How to Determine the Increasing Returns Sensitivity of Your Industry?

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Abstract

Increasing returns means that self-reinforcing mechanisms are at work within firms and markets. These mechanisms come in four forms: scale effects, learning effects, network effects and social interaction effects. Some industries are more sensitive to increasing returns than others. It is important that managers are able to assess the increasing returns sensitivity of their industry. Therefore we have developed an analytical tool that allows managers to assess their industry's sensitivity to increasing returns. Four case studies are used to illustrate this typology. The analytic tool shows that an industry has high increasing returns sensitivity if a combination of the following situations exists: 1) high fixed costs and low, or even zero, variable costs, indicating a high sensitivity to scale effects, 2) a high level of complexity of the business process and/or the products, indicating a high sensitivity to learning effects, 3) low product utility and high network utility, indicating a high sensitivity to network effects and finally, 4) a high degree of social involvement by customers and potential customers, indicating a high sensitivity to social interaction effects.

Keywords

Increasing returns
Industry sensitivity
Scale effects
Learning effects
Network effects
Social interaction effects

1. Introduction

"Managers of well-performing businesses are able to avoid vicious circles of failure and are involved in setting up and developing virtuous growth circles. Success begets success and attracts new possibilities. Everything that is touched turns into gold, and as long as the borders of the self-reinforcing processes are cherished, as long as managers stay alert for unexpected developments and as long as they know how to suppress arrogance, good business performance is the logical result." (Commandeur, 2002, p.121 [translated by the authors])

In the process described here, management is able to utilize the business potential of increasing returns through self-reinforcing mechanisms in the firm and in the market. Increasing returns comes in four forms[1]: scale effects, learning effects, network effects and social interaction effects.[2] Of these, scale effects and learning effects are firm-based and network effects and social interaction effects are market-based. As business processes and products become increasingly information and knowledge intensive, increasing returns become more important in the competitive arena (Arthur, 1996). This growing importance of increasing returns has consequences for industry structure, for business processes, for competitive strategy and eventually for a firm's performance (Den Hartigh & Langerak, 2001). The consequences of increasing returns for industry structure are that: (1) competition will be at the network level rather than the level of individual products, (2) a 'battle for the technological standard' may emerge in the market, (3) market developments may be highly irregular and, (4) market outcomes may become unpredictable. To exploit these consequences for industry structure successfully to their own advantage, firms face challenges in their business processes. These challenges involve: (1) fighting the battle for the technological standard, (2) influencing customers' and competitors' expectations, (3) avoiding lock-out situations, (4) shaping network competition and, (5) exploiting the installed base.

[1] Derived from Arthur (1988).

[2] Scale effects are also known as 'economies of scale' or 'increasing returns to scale'. Learning effects are also known as 'learning by doing', 'experience effects' or 'dynamic learning effects'. Network effects are also known as 'network externalities', 'increasing returns to adoption' or 'demand side increasing returns'. Social interaction effects are also known as 'social contagion', 'social network effects', 'information contagion', 'herding behavior' or 'information cascades'.

Addressing these challenges is a difficult and highly risky task. Arthur (1996) even speaks of the 'casino of technology', which might leave the impression that competing in information and knowledge intensive markets is like playing 'Russian roulette', where firms are at the mercy of erratic market forces. We think that if managers understand the mechanisms and consequences of increasing returns, they should be capable of dealing with the challenges of competition in increasing returns markets.

We define the management of increasing returns as the development and implementation of a strategy aimed at maximizing long-term value creation, and value capturing, through the exploitation of the increasing returns potential within a firm's industry. However, before being able to manage increasing returns, managers need a basic understanding of the increasing returns sensitivity of their industry. Analysing this sensitivity involves determining the extent to which the antecedents of the four mechanisms of increasing returns are present in the industry.

In this paper, we start in section two by defining the four sources of increasing returns. Furthermore, we provide an analytic tool that allows managers to assess their industry's sensitivity to increasing returns. Applying this tool, in section three we present a typology of the increasing returns sensitivity for different industries. Four case studies are used to illustrate this typology. We will present conclusions in section four.

2. Determining increasing returns sensitivity

The increasing returns sensitivity of an industry is the degree to which the characteristics causing the different mechanisms of increasing returns apply to this particular industry. The degree of industry sensitivity to increasing returns depends on the following characteristics:

- the ratio between fixed and variable costs
- the degree of complexity of the business process and/or the products
- the ratio between product utility and network utility
- the degree of social involvement by customers and potential customers

Figure 1 shows the framework for analysing the increasing returns sensitivity of an industry.

<<figure 1 about here>>

In this figure we can see four possible situations indicating a high sensitivity to the mechanisms of increasing returns:

- a situation with high fixed costs and low, or even zero, variable costs, indicating a high sensitivity to scale effects
- a situation with a high level of complexity of the business process and/or the products, indicating a high sensitivity to learning effects
- a situation with low product utility and high network utility, indicating a high sensitivity to network effects
- a situation with a high degree of social involvement by customers and potential customers, indicating a high sensitivity to social interaction effects

Whether or not the above situations will occur, depends to a large extent on the information and knowledge intensity of the industry. In information and knowledge intensive industries there will be higher increasing returns sensitivity. Table 1 summarizes the characteristics of information and knowledge, which differ from those of physical labour and capital (Romer, 1990; Glazer, 1991; Stähler, 2001).[3] These characteristics explain why the information and knowledge intensity of industries are important determinants of the increasing returns sensitivity. Arthur (1996) distinguishes between the old and the new world of business. In the old world of business, in which capital and physical labour are the most important factors of production, increasing returns are almost non-existent. In the new world of business, in which information and knowledge are the primary factors of production, increasing returns are all-important. The shift from 'old' to 'new' becomes visible through the rising prevalence of the information services sector, the rising prevalence of information goods, e.g., software or media, the rising prevalence of high-tech products, e.g., computers or mobile phones, and the increasing amount of knowledge required to configure and improve business processes. We will now discuss the characteristics that determine the sensitivity of an industry to each of the four mechanisms of increasing returns.

<<table 1 about here>>

[3] Capital and physical labour share the characteristic of a normal economic good, i.e., they are perfectly divisible, rival, perfectly excludable, and have diminishing returns to use.

Sensitivity to scale effects

An industry's sensitivity to scale effects depends on the ratio between fixed and variable costs that is characteristic of the products and business processes in the industry. Scale effects exist when an increase in the firm's production volume (output) leads to a decrease in the average total costs (Amit, 1986). To analyse an industry's sensitivity to scale effects, a distinction must be made between scale effects with regard to fixed costs and variable costs.

Scale effects due to high fixed costs will be present in capital and physical labour intensive industries and in information and knowledge intensive industries. These scale effects exist when the fixed costs of the input are spread over a larger amount of output, so that the fixed costs per unit of output go down. However, in capital and physical labour intensive industries the variable costs often increase proportionally or even progressively. This causes negative scale effects that counteract the positive scale effects due to fixed costs.

In information and knowledge intensive industries there is the possibility of scale effects with regard to variable costs next to the scale effects with regard to fixed costs. Information and knowledge intensive industries are often characterized by high fixed costs, e.g., due to investments in research and development. Therefore, scale effects due to high fixed costs are also present in these industries. Additionally these industries are often characterized by low variable costs that remain equal or that even decline with larger production volumes (Shapiro & Varian 1999). In these cases the development of the variable costs with rising production volumes no longer counteracts the scale effects due to high fixed costs, in some cases it may even reinforce them. Examples of such industries are the semiconductor industry, the software industry, the movie industry and the pharmaceutical industry. Developing a new computer program or medicine takes high fixed investments while the variable (re)production and distribution costs are relatively small. This results in a situation where the average total cost curve declines very steeply.

An industry's sensitivity for scale effects can therefore be expressed in the ratio of fixed costs compared to variable costs. Information and knowledge intensive products have an average cost curve that starts higher because of higher fixed costs, and slopes down in a steeper curve compared to capital and physical labour intensive products, because of lower or even declining variable costs. Therefore, the sensitivity to scale effects is higher in information and knowledge intensive industries (cf. figure 1).

<<figure 1 about here>>

Sensitivity to learning effects

An industry's sensitivity to learning effects is determined by the complexity that is characteristic of the products and business processes in the industry. Learning effects exist when there is a positive dynamic relationship between the growth of the firm's cumulative output and the growth of productivity (Amit, 1986). The dynamic aspect, involving the *growth of output* instead of the *scale of output at one moment in time*, distinguishes learning effects from scale effects. The growth of productivity, i.e., more units of output per unit of input, is an indication of learning.

The learning potential of a task has three determinants (Ellström, 2001): task complexity, task variety and control or scope of action. The authors expect the task variety and control or scope of action to be determinants of the task complexity and therefore to be completely captured in the variable task complexity. Only at a lower aggregation level than the industry do task variety and control or scope of action directly influence the complexity of the task. The reason for this is that the task variety and control or scope of action only influence learning potential when tasks are divided differently among employees. The way tasks are divided among employees is not an industry characteristic but a managerial decision and accordingly does not influence the learning potential of an industry. Consequently, the complexity of the product and/or the business processes determines an industry's sensitivity to learning effects (Ellström, 2001; Lall, 1999). The technological complexity of a process or the market complexity, such as difficulty with determining customers' requirements, are examples of complexities that determine an industry's sensitivity to learning effects.

The high technological complexity of business processes means that a lot of productivity improvement can be gained by executing a task better, by improving the organization of work, or by a better division of labour or task specialization. Adam Smith's (1776) famous story of the pin factory, where one single craftsman could manufacture between one and twenty pins a day whereas ten craftsmen who specialise in the various production tasks could produce around 48.000 pins a day, is a perfect example of productivity improvement due to mastering the complexity of a business process.

High technological complexity of a product means that a lot of productivity improvement can be gained by improving the quality of the different parts or modules of this product and improving the way these different parts are integrated. Moreover, the more complex a product, the more complex the business processes required to develop, produce and distribute this product will be. This will, in turn deliver a high potential for learning. An industry's sensitivity to learning effects is therefore determined by the complexity of its products and its business processes.

In information and knowledge intensive industries, products and processes tend to have a higher technological complexity than in the more traditional capital and physical labour intensive industries. Therefore the sensitivity to learning effects will be higher in information and technology intensive industries.

Sensitivity to network effects

An industry's sensitivity to network effects is determined by the ratio between product utility and network utility which will be characteristic for the products of that industry. Network effects exist in a market when the economic utility of using a product or service becomes larger as its network grows in size (Katz & Shapiro, 1985). The network consists of the users of compatible products and services and the users and suppliers of complementary products and services.[4] When more users join the network, e.g., by buying compatible products or by supplying complementary products, the network becomes automatically more attractive for other buyers and suppliers.

From the former, we can observe a distinction between direct and indirect network effects. Direct network effects are present when the economic utility of joining a network increases with some function of $N*(N-1) \approx N^2$, in which N is the number of network members. This is often referred to as Metcalfe's law (Shapiro & Varian, 1999). Indirect network effects occur when products and services are used in combination with other, complementary, products and services. When the proposition of complementarities improves, e.g., when more software becomes available for computers or when more games become available for game consoles,

[4] Products are fully compatible if the costs to combine the products so they can deliver a joint service are zero (Hill, 1997). Products are complementary if the cross-elasticity of demand is larger than zero, i.e., when the demand for product A rises, the demand for the complementary product B also rises.

the utility of the original product also increases (Stremersch, 2001). Examples can be found in the computer industry, the market for CD-players, DVD-players, and televisions. After all, they are all worth little or nothing without their respectively software, CD's, DVD's and television programs.

To analyse an industry's sensitivity to network effects, a distinction can be made between product utility and the network utility of a product. Product utility consists of a product's intrinsic value to the customer, i.e., the value of the product as it is, within its direct application and without the value of network effects. The network utility consists of the value to the customer of the direct and indirect network effects associated with the product. An industry's sensitivity to network effects is determined by the ratio between the product and the network utility of the product or service. An example of how this can be done is shown in table 2.

<<table 2 about here>>

From the table it becomes clear that sensitivity to network effects is especially high in information and knowledge intensive industries such as the software, computer and telecom industries.

Sensitivity to social interaction effects

An industry's sensitivity to social interaction effects is determined by the degree of social involvement of customers and potential customers with the products and services provided by the industry. Social interaction effects exist in a market when the preference of potential buyers for a product or service is dependent on the opinions and expectations of other buyers or potential buyers (Abrahamson & Rosenkopf, 1997; Kretschmer, Klimis & Choi, 1999). Social interaction effects are different from network effects in that they reflect a quest for social legitimacy instead of economic utility.

Social interaction effects are particularly present with experience products, where buyers can only assess product quality after they have bought this particular product. To assess the risks that purchasing such products entail, potential buyers search for information on products by consulting member of their social network. The larger the available social network in

comparison to competing social networks, the more likely it is that a potential buyer will receive positive information about a specific product, and the more likely he or she is to buy it. This in turn increases the social network size. Besides searching for information, potential buyers form expectations about the size of competing networks (Katz & Shapiro, 1985). The expected size depends on the number of suppliers and customers who have already invested in the network, or who will (soon) do so. When a substantial number of potential suppliers and buyers expect that a particular network will dominate the market, they will be more inclined to invest in this network. As a result, the network will grow and will thereby fulfil the suppliers' and buyers' expectations, i.e., self-fulfilling expectations.

An analysis of an industry's sensitivity to social interaction effects can be done by assessing the social involvement of buyers and potential buyers with the product category, i.e., buyers' and potential buyers' willingness to exchange opinions and to search for information. In the case of low involvement, information exchange will be low and expectations will be based on information from the past that is already in the possession of the individual or the group. In the case of a high involvement, there is joint problem solving between consumers and their decisions will be coordinated. High social involvement with a product category thus makes it possible for a process of social interaction to emerge (Laurent & Kapferer, 1985).

Analysing an industry's sensitivity to social interaction effects by assessing the degree of social involvement with its products corresponds to the method of Arthur & Lane (1993), who mention risk-aversion as the determining variable. Risk-aversion has a large influence on the level of social involvement in a product and thereby an indirect influence on an industry's sensitivity to social interaction effects. Compared to risk-aversion, social involvement better takes into account the persons who supply the information for the process of information exchange, which underlies the process of social interaction effects. People do not just exchange information on the basis of perceived risks, they also do so when they are (dis)satisfied with a product or service and want to share their experiences. In comparison to risk-aversion, social involvement also takes into account the customers' willingness to provide information.

High degrees of social involvement exist across different industries, such as the fashion industry or the car industry. It it is especially relevant for products from information and knowledge intensive industries such as movies, mobile phones or MP3-players.

3. A typology of industries

The characteristics described in the previous section should be compared across industries to understand the relative increasing returns sensitivity of these different industries. To facilitate this process for managers, we have developed a typology of industries based on a qualitative assessment of their industries' increasing returns sensitivity (see figure 3). In the figure below, for every increasing returns mechanism, we differentiate between low and high sensitivity. In reality, the degree of sensitivity is a continuum. Moreover, an industry's sensitivity to increasing returns may change over time as a result of external and internal developments.

<<figure 3 about here>>

We use four cases to illustrate this typology. One, we analyse the metal-working industry and show the low increasing returns sensitivity of this industry. Then, two and three, we analyse a car tyre manufacturer and a top restaurant and show that their industries have a high sensitivity for firm-based and for market-based increasing returns, respectively. Four, we give a more in-depth analysis of an Enterprise Resource Planning (ERP) software supplier, Oracle, and we show that the ERP industry is highly increasing returns sensitive. The four cases are therefore the extremes of the typology in terms of their sensitivity to market-based and firm-based increasing returns.

Metal-working industry

The characteristics of small firms in the metal-working industry endow them with a low sensitivity to all four of the mechanisms of increasing returns. First, the fixed cost for starting up such a metal-working firm are not especially high. Most of the process technologies used are well known and use general-purpose machinery, which is widely available in the market. The most important cost aspect is made up of the variable cost of raw materials, energy, labour and distribution of products. The ratio between fixed and variable costs is therefore lower than in many other industries. Scale effects due to fixed costs are present, but only to a limited extent. When production volumes soar, they are quickly offset by an increase in variable cost. We can conclude that the sensitivity to scale effects is relatively low.

Technological complexity of the products and the business processes is low in the metal-working industry. The products are usually standardized or customized parts requiring only a few simple machining steps. Moreover, the ways of machining are all very well known and generally not very technologically advanced. Any possible improvements to the process are mainly in the realm of better logistics or a better layout of the shop floor. Once the basic technologies are mastered, and the most obvious improvements have been implemented, there are few opportunities for further improvement. Therefore, sensitivity to learning effects is also relatively low in this industry.

The ratio between product utility and network utility is very high in the metal-working industry. There is almost no utility to be derived from the growth of the network of users and only a limited utility from the use of the product with complementary products. While the product is generally designed to be part of a larger system, it is not of crucial value for this system because the customer does not derive any differentiation value from it. For example, a crankshaft is a crucial part of a car, but customers do not derive value from the car because of the crankshaft.

The degree of social involvement is generally very low in the metal-working industry. The products are not experience products, i.e., their quality can be assessed beforehand. The products are also not very important in the eyes of the customers as they are often not visible in the end product and therefore do not have differentiation value in the eyes of the consumer. Therefore, the metal-working industry's sensitivity to social interaction effects is relatively low.

We can conclude that with a low sensitivity to all four the mechanisms of increasing returns, this industry is located in the lower left-hand corner of figure 3.

Car tyre industry: Michelin

Michelin is the world's largest manufacturer of car tyres with net sales of over 15 billion euros in 2002. The company is a good illustration of knowledge accumulation. Car tyres are much more complex than many think. Environmental issues and the context in which the tyres are used are very important. To illustrate the importance of the context, Michelin offers different types of tyres in different areas in the world to take into account the different roads

and driving conditions. A producer of car tyres can learn a lot about its product. Continuous innovation takes place at the process level and especially at the product level. The most important innovations since 1891 can be seen on Michelin's website.[5] There are quite some significant innovations, such as the removable tyre (1891), the twin wheel where two tyres fitted alongside can carry more load (1908), the metallic, i.e., the combination of rubber and metal in a tyre (1937), a radical new architecture for the tyre (1946), the tubeless tyre (1955), an energy saving technology called Green-X (1992), and the Pax system a radical renovation of the tyre architecture (1998). Tyres have become more reliable and longer lasting over time. Michelin participates in car sports, such as Formula 1, the Paris-Dakar rally and the Le Mans 24hrs, not just to promote its brand name but also to increase its cumulative experience and realize learning effects.

Sensitivity to scale effects is also large in the tyre industry. While investment costs for research and development are very high, reproduction costs are quite low.

The utility of owning a car tyre depends little on network utility. Direct network effects are low to medium and indirect network effects play only a minor role in the form of the complementarity between the tyre and the car and/or the usage-situation.

Furthermore, social involvement with the choice of a car tyre is limited. Professional drivers do care a lot of course, but consumers mainly make their choice on the basis of price and advice of the salespersons who will be informed about the quality of the tyres.

We conclude that in the tyre industry, market-based increasing returns are of minor interest, while the industry is highly sensitive to firm-based increasing returns. Consequently, the industry is located in the lower right-hand corner of figure 3.

Top restaurant

The characteristics of top restaurants cause the top restaurant industry to be relatively sensitive to the market-based mechanisms of increasing returns, i.e., network effects and social interaction effects, yet relatively insensitive to the firm-based mechanisms of increasing returns, i.e., scale effects and learning effects.

[5] http://www.michelin.com

The fixed costs for starting up a top restaurant are not extremely high. The fixed costs for a top restaurant are much higher than for a normal restaurant, because investments have to be made to provide a nice location and, especially, to build a good reputation, but these costs are much lower compared to, say, those for setting up a plant for manufacturing car tyres. Some important components of the costs are in the variable costs of the ingredients and the variable labour costs of preparing the meals and serving the guests. The ratio of fixed to variable costs is therefore relatively low and so is the industry's sensitivity to scale effects.

While the processes of cooking and preparing meals may seem to be quite complex, there is relatively little learning potential beyond the level of craftsmanship of the cook, which is especially important for the integration of sub-processes. For example, it is hardly possible to gain efficiency by preparing a steak in half the time, but there are also clear limits to how much you can do to prepare a 'better' steak. The same reasoning applies to the management of other processes in the restaurant, e.g., customer service. Beyond a certain minimum level it is only possible to improve these processes by employing extra staff members. This means that beyond this minimum level, adding extra service is unlikely to result in high productivity improvements. Therefore, sensitivity to learning effects beyond the basic level of craftsmanship is relatively low in this industry.

The ratio between product utility and network utility is relatively low in the top restaurant industry. Most people do not go to a top restaurant because of the sheer quality of the food. For quality food, a sub-top restaurant will normally be just as good. Rather they go to the top restaurant to impress their eating partners, because of the conspicuous social aspects of 'having been to eat at that restaurant' or because of the complementary utility of the 'ambiance'. Sensitivity to network effects in the top restaurant industry is therefore medium to high.

The social involvement of customers with a restaurant's products and services is generally very high. A visit to a restaurant is an experience product par excellence. Whether or not a potential customer decides to go to a top restaurant is highly dependent on the experiences and the opinions of others. This is also where the reputation of the restaurant plays an important role. The top restaurant industry is therefore very sensitive to social interaction effects.

We may conclude that with a relatively low sensitivity to scale effects and learning effects and a relatively high sensitivity to network effects and social interaction effects, the top restaurant industry is located in the upper left corner of figure 3.

ERP supplier: Oracle Corporation[6]

"Oracle Corporation is world's largest supplier of business software. Oracle's revenues in 2003 were over 9 billion dollar. The corporation builds databases, tools and applications, and provides the accompanying consultancy, courses and support."[7]

Oracle is a well-known supplier of Enterprise Resource Planning (ERP) software. The ERP industry is characterized by a high sensitivity to all four mechanisms of increasing returns. To start with, the complexity of developing ERP software implies that large investments in R&D have to be made before a company can enter the market. These investments can be regarded as fixed costs. This means that in this industry the ratio between fixed and variable costs is high and that scale effects are very important. For Oracle, additionally, the variable costs are especially low because of its operational excellence and cost leadership.

The complexity of the ERP software also contributes a lot to the industry's sensitivity to learning effects. For example, an ERP software suite consists of many different components that have to be integrated to work flawlessly as a whole. This product complexity entails that the business processes of developing, improving, installing and servicing the product are also complex. Learning can therefore take place in various ways, e.g., by developing more cost-efficient components, improving component quality or improving the way in which the components are integrated.

Another way for learning to take place within Oracle is by improving the efficiency of its business processes. An example is the way in which Oracle changed its distribution process by exploiting the advantages of the Internet. The Internet is recognized as the most efficient communication channel in the ERP industry by far. Providing information over the Internet and using the Internet as a distribution channel has increased Oracle's efficiency substantially. Currently, about 50% of Oracle's orders are submitted over the Internet, counting for 10 to

[6] The authors wish to thank drs. Martin A. ten Voorde of Oracle Corporation for his valuable contribution.

[7] http://www.oracle.com

20% of total revenues. Customer support is also largely provided through the Internet. This has several advantages: customers can now find solutions to their problems by themselves, Oracle's costs have decreased, waiting times at the support centres have decreased, customer satisfaction has increased and Oracle's employees have time to focus on the more challenging questions. As a result, employee satisfaction has also increased.
The final mechanisms for learning are the professional communities where employees of Oracle can share their knowledge.
To sum up, the products and several processes of ERP suppliers are highly complex and the sensitivity to learning effects is consequently also high.

The ERP industry is highly sensitive to network effects because of the importance of the network utility of the product. The utility of a specific ERP software suite increases with an increase in the size of the network of users of this specific suite, i.e., there are large direct network effects. A larger network size improves the possibilities for the users (firms) to connect their business processes, to communicate with each other, to share experiences and to learn how to use the ERP suite to its full potential. Oracle stimulates communication between customers by facilitating Internet user groups.
Indirect network effects are also present in the ERP industry. The availability of additional components with additional functionality can add substantial value to an ERP software suite. The same is true for the availability of adapters that enable integration between the ERP suite and other business applications and for the availability of additional services, e.g., consulting services on ERP implementation. To secure sufficient quality, Oracle supplies many of these complementary products and services itself. Oracle also provides special training courses for other suppliers of complementary products and services. To secure sufficient quantity, Oracle makes exclusive partnership deals with suppliers of complementary products and services.
We conclude that both direct and indirect network effects are very important to succeed in the ERP industry. The industry is therefore very sensitive to network effects.

Finally, the ERP industry is highly sensitive to social interaction effects. Firms that buy ERP software suites make high investments when buying the software and even higher investments when implementing it into their business processes. Therefore, the choice of an ERP software supplier is a very important one and, as a consequence, customer involvement will be high.
Firms build expectations about different ERP suppliers based on other firms' experiences, expert analyses and consultancy firms' advice. Consultants involved with the choice and

implementation of ERP software often prefer the software of a supplier with which they already have experience. Consequently, the better-known ERP products get recommended more often.

Customers in every market segment expect the ERP supplier with the largest installed base in their segment to develop its value proposition the fastest. After all, to deliver and implement a product as complex as an ERP suite, the ERP supplier needs to learn a lot about the specific customer requirements in this segment every time a new segment is entered. Oracle, when entering a new market segment, frequently works together with exclusive partners that have already built a strong position in the market segment. In this way, Oracle makes optimal use of the social interaction effect already realized by these partners.

In summary, as the customer's choice for an ERP supplier entails high involvement, there is high industry sensitivity to social interaction effects.

We can conclude that with a high sensitivity to all four the mechanisms of increasing returns, the ERP software industry is located in the upper right-hand corner of figure 3.

4. Conclusion

The presence of increasing returns in markets and firms has important consequences for the structure of the market and for the business processes of a firm. Managers need to know the sensitivity of their industry to increasing returns to address these challenges. We have presented an analytical tool that allows managers to assess their industry's sensitivity to increasing returns. Does their firm belong to the 'old world of business', where increasing returns are not that important? Does it belong to the 'new world of business', where increasing returns are all-important?

The tool we developed can be used by managers to help them to understand better the sensitivity of their industry to the different mechanisms of increasing returns and to act upon them. The importance is underlined by Arthur (1998): "Above all, management must be able to identify which of these worlds they are in, and then respond accordingly."

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FIGURE 1: Analysis of the increasing returns sensitivity of the industry

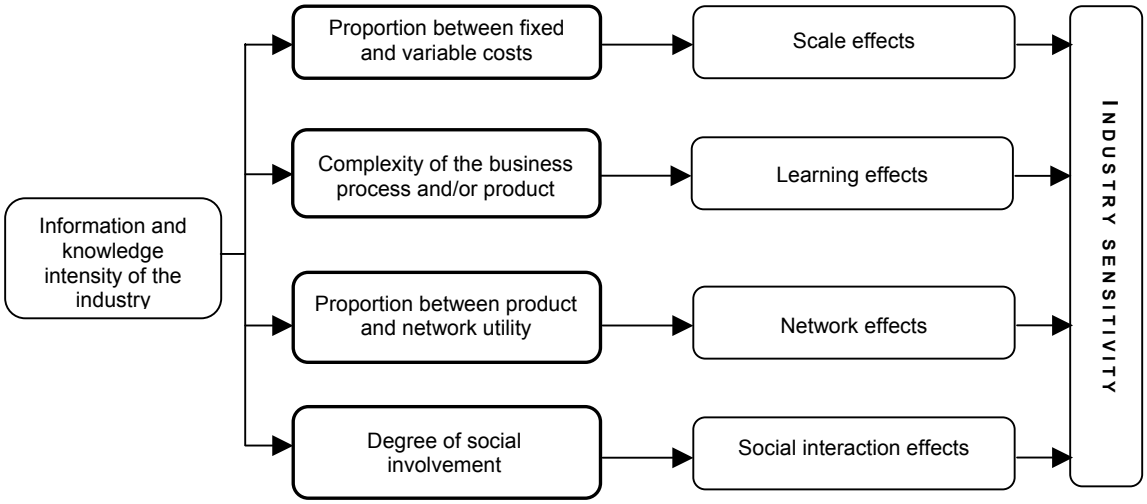

FIGURE 2: Scale effects in the old and in the new world of business

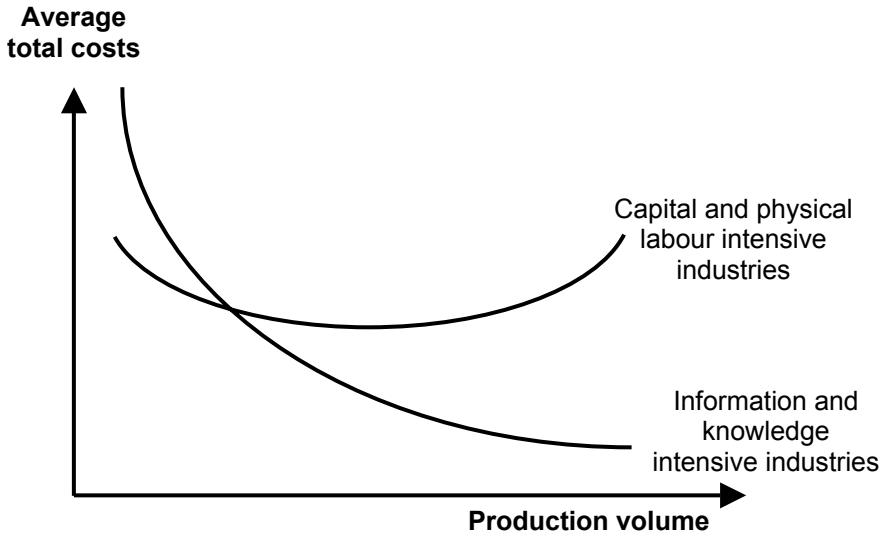

FIGURE 3: Typology of industries according to increasing returns sensitivity

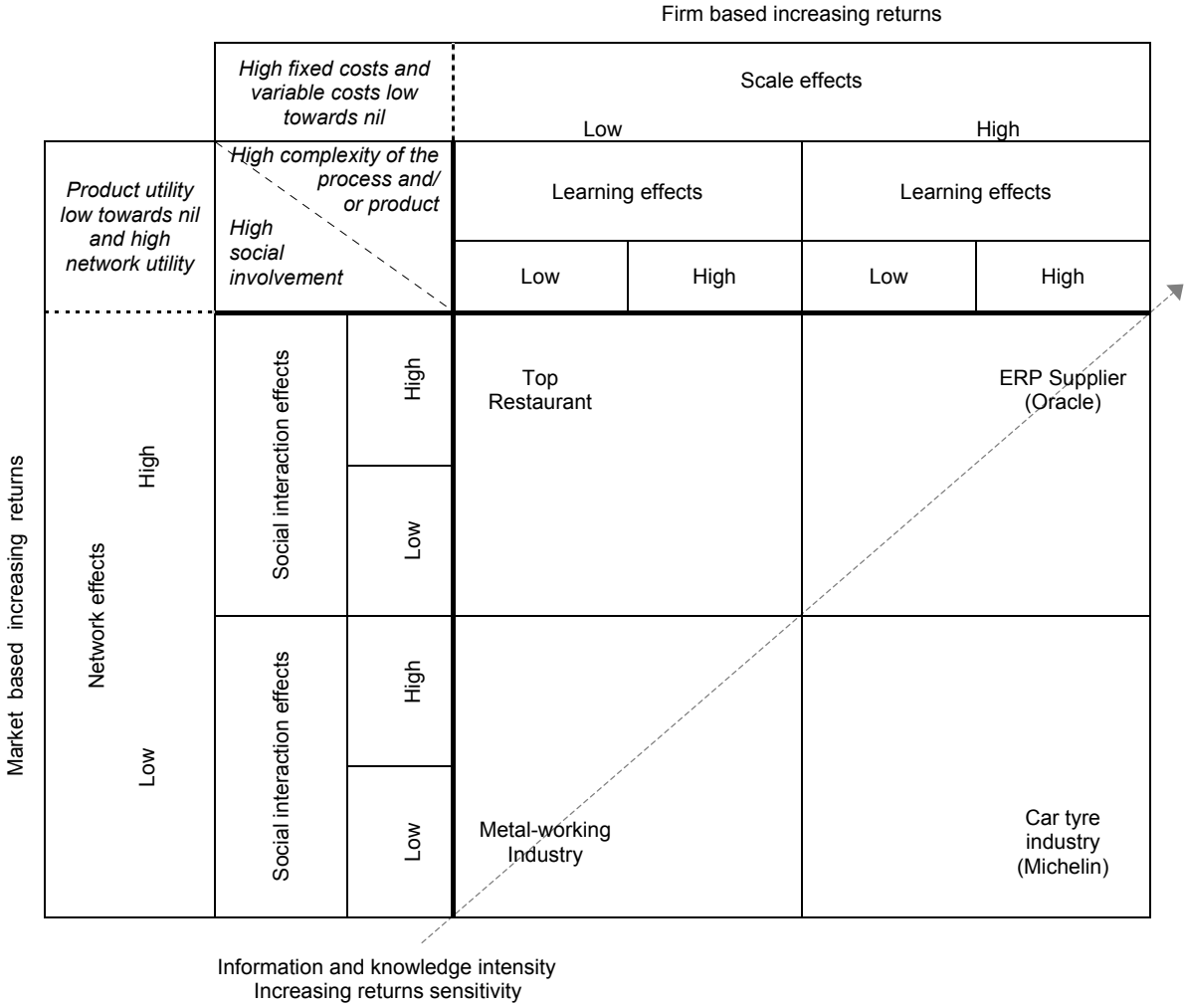

TABLE 1: Characteristics of information and knowledge intensive products and business processes

General
▪ Durable: information and knowledge can be endlessly reused, mostly with minimal marginal costs ▪ Time sensitive ▪ Intangible
Supply side
▪ High fixed costs and low variable costs ▪ Application possibilities are specific, so that fixed costs are sunk costs ▪ Information is not inherently scarce. Scarcity at the input side disappears, to a certain level ▪ Information and knowledge regenerate themselves. Therefore, new relevant information and knowledge can be obtained as a by-product during the business process. ▪ Information and knowledge can be sold and at the same time be preserved.
Demand side
▪ Information and knowledge are difficult to separate ▪ Non-rivalry good: it is possible for different entities to use information and knowledge at the same time. ▪ Information and knowledge show no decreasing returns when they are used. The value even increases with higher usage intensity. ▪ Experience goods or services ▪ De demand strongly depends on the information position and expectations of (potential) buyers. ▪ To a lesser extent a trade-off between wealth, i.e., quality as defined by the users, and reach, i.e., the number of people participating in the exchange, of information. With information this trade-off applies less as a result of the increase in connectivity and the rise of a general standard of information exchange (Evans & Wurster 2000).

TABLE 2: Assessment of the sensitivity for network effects

Ratio of product and network utility	Sensitivity	Example
Only product utility is derived	--	Salt
Product as well as network utility; product utility dominates	-	Clothing
Product and network utility are in balance	o	Car
Product as well as network utility; network utility dominates	+	Personal Computer
Only network utility is derived from the product	++	Fax

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