offer. Companies do not have enough knowledge to provide services also for these products. Moreover in these deals it is rarely possible to re-brand not own machines.

Figure 124: small and medium producers of other machines, key partnerships block.



COST STRUCTURE

Very often, small and medium companies deliver services directly to customers. For this reason producers have more variable costs, compared to traditional manufacturers, which rise with service offer increase. However other machines producers are capital intensive firms with big asset investments and accordingly high fixed costs.

The suggested service oriented business model does not imply any relevant changes in manufacture's cost structure.

In Figure 125 it is illustrated the business model canvas for small and medium machines producers.

Figure 125: Business model canvas for other machine small and medium producers.

The Business Model Canvas: **Other machines small and medium producers**

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
❑ With customers in niche sectors ❑ With foreign distributors	❑ High quality production ❑ Efficient service provision to local customers	❑ Development of an innovative service provision structure ❑ Driving a sustainable oriented spread of services in agriculture ❑ Total care maintenance solutions ❑ Rental service ❑ Customization ❑ Incremental mechanical improvements	❑ Personal assistance to local customers ❑ Automated services for not-local customers ❑ Co-creation with customers of niche sectors	❑ Large local farms ❑ Small and medium local farms ❑ Local Contractors ❑ Niche sectors ❑ Foreign farms in developing countries
	Key Resources ❑ Manufacturing facilities ❑ Patents ❑ Internal service team ❑ Human resources		Channels ❑ Staff dedicated to service to provision ❑ Multi-brand distributors ❑ Web channel ❑ Sales force	

Cost Structure	Revenue Streams
❑ Capital intensive firm's cost structure ❑ Increased variable costs for the direct provision of the services	❑ Subscription fees from total care maintenance packages ❑ Asset sale of machines and spare parts ❑ Rental revenues: fee linked to the period

8 CONCLUSIONS

The first and fundamental conclusion that emerged, after the literature analysis and on which subsequent studies are based, is the growing need for services in western economies. There are different causes to this request. Companies are developing services to differentiate their offerings from the ones of other producers operating in nations with low labour cost. Customers are requiring advanced services to satisfy all their needs and in some sectors it is emerging the idea that service exploitation can reduce the total cost in the long term. Last but not least, the environment needs service provision development to decrease the pollution caused by the massive production activities of manufacturer companies. For this reason Product-service system can be considered as an enabler for sustainable-oriented innovation (Grosse-Dunker, 2011).

This research on the spread of services was carried out in the field of agricultural machinery manufacturers. The sector is relatively neglected in the literature and their customers seem ready to big changes in direction of service exploitation. Moreover the increasing technological level of the machines of the sector is pushing the spread of service provision to permit an efficient utilization of the products.

In this context we propose some service oriented business models for the Italian market basing the development of these and the description of the state of the art on Osterwalder framework. With the purpose of analyzing a significant part of supply chain, the study involved 31 manufacturers, 3 dealers and 2 farms. The market analysis underlines the distinction between tractor producers and other machines manufacturers. The research, based on questionnaires, telephone calls and case studies, highlights the differences between small-medium producers and large producers in terms of possibility to develop high service standards. For this reasons we developed three different business models, one for tractor producers (the data show that these manufacturers are only large companies) and two for other machines manufacturers (one for large dimension ones and one for small-medium producers).

What emerged from our research is a general lack of developed service provision structures in the sector; manufacturers are still focused on production activities and final users are rarely sustained by companies in their need for service but they refer to local dealers which receive seldom support by producers.

From this starting point and by analyzing service provision leaders of different sectors we developed the business model proposals. More in detail it is observable that manufacturers companies, even the more evolved in their offers, rarely provide services directly to final customers. Their way towards PSS is based on the implementation of a support system to a subsidiary distribution network owned by local entrepreneurs. This is explainable with the fact that they do not want to loose their core competences and that, economically speaking, the efforts to develop their own service provision structure would be too high.
The robustness of the business models proposed for large producers is demonstrated by the fact that manufacturers in similar - but more service evolved - sectors developed comparable solutions. Moreover in the research emerged that world leader companies of the agricultural sector have already started a transformation process towards the service provision that reflects partially our proposals.
The solution proposed for small-medium producers is not comparable with anyone in parallel sectors and has not been flatly adopted by any contacted firms. These companies do not have the resources to invest in technologic (electronic) improvement of their products and to develop an efficient distribution network. Moreover they face greater risk because of the entry of new competitors with lower-price products. For these reasons a more radical solution (direct provision of products and services) is suggested to them.

During our research it emerged that the application of Osterwalder framework to manufacturers companies is not simple and intuitive. The adopted model is definitely useful to partitioning the investigation in different building blocks but the solutions proposed by the author to study the strategies implemented in every block seemed not easily adjustable for the examined sector. For this reason the framework has been partially adapted and in part changed to be closer to the analyzed sector.

At some stage of our study it was discovered that the management of the service provision is often left to the distribution network. Our research focus has been consistently the analysis of producers' business models in order to improve their service structure but a subsequent analysis of the distributors was necessarily carried out. Anyway a specific study on the state of the art of the distribution system and on the improvement needed to this structure to achieve a more efficient service provision, could seamlessly integrate our work. Moreover further studies could focus mainly on the final customers, to investigate more in deep the actual market service needs.

Finally, in order to go deeper with PSS business models in agricultural sector, the niche segment of contractors could be carefully analyzed. These small and private companies offer outsourced performances to farms; their activity is the only case reported of result-oriented product-service system in the agricultural field. Actually their business models are rarely structured and formalized but their presence in the market is proof that evolved PSS can be exploited in agricultural sector.

To conclude we must say that this research – even if involved six foreign producers operating in Italy – is focused on the service provision in the national territory. A similar work may be carried forward in other countries to enlarge the sample, highlight the differences and with a greater chance to identify more best-practices for the development of PSS business models.

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Attachments:

Attachment 1: questionnaire for agricultural equipment manufacturers

Case Study Category and Structure	**Particulars**	**Questions**
Overview	Firm dimension	1. How many people are now employed in your company? • **Less than 50** • **51-250** • **More than 250** 2. What was the amount of your revenues last year? • **Less than 7 million €** • **7-40 million €** • **More than 40 million €** 3. What is the percentage of revenues coming out from services? • **Less than 5%** • **5-30%** • **More than 30%**
Services enabling a product-service system (PSS)	Service offered	4. What type of services connected to your products do you offer to your customers? (*check one or more*) • **Maintenance** • **Renting**

		• **Consultancy** • **Pay per use (Total care)** • **Leasing** • **(Others)**
	Product ownership	5. What percentage of your installed base (products) is owned by your company after the transaction with the customer? • **0%** • **0-5%** • **5-20%** • **More than 20%** 6. Among your offers to the customers, do you always sell the ownership of your products? • **Yes** • **No** **Comments:**
Business Model Front (Osterwalder model blocks)	Customer segments	7. Do you offer the same products-services for every customer or a different offer for specific customer segments? • **Offers for every segment** • **Standard offer for every segment**
	Value proposition	8. Which are the most relevant values in your product-service offer that

		you want to deliver to your customers? *(Check max 3)* • **Newness** (First or unique offer to satisfy new customer needs) • **Performance** (Improving previous performance of an existing offer) • **Customization** (Tailoring offer to the needs of an individual customer) • **'Getting the job done'** (Offering to customers everything they need to help them to get a certain job done –as in outsourcing-) • **Design** (style) • **Brand** • **Price** (Offering something already existing at a lower price) • **Cost reduction** (Helping customers reducing their variable and fixed costs) • **Risk reduction** (Helping customers reducing their risk – e.g. risk of breakdown-) • **Accessibility** (business model to make products and services available to customers who previously lacked access to them – e.g. 'car sharing' to make people drive without buying a car-) • **Convenience / usability** (making things easier to use)
	Channels	9. How do you sell your product-service to your customers, using which channels? *(check one or more)*

		• **Sales Force** • **Web sales** • **Sole agent distributors** • **Multi-brand distributors** 10. How many dealers/resellers are composing your distribution network in Italy? • **0 – 10** • **11 – 50** • **51 – 150** • **More than 150**
	Customer relationship	11. What type of relationship do your customers expect you to establish and maintain with them? *(check one or more)* • **Personal assistance** (human interaction) • **Dedicated personnel** (dedicated staff to each customer) • **Self-service** (customer help themselves) • **Automated services** (self service with customized services -e.g. log-in online-) • **Communities** (Forum to connect to customers and to make customer connected between them) • **Co-creation** (create and design together with customers)
	Revenue streams	12. How are your customers paying your product-services? *(Check one or more)* • **Asset sale** (buying the ownership of

		a physical product) • **Usage fee** (The more a service is used the more the customer pays) • **Subscription fees** (Buying continuous access to a product-service –e.g. fixed monthly fee) • **Lending – Renting – Leasing** (temporarily granting someone the exclusive right to use a particular asset for a fixed period in return for a fee linked to the period)

Business Model Back (Osterwalder model blocks)	Key resources	13. Which are the most important assets required to make your business model work? *(Check max 2)* • **Manufacturing facilities** • **Buildings** • **Distribution network** • **Patents-copyrights** • **Brand** • **Human resources**
	Key activities	*14.* On what are the most relevant activities focused in your business model? *(Check one)* • **Production** • **Problem solving**
	Key partnerships	15. Did you establish any partnership with suppliers, customers or others? • **Yes** • **No** 16. What are their roles in your business model?
	Cost structure	17. What kind of costs are the most relevant in your business model? *(Check one)* • **Fixed** • **Variable** 18. If you shifted from product sale to an integrated product-service offer,

		did you notice any relevant changes in these two categories of costs? • **Yes** • **No** • **Not shifted** **Comments:**

Sustanibility		19. What does sustainability mean to your company?
		20. How does sustainability affect your company's business model? 21. Is there in your company a formal process for developing a sustainable business model? • **Yes** • **No** • **Not yet** **Comments:**
		22. What are the challenges and barriers to implement sustainability initiatives?
		23. Do you see sustainability as an opportunity for value creation? • **Yes**

		• **No** **Comments:**

Attachment 2: questionnaire for dealers network

Overview	1. What kind of products are involved in your business? • **Tractors** • **Machines** • **Both**
	2. Are you one-firm or multi-firm dealer? • **One-firm** • **Multi-firm**
	3. How many people are now employed / what are the revenues of your company?
	4. What percentage of the revenues comes from services?
Service	5. What kind of services do you offer to your customers?
	6. What kind of help do you receive from the

	manufacturer companies?
	7. How are your customers paying for your product-services? • **Asset sale** (buying the ownership of a physical product) • **Usage fee** (The more a service is used the more the customer pays) • **Subscription fees** (Buying continuous access to a product-service –e.g. fixed monthly fee) • **Lending – Renting – Leasing** (temporarily granting someone the exclusive right to use a particular asset for a fixed period in return for a fee linked to the period)
Rental – Total care	8. What kind of product do you offer for rent?
	9. What barriers and challenges do you see to the spread of rental-total care?

Attachment 3: Questionnaire for farms

Overview	1. How many people are now employed in your company?
	2. How many acres are cultivated by your company?
	3. What products are cultivated in your

	company?
	4. How many units your fleet consist of?
Service	5. What services do you require on tractors – machines?
	6. Are you satisfied of the service level you receive?
Use/result oriented PSS	7. Have you ever rented some equipment / outsourced an activity?
	8. What barriers and challenges do you see to the spread of rental/total care?

Attachment 4: Schematized answers of manufacturers' questionnaires:

Nome Azienda:	1. Quanti dipendenti sono al momento assunti in azienda?	2. Qual è stato l'ammontare del fatturato nell'ultimo bilancio?	3. Quanta parte del vostro fatturato deriva dall'area Service?	4. Quali servizi connessi ai vostri prodotti offrite ai clienti?
G*********	Da 51 a 250	Tra 7 e 40 milioni di €	Minore del 5%	Manutenzione
C*******	Più di 250	Maggiore di 40 milioni di €	Minore del 5%	Manutenzione
A*******	Più di 250	Maggiore di 40 milioni di €	Minore del 5%	Manutenzione
F**	Da 51 a 250	Tra 7 e 40 milioni di €	Minore del 5%	Manutenzione
M******	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione
G*******	Meno di 50	Minore di 7 milioni di €	Dal 5 al 10%	Manutenzione , Consulenza
B******	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione
F*******	Da 51 a 250	Tra 7 e 40 milioni di €	Dal 5 al 10%	Manutenzione , Consulenza
R*******	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione
O******	Meno di 50	Minore di 7 milioni di €	Dal 5 al 10%	Manutenzione , Consulenza
I******	Meno di 50	Tra 7 e 40 milioni di €	Minore del 5%	Manutenzione , Noleggio , Consulenza
M******	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione, Consulenza
W****	Più di 250	Maggiore di 40 milioni di €	Dal 10 al 30%	Manutenzione , Consulenza
I**	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione
B******	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione
S*******	Più di 250	Maggiore di 40 milioni di €	Dal 10 al 30%	Manutenzione
A**********	Più di 250	Maggiore di 40 milioni di €	Dal 10 al 30%	Manutenzione
B*******	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione, Consulenza
O*********	Meno di 50	Minore di 7 milioni di €	Dal 5 al 10%	Manutenzione
K******	Più di 250	Maggiore di 40 milioni di €	Minore del 5%	Manutenzione , Consulenza
B*********	Meno di 50	Minore di 7 milioni di €	Dal 5 al 10%	Manutenzione , Consulenza
G********	Meno di 50	Minore di 7 milioni di €	Minore del 5%	Manutenzione , Consulenza
A**********	Da 51 a 250	Tra 7 e 40 milioni di €	Minore del 5%	Manutenzione
C**********	Più di 250	Maggiore di 40 milioni di €	Minore del 5%	Manutenzione , Noleggio , Consulenza

M**********	Più di 250	Maggiore di 40 milioni di €	Minore del 5%	Manutenzione , Consulenza
R**********	Più di 250	Maggiore di 40 milioni di €	Minore del 5%	Manutenzione , Consulenza
A**********	Più di 250	Maggiore di 40 milioni di €	Minore del 5%	Manutenzione
J*******	Più di 250	Maggiore di 40 milioni di €	Dal 10 al 30%	Manutenzione , Consulenza
F**********	Da 51 a 250	Tra 7 e 40 milioni di €	Minore del 5%	Manutenzione
S*******	Meno di 50	Minore di 7 milioni di €	Dal 5 al 10%	Manutenzione
F******	Da 51 a 250	Tra 7 e 40 milioni di €	Dal 5 al 10%	Manutenzione , Consulenza

Nome Azienda:	5. Di quale percentuale della vostra base installata (parco macchine) mantenete la proprietà dopo la transazione con il cliente?	6. Tutte le vostre offerte ai clienti prevedono la vendita della proprietà di un vostro bene?	7. Offrite lo stesso prodotto-servizio ad ogni cliente o proponete offerte diverse per segmenti specifici di clienti? (es. offerte diversificate per agricoltori diretti e contoterzisti)
G*********	0%	Sì	Offerte standard
C*******	0%	Sì	Offerte per ogni segmento
A*******	0%	Sì	Offerte standard
F**	0%	Sì	Offerte standard
M******	0%	Sì	Offerte standard
G*******	0%	Sì	Offerte per ogni segmento
B******	0%	Sì	Offerte standard
F*******	0%	Sì	Offerte per ogni segmento
R*******	0%	Sì	Offerte standard
O******	0%	Sì	Offerte per ogni segmento
I******	0%-5%	No	Offerte per ogni segmento
M******	0%	Sì	Offerte per ogni segmento
W****	0%	Sì	Offerte standard
I**	0%	Sì	Offerte per ogni segmento

B******	0%	Sì	Offerte standard
S*******	0%	Sì	Offerte per ogni segmento
A***************	0%	Sì	Offerte per ogni segmento
B*******	0%	Sì	Offerte per ogni segmento
O*********	0%	Sì	Offerte per ogni segmento
K******	0%	Sì	Offerte per ogni segmento
B*********	0%	Sì	Offerte standard
G********	0%	Sì	Offerte per ogni segmento
A**********	0%	Sì	Offerte per ogni segmento
C**********	0%	Sì	Offerte per ogni segmento
M**********	0%	Sì	Offerte per ogni segmento
R**********	0%	Sì	Offerte per ogni segmento
A***********	0%	Sì	Offerte per ogni segmento
J*******	0%	Sì	Offerte per ogni segmento
F**********	0%	Sì	Offerte per ogni segmento
S*******	0%	Sì	Offerte per ogni segmento
F******	0%	Sì	Offerte per ogni segmento

Nome Azienda:	8. Quali sono i valori effettivi più significativi nella vostra offerta che volete ai vostri clienti?
G*********	PERFORMANCE (Migliorate le performance di offerte già esistenti), BRAND (marchio)
C*******	CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), BRAND (marchio), USABILITY (rendere un prodotto più facile da utilizzare)
A*******	CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), BRAND (marchio), PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore)
F**	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente)
M******	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente)
G*******	CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), RISK REDUCTION (aiutate i clienti a ridurre i loro rischi –come il rischio di break down-), USABILITY (rendere un prodotto più facile da utilizzare)
B******	PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore), USABILITY (rendere un prodotto più facile da utilizzare)
F*******	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), RISK REDUCTION (aiutate i clienti a ridurre i loro rischi –come il rischio di break down-)

R*******	PERFORMANCE (Migliorate le performance di offerte già esistenti), BRAND (marchio), PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore)
O******	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)
I******	PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore)
M******	DESIGN (stile), BRAND (marchio), RISK REDUCTION (aiutate i clienti a ridurre i loro rischi –come il rischio di break down-)
W****	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), 'GETTING THE JOB DONE' (Offrite ai clienti tutto quello di cui necessitano per effettuare una certa attività –come avviene nell'outsourcing-)
I**	PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)
B******	PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore)
S*******	CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), DESIGN (stile), PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore)
A***************	PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), BRAND (marchio)
B*******	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), BRAND (marchio)
O*********	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore)
K******	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)
B*********	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), DESIGN (stile)
G********	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente)
A**********	PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), USABILITY (rendere un prodotto più facile da utilizzare)
C**********	CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), BRAND (marchio), RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)
M**********	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), USABILITY (rendere un prodotto più facile da utilizzare)
R**********	BRAND, PREZZO (Offrite qualcosa che già esiste ma ad un prezzo inferiore), RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)
A**********	PERFORMANCE (Migliorate le performance di offerte già esistenti), BRAND, RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)
J*******	PERFORMANCE (Migliorate le performance di offerte già esistenti), BRAND (marchio), RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)
F**********	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente)
S*******	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente), RIDUZIONE DEI COSTI (aiutate i clienti a ridurre i loro costi fissi o variabili)

F******	NOVITA' (siete i primi a soddisfare nuove esigenze nei clienti.), PERFORMANCE (Migliorate le performance di offerte già esistenti), CUSTOMIZATION (Personalizzate l'offerta per i bisogni specifici di un singolo cliente)

Nome Azienda:	9. Quali canali utilizzate per vendere il vostro prodotto servizio?	10.Quanti distributori/rivenditori compongono la vostra rete distributiva?	11.Che tipo di relazioni stabilite e mantenete con i vostri clienti?	12. Come vi fate remunerare dai vostri clienti?
G*********	Distributori multimarca	51-100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
C*******	Distributori monomarca	più di 100	Assistenza personale (con interazione umana), Co-creazione (creare e progettare un prodotto-servizio insieme al cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
A*******	Distributori monomarca, Distributori multimarca	più di 100	Assistenza personale (con interazione umana), Co-creazione (creare e progettare un prodotto-servizio insieme al cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
F**	agenti di vendita , Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
M******	Distributori multimarca	più di 100	Assistenza personale (con interazione umana), Co-creazione (creare e progettare un prodotto-servizio insieme al cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
G*******	agenti di vendita , Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
B******	Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
F*******	agenti di vendita , Distributori monomarca	11-50	Personale dedicato (staff dedicato per ogni cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
R*******	agenti di vendita , Distributori multimarca	51-100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
O******	agenti di vendita , Vendita tramite web	no distributori	Assistenza personale (con interazione umana), Co-creazione (creare e progettare un prodotto-servizio insieme al cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)

I******	agenti di vendita , Distributori multimarca	11-50	Personale dedicato (staff dedicato per ogni cliente), Co-creazione (creare e progettare un prodotto-servizio insieme al cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico) , Noleggio - leasing (Garantire temporaneamente l'uso esclusivo di un prodotto-servizio per un periodo prefissato di tempo pagando in relazione al periodo)
M******	Distributori monomarca, Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
W****	agenti di vendita , Distributori monomarca	no italia	Personale dedicato (staff dedicato per ogni cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
I**	agenti di vendita , Distributori monomarca, Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
B******	agenti di vendita , Vendita tramite web, Distributori monomarca, Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
S*******	Distributori monomarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
A**********	agenti di vendita , Distributori monomarca, Distributori multimarca	più di 100	Assistenza personale (con interazione umana), Personale dedicato (staff dedicato per ogni cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
B*******	agenti di vendita , Distributori multimarca	51-100	Assistenza personale (con interazione umana), Personale dedicato (staff dedicato per ogni cliente), Co-creazione (creare e progettare un prodotto-servizio insieme al cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
O*********	agenti di vendita , Distributori multimarca	51-100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
K******	Distributori monomarca, Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
B*********	Distributori monomarca,	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di

	Distributori multimarca			un prodotto fisico)
G********	agenti di vendita , Vendita tramite web, Distributori monomarca, Distributori multimarca	più di 100	Assistenza personale (con interazione umana), Personale dedicato (staff dedicato per ogni cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
A**********	agenti di vendita , Distributori multimarca	51-100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
C**********	Distributori monomarca	0-10	Assistenza personale (con interazione umana), Personale dedicato (staff dedicato per ogni cliente), Servizi automatici (self service con servizi personalizzati- a seguito di un log in) , Communities (forum per relazionarsi con i clienti permettendo agli stessi di interagire tra loro), Co-creazione (creare e progettare un prodotto-servizio insieme al cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
M**********	agenti di vendita , Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
R**********	Distributori multimarca	no italia	Assistenza personale (con interazione umana), Personale dedicato (staff dedicato per ogni cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
A**********	Distributori multimarca	più di 100	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
J*******	Distributori monomarca	11-50	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
F**********	Distributori multimarca	51-100	Assistenza personale (con interazione umana), Personale dedicato (staff dedicato per ogni cliente)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
S*******	agenti di vendita	no distributori	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)
F******	agenti di vendita	no distributori	Assistenza personale (con interazione umana)	Vendita di un prodotto (acquisto della proprietà di un prodotto fisico)

Nome Azienda:	13. Quali sono le	14. Su quali attività si	15. Avete	16. Se sì, qual è il loro ruolo nel vostro modello di business?

	risorse principali per far in modo che il vostro modello di business possa funzionare?	focalizza maggiormente il vostro modello di business?	stabilito partnership con fornito, clienti o altre aziende?	
G*********	Rete di distribuzione , Brevetti-copyright	Produzione	Sì	con azienda kverneland
C*******	Impianti di produzione, Rete di distribuzione	Production	Sì	clienti che testano macchine
A*******	Impianti di produzione, Rete di distribuzione	Produzione	Sì	fornitura motori e componenti e Daedong per trattori
F**	Impianti di produzione, Rete di distribuzione	Produzione	Sì	fornitura di prodotti finiti
M******	Impianti di produzione, Risorse umane	Produzione	No	no partnership
G*******	Rete di distribuzione , Brevetti-copyright	Produzione	No	no partnership
B******	Risorse umane	Produzione	No	no partnership
F*******	Impianti di produzione, Rete di distribuzione	Produzione	Sì	per proposte tecnologiche e con fornitori per just in time
R*******	Impianti di produzione, Rete di distribuzione	Produzione	Sì	per organizzare approvvigionamenti e vendite
O******	Brevetti-copyright, Risorse umane	Problem solving	No	no partnership
I******	Impianti di produzione, Rete di distribuzione	Produzione	Sì	Con clienti chiave la collaborazione è fondamentale per l'analisi delle richieste del mercato. Con i fornitori invece la relazione è volta alla messa a punto del prodotto.

M******	Impianti di produzione, Rete di distribuzione	Produzione	No	no partnership
W****	Rete di distribuzione , Brand	Problem solving	Sì	Clienti: sviluppo di nuovi macchinari e test dei prototipi Fornitori: no
I**	Rete di distribuzione , Risorse umane	Produzione	Sì	niente di rilevante
B******	Impianti di produzione, Brevetti-copyright	Produzione	No	no partnership
S*******	Impianti di produzione, Rete di distribuzione	Produzione	Sì	DROP SHIPMENT e kverneland RE-BRANDING
A********** ***	Rete di distribuzione , Brand	Produzione	Sì	niente di rilevante
B*******	Impianti di produzione, Brand	Produzione	Sì	fornitura di semilavorati
O*********	Rete di distribuzione , Risorse umane	Produzione	Sì	Fornitori: ci forniscono tutto il materiale inerente alla ns. produzione, all'interno del ns. stabilimento assembliamo solamente il materiale tutto il resto delle lavorazioni le effettuano i ns. fornitori con i quali lavoriamo da molti anni e abbiamo un'ottima collaborazione Clienti: la ns. rete di vendita si sviluppa principalmente attraverso i concessionari di zona, raramente vendiamo direttamente all'utilizzatore delle attrezzatura di ns. produzione. La ricerca di nuovi clienti e la fidelizzazione di quelli esistenti è alla base del nostro lavoro tutti i giorni.
K******	Rete di distribuzione , Brevetti-copyright	Production	Sì	con il distributore principale e same per trattori e raggiungimento full line, e ora con kubota
B*********	Brevetti-copyright, Brand	Problem solving	No	nessuna partnership
G********	Impianti di produzione, Rete di distribuzione	Produzione	No	no partnership
A**********	Rete di distribuzione , Risorse umane	Produzione	Sì	Fornitori: collaborazione per riduzione di sprechi e miglioramento qualitativo del prodotto (az. kamban-coprogettazione) Clienti: az. di comarketing
C**********	Rete di	Produzione	Sì	distributori esclusivi nel mondo, società

	distribuzione , Brand			informatiche per sviluppo sistema informativo e monitoraggio in tempo reale.
M**********	Impianti di produzione, Brand	Produzione	Sì	con fornitori
R**********	Manufacturing facilities, Distribution network	Produzione	Sì	Our closes customers are dealers of our products.
A**********	Manufacturing facilities, Distribution network	Produzione	Sì	Suppliers are key to supporting our demad with quality components ,integrated flly in our product that meet the needs of final customers.
J*******	Rete di distribuzione , Brand	Produzione	Sì	per full line consigliare aratri
F**********	Impianti di produzione, Brand	Produzione	No	nessuna partnership
S*******	Edifici , Rete di distribuzione	Produzione	Sì	Con le primarie aziende vitvinicole (Antinori, Ruffino etc.) sono accesi dei progetti di sviluppo in partnership di nuove macchine di tipo innovativo.
F******	Brevetti-copyright, Risorse umane	Produzione	Sì	• Controllo per migliorare la qualità di Produzione • Analisi per semplificare la Produzione

Nome Azienda:	17. Quale tipo di costi è più rilevante per il vostro modello di business?	18. Se siete passati dalla vendita di un prodotto alla vendita di un' offerta integrata prodotto-servizio avete notato rilevanti cambiamenti per la vostra struttura di costo?	19. Cosa significa per la vostra compagnia la sostenibilità?	20. In che modo la sostenibilità influenza il vostro business model?
G*********	Costi variabili	Non passati	non ne ho idea	in nessun modo
C*******	Costi fissi	Non passati	conformità alla normativa	progettazione per conformità normative
A*******	Costi fissi	Non passati	sicurezza dei dipendenti	nessuno
F**	Costi fissi	Non passati	Non so	nessun modo
M******	Costi variabili	Non passati	sicurezza lavoratori	sicurezza sul lavoro e produzione macchine

				passive (trainate, a basso impatto ambientale)
G*******	Costi fissi	Non passati	offrire prodotti che migliorino qualità della vita e ambiente	producendo prodotti ecosostenibili e che non danneggino la salute dei clienti
B******	Costi variabili	Non passati	Non ne ho idea	in nessuno
F*******	Costi fissi	Sì	percorso di crescita aziendale in linea con lo sviluppo del settore	raggiungere un livello di crescita adeguato
R*******	Costi fissi	Non passati	Normale attività lavorativa durevole nel tempo con relativo flusso economico, miglioramento delle condizioni lavorative, ambientali e sociali	in nessun modo
O******	Costi fissi	Non passati	ambientale e sociale: diserbo meccanico e non chimico, vendere in paesi in via di sviluppo portando innovazione nelle lavorazioni.	distribuire in paesi in via di sviluppo
I******	Costi variabili	No	Ambientale per controllo consumo acqua	in nessun modo
M******	Costi fissi	Non passati	Produrre macchine di qualità utilizzando meno risorse. P.es.Una macchina che ha le stesse prestazioni e qualità di un'altra ma che si costruisce utilizzando meno materie prime. Oppure la autoproduzione di energia elettrica mediante impianto fotovoltaico.	in nessun modo
W****	Costi variabili	No	Contribuire al successo dei nostri clienti con prodotti e servizi innovativi, con processi snelli e con collaboratori qualificati.	Processi specifici per migliorare la qualità dei prodotti e progetti nei quali ogni collaboratore ha la possibilità di apportare le migliorie che ritiene opportuno, che vengono valutate ed eventualmente remunerate.
I**	Costi variabili	Non passati	non ne ho idea	in nessun modo
B******	Costi fissi	Non passati	produrre attrezzature per agricoltura conservativa	nella progettazione e produzione
S*******	Costi fissi	Non passati	ambientale ed economica	in progettazione trattore riciclabile al 99%
A**********	Costi fissi	No	non so	in nessun modo
B*******	Costi fissi	Non passati	capacità di diversificare l'offerta senza gravare sul costo e sull'ambiente	è determinante
O*********	Costi fissi	No	sostenibilità economica	garantire sopravvivenza azienda in periodo di crisi

K******	Costi fissi	Non passati	diminuire i consumi e gli sprechi dei clienti	offerte innovative sostenibili
B*********	Costi variabili	Non passati	economica, sopravvivenza azienda	in nessun modo
G********	Costi fissi	Non passati	ambientale, diminuire inquinamento	in produzione per diminuire impatti ambientali
A**********	Costi fissi	Non passati	sostenibilità = crescita della redditività operativa valorizzando il capitale umano e nel rispetto del sistema ambientale	diventanone l'obiettivo
C**********	Costi fissi	Sì	puntare sulle riparazioni e allungare così la vita del prodotto il più possibile. diminuire le emissioni, sprechi e consumi con consulenze attraverso il continuo monitoraggio satellitare in remoto e in tempo reale di ogni singola macchina venduta o noleggiata.	il nostro business model è tutto incentrato sull'offerta di servizi ai clienti che vanno nella direzione di aumentare la sostenibilità ambientale.
M**********	Costi fissi	Non passati	non ne ho idea	sostenibilità economica
R**********	Costi fissi	Sì	I think it's about permanent growth on the traditional and new markets.	New models, new equipment, new markets, quality improvements and so on.
A**********	Costi fissi	Non passati	Efficient management and conservation of resources employed at all steps of the supply chain from our initial creation of a product to the customers own use of our product.	It drives us to be more efficient and think more efficiently.
J*******	Costi fissi	Non passati	ambientale ed economica	in progettazione e riducendo i consumi, garantendo sostenibilità economica ai concessionari
F**********	Costi fissi	Non passati	non so	in nessun modo
S*******	Costi variabili	Non passati	Uno sviluppo basato sul buon senso.	Nelle scelte sugli investimenti.
F******	Costi fissi	Non passati	Attualmente c/o la FAE Group è attivo il servizio di utilizzo di energia proveniente da fonti rinnovabili tramite la Società fornitrice Trenta.	Tale livello di sostenibilità non influenza direttamente la Produzione ma ne è comunque collegata.

Nome Azienda:	21. Esiste un processo formalizzato per	22. Quali sono le sfide e le barriere per implementare iniziative di sostenibilità?	23. Vedete la sostenibilità come un'opportunità per creare	Settore

	sviluppare un modello di business sostenibile?		valore?	
G*********	No	barriere culturali del cliente	Non so	other machines
C*******	No	valore aggiunto poco riconosciuto dal mercato	No	traction and power
A*******	No	barriere culturali del cliente	No	traction and power
F**	No	barriere culturali del cliente	No	other machines
M******	Non ancora	barriere culturali del cliente. spesso solo se sovvenzioni europee.	Sì	other machines
G*******	Non ancora	mancanza di capitali finanziari e risorse umane di eccellenza per sviluppare prodotti innovativi	Sì	other machines
B******	Non ancora	barriere culturali del cliente	No	other machines
F*******	Non ancora	sfide di innovazione tecnologica. barriere di costo della ricerca e sviluppo	Sì	other machines
R*******	No	barriere economiche, culturali, non riconosciuto dal mercato: Mancanza di liquidità (qualunque attività diversa dalla normale produzione è principalmente considerata un costo), ad oggi la clientela non ha colto il maggior valore di quei beni prodotti con un'attenzione particolare alla sostenibilità. Gli stessi pannelli fotovoltaici (ad oggi il più chiacchierato fattore di sostenibilità) sono installati non per la ricerca di un minor impatto ambientale ma in primis per un tornaconto economico considerevole	Sì	other machines
O******	No	barriera economica	No	other machines
I******	No	non so	Sì	other machines
M******	No	La principale barriera è che la nostra clientela in molti casi non è ancora ricettiva relativamente a "prodotti che hanno minor impatto ambientale". Molto, soprattutto in un momento di crisi come l'attuale, è legato al prezzo. Spesso è richiesta la marca che costa meno o comunque una di quelle che costano meno, se poi è costruta p.es. in una ditta che inquina il doppio di un'altra, il cliente normale non lo sa e soprattutto, se anche lo sapesse, per lo più non se ne interesserebbe.	Non so	other machines

		La sfida potrebbe essere nel costruire macchine che, utilizzando meno risorse, meno materie prime ecc. ecc.possano anche, a parità di qualità, costare meno rispetto a prima aumentando di conseguenza la loro competitività sul mercato.		
W****	Sì	Processi interni non sufficientemente snelli e produzione poco flessibile.	Sì	other machines
I**	No	Il mondo agricolo che comunque rimane un mondo dove si ruota molto sul prezzo più che sull'offerta	Sì	other machines
B******	No	barriere culturali	No	other machines
S*******	Non ancora	costi maggiori non riconosciuti dal cliente	Non so	traction and power
A**********	No	non è riconosciuta dal mercato	No	traction and power
B*******	No	non so	Sì	other machines
O*********	No	barriere culturali del cliente	No	other machines
K******	No	diffondere i nostri prodotti sostenibili, barriere culturali clienti e distributori	Sì	other machines
B*********	Non ancora	barriere culturali del cliente	Non so	other machines
G********	Non ancora	non so	Non so	other machines
A**********	Sì	non so	Sì	other machines
C**********	No	barriere culturali del cliente. come sfide diffondere i servizi in paesi in via di sviluppo (Africa)	Sì	traction and power
M**********	Non ancora	barriere culturali del cliente	Sì	other machines
R**********	Sì	mentality, origin, barriers between department	Sì	traction and power
A**********	Sì	Internal understanding and communication	Sì	traction and power
J*******	Non ancora	il mercato non lo riconosce, culturali	Sì	traction and power
F**********	No	non so	Non so	other machines

S*******	No	non so	Non so	other machines
F******	Non ancora	Le barriere all'implementazione delle future attività di sostenibilità da implementare in FAE sono poche; l'unico vincolo ad oggi è definire gli obiettivi più consoni per la FAE group	Sì	other machines