A TAXONOMY OF BUSINESS PROCESSES

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Abstract

This study aims to gain a better understanding of key business processes. The processes of the firm are analyzed, proposing a classification of eight generic intra-organizational processes, and eleven generic inter-organizational processes, as well as criteria for the determination of the criticality of these processes and key performance indicators. Using these criteria critical intra-organizational and inter-organizational processes are identified in sixteen industrial sectors. Five of the sectors are analyzed in greater detail, providing case-studies in Spain and Latin America. Through a better understanding of key processes and network relations enterprises can develop competitive advantages that leverage their survival and well being.

Keywords

Business processes, inter-organizational, intra-organizational, performance metrics, critical processes

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INTRODUCTION

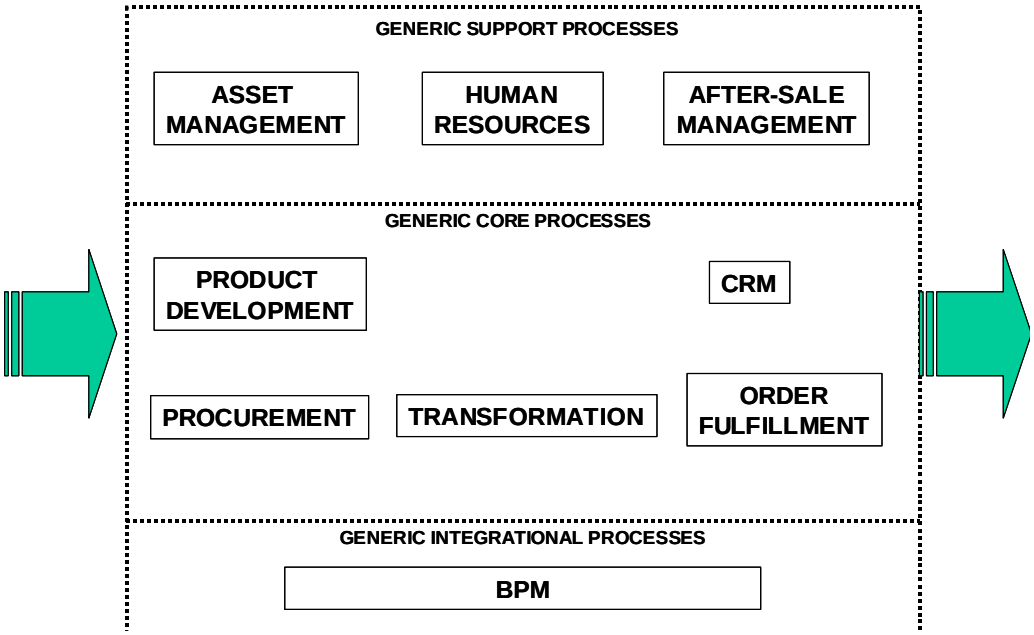
This study aims to gain a better understanding of key business processes. The processes of the firm are analyzed, proposing a classification of eig ht generic intra-organizational processes, and eleven generic inter-organizational processes, as wel l as cri teria for the determination of the criticality of these processes and key performance indicators. Using these criteria critical intra-organizational and inter-organizational processes are identified in six teen industrial sectors. Five of the sectors are analyzed in greater detail, providing case-studies in Spain and Latin America.

GENERIC INTRA-ORGANIZATIONAL PROCESSES

A process is defined by Davenport and Short (1990) as "a set of logically related tasks performed to achieve a defined business outcome". Processes, a set of which form a business unit, have customers, cross organizational boundaries and are generally independent of formal organizational structures. But processes can be defined in many different ways. Maddern et al (2004), describe a hierarchy of business processes in a bank, for ex ample 'Deliver Sales and Service' is broken down into manage sales, deliver transactions, chang e service, manag e information and control borrowing ; and these in turn are decompose in over 100 operational business processes.

We have identified eight generic intra-organizational business processes (F igure 1). These processes are g rouped in three ty pes: core, support and integ rational business processes (Curran and Ladd, 2000; Malone at al, 2000; Radjou, 2003; L ambert, Cooper, and Pag h, 1998). Core processes are those directly related to the objectives of the company, support processes those indirectly related to the objectives of the company, and an integrational processes is one that g uaranties the integ ration and coherence of other processes, i.e., Business Process Management and Total Quality Management. Table 1 summa rizes the key activities of each process, which are described in turn below.

Figure 1. Generic intra-organizational processes



Product Development: a generic core process responsible for developing a product or product subsystem. This process is undertaken by a team of representatives from distinct functional areas (e.g. marketing, engineering, manufacturing, finance, procurement, and quality). The key activities of the product development process encompass: innovation and portfolio management, project and program management, product data management, engineering change management, design (formulation, risk and reliability analysis, costing), and specification management. This process becomes critical for a company in environments of short product lifecycles and/or when the product or service to be designed presents high levels of complexity. The key performance indicator for this process is response time (see Table 2 in the key performance metrics section).

Table 1. Generic Intra-organizational Business Processes

Process	Key Activities	Attributes
Product Development	▪ Design (formulation, risk and reliability analysis, costing) ▪ Engineering change mgmt. ▪ Specification mgmt. ▪ Portfolio mgmt.	Core
Procurement	▪ Purchase ▪ Payment Cycle ▪ Inbound Logistics ▪ Supplier performance mgmt ▪ Purchasing order administrative processing	Core
Order Fulfillment	▪ Demand Planning ▪ Order administrative processing ▪ Product Delivery ▪ Distribution ▪ Transportation ▪ Inventory allocation ▪ Collecting payment from customer	Core
Transformation	▪ Production planning and scheduling ▪ Workforce planning and scheduling ▪ Products (goods and services) execution ▪ Internal logistics ▪ Conformance quality	Core
CRM	▪ Marketing ▪ Pricing ▪ Sales force support ▪ Promotional activities ▪ Selling	Core
Asset Management	▪ Network facilities design ▪ MRO mgmt. ▪ Maintenance planning and scheduling ▪ Process design and improvement	Support

After-Sales Services	▪ Warranty mgmt. ▪ Labor scheduling ▪ Reverse logistics ▪ Life cycle cash flow exploitation ▪ Post-transformation	Support, but it can be core in some sectors
Human Resources Management	▪ HR planning and scheduling ▪ Recruitment ▪ HR Development	Support
Business Process Management	▪ Process design, modeling, implementation, and monitoring ▪ Total Quality Management	Meta-process - integrational

Procurement: a generic core process through which organizations acquire goods and services for both transformation processes (i.e. raw material or production-related goods) and support processes (i.e. MRO for assets management). This encompasses the following key activities: purchase, payment, inbound logistics, supplier performance management, and purchasing order administrative processing. This process becomes a critical one for a company when inputs represent a high value of the cost structure, when there exists high concentration of vendors in the market and/or when there are perishable inputs. The key performance indicators for this process are acquisition costs, response time, and cash conversion cycle (see Table 2).

Order fulfillment: a generic end-to-end core process involved in fulfilling the customer order. This process includes the following key activities: demand planning, order administrative processing, product delivery, distribution, transportation, inventory allocation, and collecting payment from customer. This process becomes more critical for a company when it has a make-to-order approach and when it is embedded in a high-integrated supply chain. The key performance indicators for this process are delivery on time, inventory turns, response time and cash conversion cycle (see Table 2).

Transformation: a generic core process concerned with the production of goods or services. Given that "production" is often related to manufacturing scenarios, this work defines the production of goods or services in a more generic version called transformation. In this sense, one can define transformation as the conversion of resources into goods or services. This process includes the following key activities: production planning and scheduling, workforce planning and scheduling, product (goods and services) execution, internal logistics, and conformance quality. This process becomes critical for a company in the case of mature products, when production processes must be optimized for cost reduction. The key performance indicators for this process are delivery on time, inventory turns, productivity of assets and resources, and response time (see Table 2).

Customer Relationship Management (CRM): a generic core process concerned with the management of every aspect of the relationship between the company and its customers. The aim is to build lasting customer relationships. This process touches key activities such as marketing, pricing, selling, sales force support, promotional activities, and field support. This process becomes critical for a company when it competes in dynamic and complex markets characterized by a number of different types of clients, competitors, and products. The key performance indicators for this process are the ability to anticipate demand with personalized products and services, and response time (see Table 2).

Assets Management: a generic support process concerned with the management and preservation of all company assets such as facilities, equipments, production lines, buildings, vehicles and furniture. This process includes the following key activities: network facilities design, MRO management, maintenance planning and scheduling, process design and improvement, and financial processes related to investments. This process becomes critical in the case of high levels of utilization of fixed assets and equipments. The key performance indicators for this process are the ability to anticipate and maintain assets (see Table 2).

After-sales Services: a generic support process, although it can become a core process in some specific sectors (e.g. automotive). It is concerned with the management and exploitation of the product life cycle after its sale. This process encompasses the following key activities: warranty management, reverse logistics, installation, maintenance, repairs, and life cycle cash-flow management. The latter is very important for manufacturers. Manufacturers of durable goods are finding that revenues from after sales services represent 30% or more of their total revenues. In some industries, the service market is four or five times larger than the market for products. Thus, for many manufacturers, the capturing of the service value is going to be crucial for the business. This process becomes critical for a company in the case of a) product lifecycle costs higher than sale costs, b) high levels of differentiated products-services (i.e. companies attempt to achieve differentiation). The key performance indicator for this process is response time (see Table 2).

Human Resources Management: a generic support process which includes the following key activities: human resource planning and scheduling, recruitment, and human resource development. This process becomes critical for a company in the case of scarcity of qualified personnel. The key performance indicators for this process are the ability to keep a good organizational climate, personnel turns, and knowledge creation and transfer (see Table 2).

Business Process Management: a generic integrational process, or meta process, concerned with the ongoing improvement and optimization of key business processes. This process is often represented as an iterative cycle of five activities: identification of success critical factor to achieve the business objectives, identification of key business processes, process modeling and analysis, process simulation, implementation, and evaluation and monitoring. This process becomes critical for a company in the case of complex external environments. The key performance indicator for this process is response time (see Table 2).

GENERIC INTER-ORGANIZATIONAL PROCESSES

Inter-organizational processes take place in business networks. Researchers have provided some evidence that companies relying on strategic network alliances are more profitable since closer buyer-supplier relationships may offer many technical, financial, and strategic advantages over spot market transactions and vertical integration (Mohr and Speckman, 1994; Gulati, 1995; Stuart, 1997; Closs and Mollenkopf, 2004). Different scholars have studied the antecedents that lead to different forms of network alliances (Parise and Casher, 2003; Das and Teng, 2000; Dyer, 1996; Gulati, Nohria, and Zaheer, 2000). These studies suggest, for example, that the type of assets involved will impact the type of relationships (Dwyer et al., 1987). The drivers for collaboration have been extensively analysed in the literature and can be synthesized in strategies of co-specialization; the search for mutual learning to support fastest product developments, better information and product flows (resulting in cost and time reductions, a dominating theme in logistics); the creation of virtual scale and scope economies; and in the creation of entry barriers, among others (Ernst, 2003).

The dynamics of network formation can follow the following path. In a first stage most companies in less complex business environments, or with strong internal capabilities develop in-company activities. Increased complexity, cost pressure and reductions in buffers (e.g., stocks, delays) drive companies to rely on external sources for non-core processes. These relations are largely transactional, and the need for a stability in complex business environments to facilitate agility drive companies to form alliances and networks.

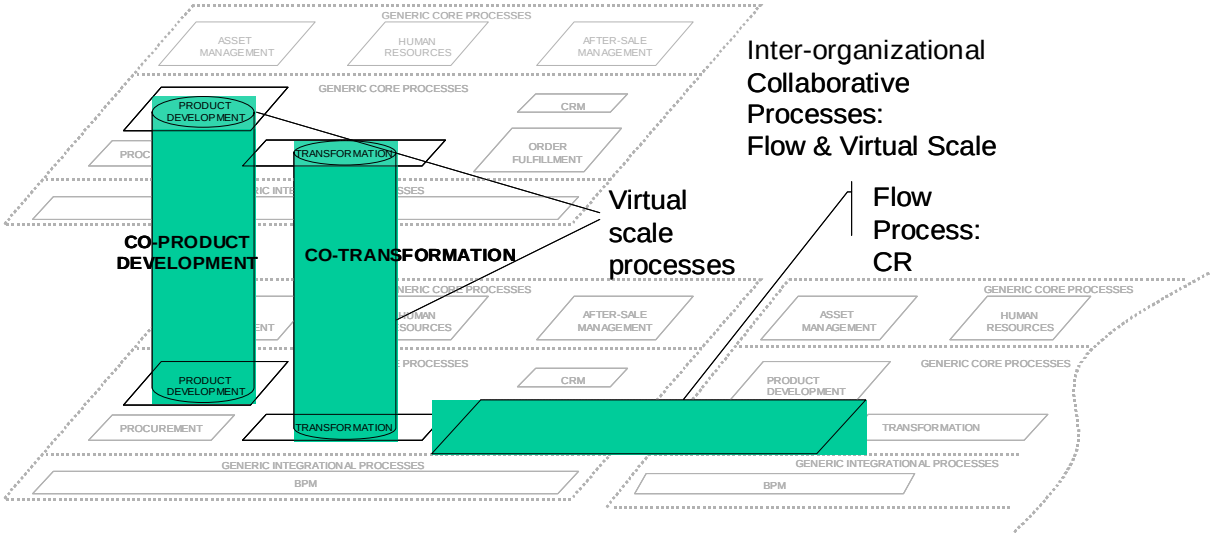
Enterprises can then be classified according to the patterns of their integration in enterprise networks. A practical taxonomy is based upon the two basic types of collaboration based on power symmetries (Díaz, 2000). In the case of large suppliers and small customers, power asymmetries preclude tight integration, but horizontal cooperation among the smaller companies can provide virtual scale economies for such activities as purchasing, exporting and marketing (Albaladejo, 2001). In the case of small suppliers to larger customers, power asymmetries provide incentives for true vertical integration, as both supplier and customer are motivated to synchronize their production plans to achieve true just in time relations. In this case the relation goes beyond transactions and implies mutual trust to exchange core information, such as forecast and production plans.

With this ideas in mind we can classify inter-organizational processes in virtual economy processes and flow processes (see Figure 2). Virtual economy processes are concerned with horizontal collaboration among companies in order to achieve virtual scope and/or scale economies. For example, two or more companies might undertake joint procurement in order to increase their bargaining power in purchasing goods from a supplier. Flow processes are concerned with vertical collaboration between two companies in order to synchronize their processes. For example, just-in-time (JIT) delivery between two companies as a result of sharing demand and production planning. The specific inter-organizational processes are explained below.

Virtual economy processes

This type of processes exists mainly for core processes. It is less common to find virtual economy processes for support processes (but not unknown, e.g., shared services such as cafeterias). The virtual economy processes are described in turn below.

Figure 2. Inter-organizational Collaborative Processes



Co-Product Development: This process generates virtual scope economies. It is concerned with the co-developing of a product or product subsystem between two or more companies. For example, Fuji and Xerox have undertaken joint development of photocopier machines, but compete in the transformation and CRM processes.

Co-Procurement: This process generates both virtual scale and scope economies. It is concerned with the joint procurement of goods and services between two or more companies. The aim is to increase the buyers´ bargaining power by buying high volume of goods (i.e. scale). This occurs often in agricultural cooperatives when they buy, for example, seeds. In addition, a joint procurement can aim to find scope economies by buying different products using the same resources.

Co-Order Fulfillment: This process generates both virtual scale and scope economy process. It is concerned with the joint order fulfillment between two or more companies. The aim is likely to maximize the use of resources by doing the same activity for several companies. For example, in the food and beverage sector is common to find companies that share the distribution and transportation resources to delivery their products to retailers.

Co-Transformation: This process generates both virtual scale and scope economies. It is concerned with the joint transformation between two or more companies. The aim is to achieve scale-scope economies in the use of the transformation facilities. For example, in the automobile sector is common to find competitors that share vehicle production lines. Volkswagen and Ford undertook joint production of trucks in Brazil for many years.

Co-CRM: This process generates virtual scope economies. It is concerned with the joint management of the customer relationships between two or more companies. The aim is to achieve scope economies by using the same resources in the execution of the same process for two or more companies. For example, it is common to find joint marketing studies in SMEs in order to pool marketing expenses. In 2002, all of the top ten companies selling drugs involved themselves in some form of joint marketing.

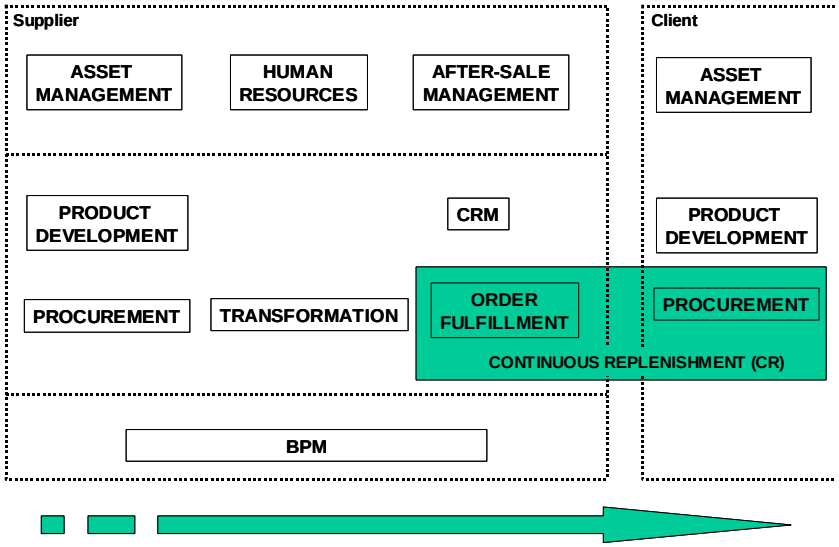
Co-BPM: This process adapts the idea of process-oriented companies to the extended enterprise. The design, ongoing improvement and optimization of networks and supply chains is a process that is being realized through the practice of joint business process management. The automotive sector has designed, and is evolving continuously, new business processes to increase the collaboration among all players. This new initiative has been co-developed and co-managed by the big OEM and the first-tier suppliers, for example in the creation of tightly integrated industrial parks.

Flow Processes

This type of processes can be described as meta processes composed of intra-organizational processes from two or more companies. These meta processes integrate the flow of goods and information between two or more companies in a supply chain or network. They are described below.

Continuous Replenishment (CR): a collaborative flow process, CR is a process of efficient replenishment that focuses on improving the flow of products between supplier (order fulfillment) and retailer (procurement) – see Figure 3. The aims of CR are to achieve zero order costs and the optimization of inventory management in a supply chain. The basis of CR is the collaboration between supplier and retailer by replenishing goods based on actual and forecasted product demand. The major examples of CR are related to the relationship between big consumer goods companies (e.g. P&G and Campbell Soups) and big retailers (e.g. Wal-Mart and Carrefour).

Figure 3. Generic inter-organizational flow processes: Continuous Replenishment



Collaborative Planning Forecasting and Replenishment (CPFR): This is a collaborative flow process (see Figure 4). The central premise of CPFR is that short-term and long-term information regarding POS data, forecasts, shipping, and production plans, and order generation is jointly planned by selected members in a supply chain. All companies involved initiate and execute business plans and processes together. Matching this concept to the intra-organizational processes, CPFR includes running transformation and order fulfillment processes in the supplier and the procurement process in the retailer.

Collaborative Product Lifecycle Management (CPLM): This is concerned with the design, analysis and management of products from initial conception to retirement. Collaborative activities in CPLM include collaborative engineering, custom product development, project management, asset management, and quality management among multiple business partners in a supply chain or network (see Figure 5).

Figure 4. Generic inter-organizational flow processes: CPFR

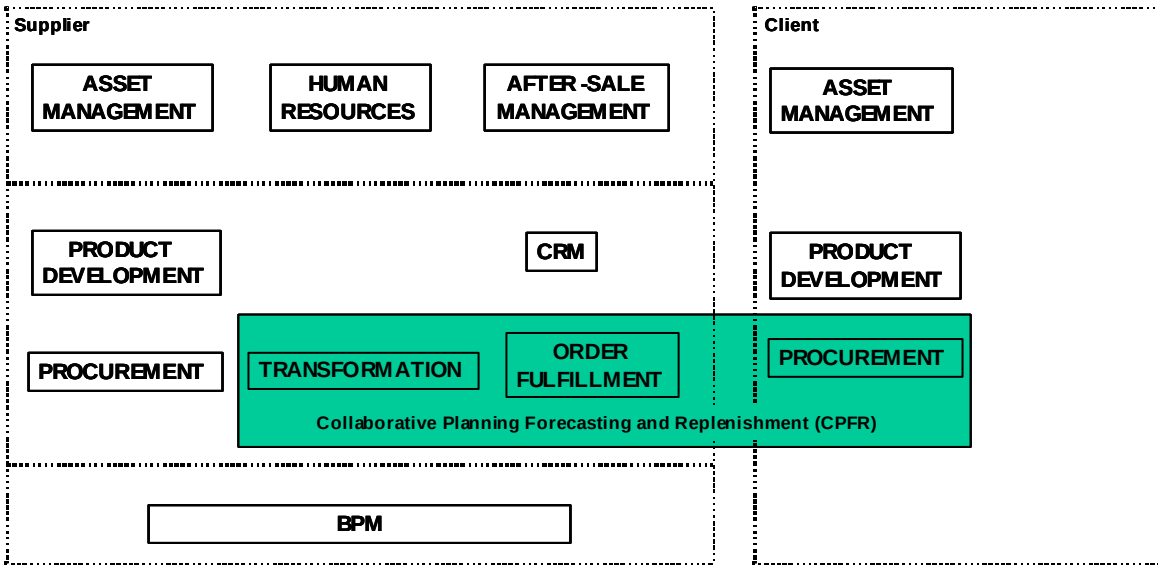
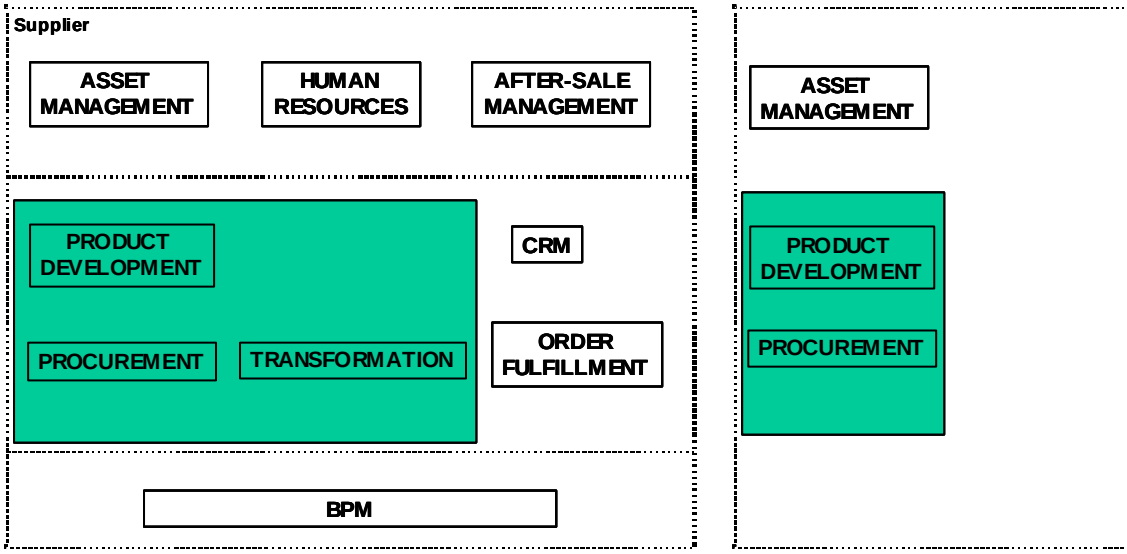


Figure 5. Generic inter-organizational flow processes:
CPLM (Collaborative Product Lifecycle Management)



Key Performance Metrics

The current supply chain and networks perspective considers three key dimensions to measure the performance of business processes (Hausman, 2002). They are:

- Service
- Assets
- Speed

Service relates to the ability to anticipate, capture and fulfill customer demand with personalized products and on-time delivery. Assets involve anything with commercial value, primarily inventory and cash. Speed is time-related. They track responsiveness and velocity of execution. Note that quality is absent. This is because in modern Supply Chain and Networks thinking, quality is taken as a given. This work identifies generic metrics for each of these three dimensions and applies them to the business processes thus described (see Table 2).

Table 2. Processes vs. KPI

	Key Performance Metrics		
Processes	Service	Assets	Speed
Product Development			Response Time
Procurement		Acquisition Costs	Response Time Cash Conversion Cycle

	Key Performance Metrics		
Processes	Service	Assets	Speed
Order Fulfilment	Delivery On time	Inventory turns	Response Time Cash Conversion Cycle
Transformation	Delivery On time	Inventory turns Productivity of assets and resources	Response Time
CRM	Ability to anticipate the demand with personalized products or services		Response Time
Assets Management	Ability to anticipate and maintain assets		
After-sales Services			Response Time
Human Resources Management	Ability to keep a good organizational climate	Personnel Turns Knowledge creation and transfer	
Business Process Mgmt.	Effective processes		Response Time
Co-Product Development			Response Time
Co-Procurement		Monetary Value	Response Time Cash Conversion Cycle
Co-Order Fulfillment	Delivery On time	Inventory turns	Response Time Cash Conversion Cycle
Co-Transformation	Delivery On time	Inventory turns (RM, WIP, FG) Productivity of assets and resources	Response Time
Co-CRM	Ability to anticipate the demand with personalized products or services		Response Time
Co-BPM	Effective processes		Response Time
CR	Delivery On time	Inventory turns Order Costs	Response Time
CPFR	Delivery On time	Inventory turns Order Costs	Response Time
CPLM			Response Time

	Key Performance Metrics		
Processes	Service	Assets	Speed

Processes in different Industrial sectors

The above-mentioned processes are not equally critical in different industrial sectors. In a retailer, for example, Continuous Replenishment will be critical, while product development will not. This situation will be reversed for an Engineering company.

In this section we provide criteria for the determination of the criticality of processes in different industrial sectors, using the NAICS classification[1]. A sector differs from a vertical (or horizontal –Bordoni, 2003) market in that the last can encompass more than one industrial sector. The vertical market (or value added chain, in Porter's parlance) oil and gas contains companies in the primary sector (oil extraction), in the secondary sector (refineries) and in the tertiary sector (gasoline station). Some organizations, like the Venezuelan PDVSA can encompass all sectors.

Naics includes over 2000 classifications (i.e. code 315192, Underwear and Nightwear Knitting Mills, belongs to 31519, Other Apparel Knitting Mills, which belongs to 3151, Apparel Knitting Mills, which in turn belongs to 315, Apparel Manufacturing). It was thus imperative to group and prune this classification to a meaningful format. Thus, although, for example, the primary players in oil extraction and refinement are likely to be large industries due to scale economies, these companies will cluster suppliers of goods and services. The analysis will refer to this cluster of companies.

The chosen sectors are listed in turn below. They are grouped according to the three basic sectors (primary, secondary and tertiary):

Primary Sector
1. Agriculture, forestry, fishing and hunting. Naics 11
2. Mining. Naics 21

Secondary Sector
3. Automobiles. Naics 336
4. Electronics & computers. Naics 334
5. Textile, Apparel, Footware. Naics 313 to 316
6. Food & beverage. Naics 311 & 312
7. Chemicals, Oil & Gas. Naics 324 & 325
8. Pharmaceutical & medicines. Naics 325
9. Printing & Publishing. Naics 32311 & 511

Tertiary sector
10. Retail. Naics 44 & 45
11. Accommodation and Food Services. Naics 72

[1] The North American Industry Classification System (NAICS) has replaced the U.S. Standard Industrial Classification (SIC) system. NAICS was developed jointly by the U.S., Canada, and Mexico to provide new comparability in statistics about business activity across North America. The classification used is the 2002 version (http://www.census.gov/epcd/www/naics.html).

12. Health Care and Social Assistance.	Naics 62
13. Utilities.	Naics 22
14. Finance and Insurance.	Naics 52
15. Transportation and Warehousing.	Naics 48 & 49
16. Professional, Scientific and Technical Services.	Naics 54

Criticality of intra-organizational processes per sector

Table 3 determines the criticality of intra-organizational processes per sector. The level of criticality of each process for each sector was determined using the criteria described in section 3 for each process, which is revisited in turn below:

- Product development is critical in companies with short product lifecycles and/or when the product or service to be designed presents high levels of complexity.
- Procurement is critical in companies where inputs represent a high value of the cost structure, when there exists high concentration of vendors in the market and/or when there are perishable inputs.
- Order fulfillment is critical for companies that has a make-to-order approach and when it is embedded in a highly integrated supply chain.
- Transformation is critical for a company with mature products, when production processes must be optimized for cost reduction.
- CRM is critical in companies that compete in dynamics and complex markets characterized by a number of different types of clients, competitors, and products.
- Asset management is critical in the case of high levels of fixed assets and equipment utilization.
- After-sales services are critical for companies where a) product lifecycle costs higher than sale costs, b) high levels of differentiated products-services (i.e. companies attempt to achieve differentiation).
- Human resources management becomes critical for a company in the case of scarcity of personnel and in the case of needing qualified personnel.
- Business process management becomes critical for a company in the case of complex external environments.

The level of criticality is represented in Table 3 through circles that are unfilled, partially filled or completely filled. The different symbols and their meanings are explained in Figure 6. Table 3 shows, for example, that product development, for example, is high to very high critical process for companies in the automobiles, electronics, textiles and pharmaceutical sectors. Procurement is very high critical for companies in retail, and it has a medium level of criticality for companies in automobiles, electronics, textiles, food and beverage, chemical, oil and gas, accommodation and foods, and healthcare. Section 9 presents a detailed analysis for five sectors.

Figure 6. Circles and their meanings for determining the level of criticality of processes per sector

1. Non critical	1-2. Non critical to low	2. Low	2-3. Low to medium	3. Medium	4. High	4-5. High to very high	5. Very high
							

Table 3. Criticality of Intra-organizational processes per Sector

Process / Sector	Product Development	Procurement	Order Fulfillment	Transformation	CRM	Asset Management	After-Sales Services	Human Resources Management	Business Process Management
Sector 1: Agriculture									
Sector 2: Mining									
Sector 3: Automobiles									
Sector 4: Electronics									
Sector 5: Textiles									
Sector 6: Food & Beverage									
Sector 7: Chemical, Oil & Gas									
Sector 8: Pharmaceutical & Medicine									

Process Sector	Product Development	Procurement	Order Fulfillment	Transformation	CRM	Asset Management	After-Sales Services	Human Resources Management	Business Process Management
Sector 9 Printing & publishing									
Sector 10 Retail									
Sector 11 Accomation & food									
Sector 12 Healthcare									
Sector 13 Utilities									
Sector 14 Finance & Insurance									
Sector 15 Transp. & warehousing									
Sector 16 Professional Services									

Criticality of Inter-organizational Processes per Network Type

The criticality of inter-organizational processes per network type can be determined inducing the potential of virtual economy processes and flow processes on each ty pe. For example, inter-organizational processes are non critical for enterprises that work without close horizontal or vertical relations, while Co-processes (Co-procurement, Co-transformation) are important processes for companies that try to develop virtual scale economies. For companies with a hig h level of vertical integ ration, flow processes become critical.

Analysis of the Automobile sector

We analyze the sector of auto parts in detail to show the working s of the methodolog y. This sector includes all transportation equipment manufacturers, but auto parts manufacturers are a dominating sub sector, so emphasis is made here. F ollowing the methodology sketched above:

Step 1: Intra-organizational process criticality determination

Table 3 describes the criticality of intra-organizational processes per sector. The criteria considered for marking the level of criticality of each process for each sector were determined in the description of these processes (Generic intra-organizational processes). The subsequent bullets described the criticality of these processes for the automobile sector. The reader should match the description below to symbols in Table 3, which were described above.

- Product Development criticality is high to very high due to complex ity of design and short life cycles of customer products (auto assemblers and first tier suppliers).
- Procurement criticality is medium due to relatively high procurement costs compared to part value (is higher downstream where product value is higher).
- Order fulfillment criticality is ve ry high due to Just-in-Time and Just-in-Sequence requirements from most assemblers.
- Transformation processes criticality is very high due to complexity of manufacturing operations and time pressures.
- CRM criticality is non critical to low, as there are stable B 2B relations with few customers.
- Assets management criticality is low to me dium, due to less machine utilization than in assemblers.
- After-sales service criticality is low due to B 2B relations and commodity-like production.
- HRM criticality is medium due to specialized, but not scarce, labor
- Business Process Management criticality is ve ry high due to c omplex business environment and high quality requirements.

Step 2: Relevance of Network types in the Sector

This section identifies the relevant networks for the automobile sector, which is going through a profound transformation, in an environment characteriz ed by excess capacity,

very high competition, shrinking real prices and a high rate of change. As a result merged companies undergo a downstreaming process in which they try to recover the most of the life-cycle revenue of the product, beyond the sale[2], and in which manufacturing is largely outsourced. Simultaneously, automakers try to make autos only after they get the order (Make to Order, instead of Make to Stock), in an attempt to reduce inventory costs and forecast errors. This creates networks with strong integration or Supply Chain components, as in our study-cases.

Step 3: Criticality of Inter-organizational processes in the Sector

Network members with strong vertical integration require strong flow processes, CR where stocks are allowed and CPFR where a Just-in-Sequence process is required due to high inventory costs. CPLM processes also become critical for manufacturers of specific parts (i.e., specific to a platform type and not common, as in the case of batteries). Reported cases of co-manufacturing can be found mainly in the case of large assemblers (e.g. Nummi for Toyota and GM, VW and Ford in our study-case).

Critical inter-organizational processe of suppliers in the auto sector

Ford Industrial park in Almussafes (Valencia, Spain), is large (a capacity of almost 2000 vehicles per day) and flexible, being able to mix in the same production lines different models and platforms, including Mazda models. Over the years the plant has evolved into one of the largest industrial parks in the world (Soares and Wernle, 2003). Already some 20% of the subassemblies (representing the majority of components by value) are received Just in Sequence from more than 20 first-tier suppliers installed in-site and connected through a conveyor belt and an information systems that allows the supplier scheduling system to be synchronized with Ford. Additional on-site suppliers provide specialized services. A similar case is VW truck assembly in Resende (Correa, 2000) is a modular consortium, in which manufacturing activities are performed by first-tier suppliers, physically located in the complex. These suppliers have, in turn, a second-tier network of suppliers who are physically further away.

Other cases of this model of outsourcing are the Uusikaupunki car factory in Finland that assembles Porsches and Russian's Ladas, and Smart that uses in-site suppliers for most parts of the City Car. SME in these cases participate in integrationists networks, with critical processes defined by the following criteria:

Characteristics of market	Trends in players	Network & critical inter-organizational processes
Excess capacity, high competition, shrinking real prices and high rates of change	Merger companies undergo downstream and make-to-order operations	Vertical integration networks. Critical inter-organizational processes : Continuous Replenishment, CPFR

[2] The average life cycle cost of an automobile is some $70K, of which acquisition cost is some $20K. Automakers are trying to capture the rest through participation in such downstream activities as repairs (automakers make twice the profit selling parts they make selling cars), insurance and so on, while reducing their manufacturing activity, which is in some cases outsourced totally or in large proportion. Companies are trying to survive by focussing in design and after sale activities.

CONCLUSIONS

- Generic intra-organizational business processes can be grouped in: core, support, and integrational processes. The generic core processes are: product development, procurement, transformation, CRM, and order fulfillment. The generic support processes are: assets management, human resources, and after-sales service. After-sales service might convert to a core process in some specific sectors. The integrational process is business process management. This is a meta process.
- Inter-organizational collaborative processes can be classified as virtual economy processes and flow processes. Virtual economy processes are concerned with horizontal collaboration. Flow processes are concerned with vertical collaboration between two companies in order to synchronize processes. The virtual economy processes are: co-product development, co-procurement, co-order fulfillment, co-transformation, co-CRM, and co-BPM. The flow processes are: continuous replenishment, collaborative planning, forecasting and replenishment (CPFR), and collaborative product lifecycle management (CPLM).
- Enterprises must strengthen their intra-organizational business processes in order to develop internal capabilities before attempting their integration in business networks or supply chains. In addition, inter-organizational business processes are an extension of intra-organizational processes beyond the organizations walls. Thus, the identification of key business processes for collaborative networks begins with the understanding of intra-organizational processes.
- The current supply chain and network perspective considers three key dimensions to measure the performance of business processes. They are: service, assets and speed. From this perspective, a list of key performance metrics can be matched to the intra and inter-organizational business processes. The main key performance metrics are: response time, cash conversion cycle, delivery on time, inventory turns, productivity of assets and resources, ability to anticipate the demand with personalized products and services, ability to anticipate and maintain assets, personnel returns, order costs, and process effectiveness.
- The criticality of intra and inter-organizational processes per sector depends on a number of variables (e.g. product lifecycles, levels of product and process complexity, cost structure, make-to-order or make-to-stock approaches, level of integration of the supply chain, process maturity, market complexity, and differentiation levels). Thus, for example, product development is highly critical processes for the enterprises placed in the automobile, electronics, textiles and pharmaceutical sectors. Procurement is very high critical for enterprises in the retail sector. Procurement is also in a medium level of criticality for enterprises in the automobiles, electronics, textiles, food and beverage, chemical, oil and gas, accommodation and foods, and healthcare. Table 3 summarizes the level of criticality of each type of processes for each type of sector.
- The criticality of inter-organizational processes per network type was determined inducing the potential of the virtual economy processes and flow processes per network.
- Through a better understanding of key processes and network relations enterprises can develop competitive advantages that leverage their survival and well being. ES are a key element of these processes.

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