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**HIGH-TECH, INNOVATIVE PRODUCTS:  
IDENTIFYING AND MEETING BUSINESS CUSTOMERS' VALUE NEEDS**

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***ABSTRACT***

During the industrial purchasing process of high-tech, innovative products, various decision-influencers within buying companies evaluate the attractiveness of the manufacturer's market offering; namely the '*value*' of the offering. By identifying the various tangible and intangible value elements requested by the business customer, and the stage(s) of the purchasing process in which these value considerations take place, we develop a framework that will effectively guide manufacturers of high-tech, innovative products to market, and customize, their offer throughout the different stages of prospective business customers' purchasing process. Our findings, derived from in-depth interviews, demonstrate that manufacturers should focus on distinctive product-, service-, and supplier-related value elements, and that the particular elements depend on the different decision-influencers, as well as the different stages of the purchasing process. Ultimately, we discuss some avenues for future research.

**Keywords:** High-tech, innovative products; value benefits; tangible and intangible value elements; purchasing process; decision-influencers; product; service; relationship; medical industry.

## *INTRODUCTION*

A cornerstone of offering high-tech, innovative products is to identify, determine, and develop appropriate value elements from the perspective of customers [Anderson and Narus, 1999; Doyle, 2000; Mohr, Sengupta, and Slater, 2005; Möller, 2006]. Especially in business-to-business markets this process partly takes place through communication, interaction, and dialogue between the manufacturer and its business customers [Cespedes, 1994; Grönroos, 2004; Thomke and von Hippel, 2002]. The identification of value elements subsequently enables the manufacturer to determine and develop appropriate products (i.e., augmented product propositions) of which services and relationships could be important elements [Lindgreen and Wynstra, 2005; Ulaga and Eggert, 2006; Walter, Ritter, and Gemünden, 2001].

Although being able to demonstrate the value of a product offer is important, the identification, determination, and development of value elements is a complex issue that has remained largely unexplored in the literature [Menon, Homburg, and Beutin, 2005; Woodall, 2003]. This is despite the fact that rapid, ongoing technological product development and updates, a continually changing array of product choices, and the high product capital cost lead to the perception by the manufacturer of a fuzzy and difficult to understand buyer decision-making process [Englund and Graham, 1999]. This is made all the more complex by mature markets and strong competition, as well as an increased need to differentiate by means of intangible elements of services and relationships [Nambisan, 2001]. Manufacturers therefore need better means of understanding market behavior. The research problem in this article revolves around the development of a comprehensive model for, firstly, understanding business customer's value needs and, secondly, gaining insight into business customers' decision-making unit and purchasing process.

More specifically, the article addresses the tangible and intangible value elements desired by business customers of high-tech, innovative products, in this particular case by conducting a study of a leading manufacturer of magnetic resonance imaging scanners for the medical industry. We follow a qualitative approach by interviewing key informants in-depth within the case company, as well as with a sample of the company's business customers. In particular, business customers go through a purchasing process in which different decision-influencers could have different perceptions of value. To our knowledge this is an issue that has remained largely unexplored in the literature.

To help manufacturers of high-tech, innovative medical products demonstrate appropriate value offers to the different decision-influencers in the purchasing process, we identify (1) the composition of the decision-making unit; (2) the different decision-influencers' perceptions of the product's tangible and intangible value elements; and (3) the phase(s) of the purchasing process in which the different decision-influencers are involved. Doing this responds to calls for in-depth studies of manufacturers that, with or without success, have been involved in analyzing, creating, and delivering total solutions to business customers [Goffin, 2000; Homburg, Hoyer, and Fassnacht, 2002; Nambisan, 2001]. It also extends current research by examining value in new marketing contexts.

The following parts of the article are structured as follows. Firstly, we review aspects of value marketing including issues of value, industrial purchasing behavior, and the analysis of customer value. Secondly, we provide details of the case developed for this study. Thirdly, we present and discuss the findings. Lastly, we identify theoretical and managerial contributions, and draw the article together with research limitations and opportunities for further research.

## ***LITERATURE REVIEW***

Markets are increasingly dynamic and global in scope [Luo, Sivakumar, and Liu, 2005]. If the medical diagnostics sector is taken as an example it demonstrates that Western markets are becoming increasingly saturated and segmented, with much of the growth coming from new and emerging economies [Friedman, Goes, and Orr, 2000]. Although mature markets do demonstrate some drivers for possible growth such as increasing longevity accompanied by higher incidence of chronic diseases requiring diagnostic intervention, competitive pressures are increasing due to advancements in technology and the frequent segmented use of different technologies for diagnostic procedures [Frost and Sullivan, 2004; Pauly, 2005].

There are also changes in the healthcare business environment. In major markets, healthcare providers are now much more subject to market pressures and increasingly seek better value for money and lower overall operating costs, whilst at the same time using equipment and procedures that do not cause concern or anxiety to patients who increasingly have and exercise choice [Friedman, Goes, and Orr, 2000; Pauly, 2005]. Medical diagnostic equipment, if used inappropriately, can be harmful such as x-rays, whilst computer tomography and magnetic resonance imaging equipment can be extremely intimidating to patients [IMV, 2004; Millennium Research Group, 2006]. The latter may require patients to be inserted into closed cylinders, that is, the bore of the device. These are 'closed magnet' devices, whilst 'open magnet' devices provide a less claustrophobic and therefore more patient-sensitive experience because the architecture is based upon a design that does not enclose the patient. At the same time, this type of scanner provides the physicians with reproducible, consistent clinical results, without operator variability; it allows the operator to focus on the patient, and not the technology; and it makes it easier for the administrator to train staff, thereby increasing efficiency and throughput. From this discussion it can be seen that service and relationship elements are relevant to the purchase of a product.

Next follows a discussion of the nature of value within the healthcare environment, a development of a contextual understanding of the industrial purchasing process, and an analysis of customer value in the industrial purchasing process.

### ***The Nature of Value within the Healthcare Environment***

The augmented product concept teaches us that there are four value-adding levels of products; the core generic product, the expected product, the augmented product, and the potential product [Levitt, 1969; Lovelock, 1995]. These increasing levels of value are the basis for current and future differentiation [Nambisan, 2001; Wise and Baumgartner, 1999]. In turn, the concept introduces the notion that customers value something other than merely product attributes, and that customers see products in terms of solutions and supporting benefits [Lindgreen and Wynstra, 2005; Payne and Holt, 2001].

From a customer perspective the value of the product or service should in addition take into account the sacrifices customers make in order to acquire products or make use of services. For example, the benefit of a magnetic resonance imaging scanner is counteracted by the anxiety and discomfort associated with the patient being placed inside a closed magnet device. Hence the customer's perception of the price and other costs/sacrifices linked to both products and services should be accounted for [Ravald and Grönroos, 1996]. Paterson and Spreng [1997] propose that the customer value principle takes this into account; and models incorporating the concept of customer sacrifice, quality, and customer value have been proposed in the literature [Parasuraman and Grewell, 2000].

However, value is not a discrete entity, and there are several levels of abstraction to the customer's perception of its elements [Parasuraman, 1997; Woodruff, 1997]. Customer value can encompass many different factors such as financial [Anderson and Narus, 1998], emotional bonds [Butz and Goodstein, 1996], subjective aspects of the product or service



[Neip and Celik, 1999], and the investment of time and effort representing the sacrifice that customers make in order to obtain products or services [Zeithaml, 1988]. In other words, perceived customer value depends on the frame of reference of the customer [Zeithaml, 1988] and is a relative judgment [Sinha and DeSarbo, 1998]. Hence the perception of value may well be different for each customer or segment of customers. Perceived customer value also needs to be understood within the context of the customer's value chain, and the trade-offs between perceived benefits and perceived sacrifices [Ravald and Grönroos, 1996; Zeithaml, 1988]. Sinha and DeSarbo [1998] argue that perceived customer value is a multi-dimensional construct and therefore should be investigated by customer segment and product type.

This discussion of the value of the product to the customer leads to the conclusion that different types or segments of customers can have different perceptions of value composed of various levels of abstraction. In the context of magnetic resonance imaging scanners, hospitals and imaging centers are increasingly aware of the wider needs of their patients as end users. With diagnostic capability increasingly available and generic, intangible service elements are becoming more important. The need for a magnetic resonance imaging scan implies to the patient that there is a potentially serious and perhaps life threatening disorder. Patients are already apprehensive before commencing the diagnostic procedure, the nature of which is itself potentially alarming and stressful. Recent developments and enhancements have been designed to improve the ambience of the procedure and reduce patient anxiety. However, manufacturers – and the case company specifically – recognize the need to be more effective in marketing their innovations.

### ***Industrial Purchasing Behavior***

Vandermerwe [1993] proposes the concept of the customer activity cycle, in that customers progress through a series of sequential phases as part of a purchasing process: prepurchase,

purchase, and postpurchase. Prepurchasing consists of interest and awareness generation on behalf of the seller, and discovery and information search by the buyer. It will vary depending on whether the buyer is an existing or new customer. Postpurchasing constitutes the activities from purchasing and installation, as well as possible repurchasing, encompassing topics such as after sales service, customer service, and perceptions of quality and loyalty. Our research is limited to the purchasing phase.

The five-stage industrial purchasing process, which Webster and Wind [1972] developed, was adapted by Lacznia [1979] within the context of medical purchasing. The process is essentially centered around identification of need; establishment of objectives; identification of purchasing alternatives; evaluation of purchasing alternatives; and selection of supplier. Doyle [2000] identified seven roles in industrial organizations, whilst building on the work of Lacznia [1979] that distinguished different medical specialists and groups involved in the decision-making unit. Polley and Shanklin [1993] identified six categories of buyers in medical decision-making units: physicians, nursing administrators, technicians, administration, purchasing, and engineering. However, the actual buyer often has little influence over what is purchased. Hence research that seeks to understand the wider decision-making unit is critical.

Friedman, Goes, and Orr [2000] found that the acquisition of new technology in health care institutions is a highly significant decision due to the high initial costs, installation requirements, staff utilization, and maintenance costs. Their research determined the relative role of various decision-influencers and concluded that physicians and chief executives had greater influence on purchasing decisions compared to other decision-influencers. Also, previous research findings have noted that decision-makers in health care institutions implement a wide variety of strategic initiatives in order to meet widely varying objectives [Richardson and Gurtner, 1999].

This discussion has identified the purchasing phase of the customer activity cycle as the focus for our study. Research in the medical field to date has suggested who may constitute members of the decision-making unit and the process they may undertake in order to purchase the equipment.

### *Analysis of Customer Value in the Industrial Purchasing Process*

Ulaga and Chacour [2001] argue that value analysis is an important strategic marketing tool. However, it is a complex area with many different definitions and terminologies identified in the literature. In addition, 'measuring' customer value may not identify all value that is delivered to the customer. To overcome this the wider term 'assessment' has therefore been used [Anderson and Narus, 1998]. Whilst 'assessment' is broader than the term 'measuring' it may not take account of the levels of abstraction associated with value [Woodruff, 1997]. The term 'analysis' is therefore used to both identify and understand the value elements.

Hence value analysis implies that all the value elements associated with customer interaction can be analyzed. As each of these interactions is unique [Butz and Goodstein, 1996] and may occur at different stages of the purchasing process, each customer's understanding of value may be different. For this reason Woodruff and Gardial [1996] proposed a model linking product and service attributes with customer goals and purposes via product and service consequences. This is based on the argument that it is not the innate characteristics of a product or service that deliver value, but the consequences of them [Stahl, et al., 1999]. As a result, it is conceivable that a single attribute may offer multiple values, although multiple attributes may provide only one value or consequence.

The customer has more than just goals and purposes, including attitudes towards markets, products, suppliers, and other actors in the environment [Butz and Goodstein, 1996]. In turn, attitudes can also be influenced by the specific use circumstances [Ulaga and Chacour, 2001]

and the stage of the purchasing process. Attitudes can also be spread over several roles and functions in the customer's organization. This implies that there may be many different kinds of customer behavior due to these various influencing factors [Butz and Goodstein, 1996]. In proposing a customer value analysis framework, Parasuraman [1997] has enhanced Woodruff's [1997] model to take this into account.

The customer value analysis model in our article is derived from Woodruff [1997]. We propose modifying and contextualizing the data streams to include internal, external competitor, and patient influences on the value analysis process. Woodall [2003] suggested that customer value consists of benefits and sacrifices. The model proposed considers the value elements of customer benefits. In order to identify tangible and intangible value elements and benefits, customer behavior and product consequences must be juxtaposed. That is to say it is the customer behavior that determines whether a product consequence is a benefit or a sacrifice. This abstraction enables them all to be applied throughout all phases of the purchasing process. However, the analysis of the customer value perception of a single customer is unlikely to influence a change in the marketing mix on behalf of the selling company. Aggregating customers into segments provides a model for managerial action.

The main purpose of the customer value analysis model is to identify the possible value elements and the relative importance of the value elements and benefits through phases of the purchasing process. The application of this model is discussed in greater detail in the methodology section. The value model is the initial start point for the study, and serves as the basis for the understanding of customer value.

## ***METHODOLOGY***

The use of qualitative methods is appropriate when studying complex phenomena, and when there is a need to take into account numerous variables for studying the issue(s) at hand

[Eisenhardt, 1989; Matthyssens and Vandenbempt, 2003; Yin, 1994]. Our research both built and tested theory, with a customer value analysis model serving to connect exploratory findings with subsequent confirmatory findings [Newman and Benz, 1998; Onwuegbuzie and Leech, 2005].

The selection of the case study as a research methodology, as well as the associated techniques of this study method was in accordance with the principles outlined by Yin [1994]. Firstly, a comprehensive understanding of the case company's contextual setting was important, as analytical criteria would be developed with respect to the company's industry sector, in this instance the medical sector. Secondly, at the time of the study one of the authors worked within the company, offering a unique opportunity to access otherwise unobtainable data.

In a case study the use of secondary data and multiple interviews helps develop rich insights, and provides the basis for greater transferability of the findings to other contextual settings [Eisenhardt, 1989]. In our study, the case company is a worldwide respected manufacturers of a wide range of high-tech, innovative medical systems, including magnetic resonance imaging scanners. Our study also involved interviewing a representative sample of business customers.

For the exploratory research, the approach was to develop a customer value analysis model to add depth of understanding in the following two main areas. Firstly, to identify categories of benefits and to classify value elements using these categories. Secondly, to describe business customers' purchasing and decision-making process, as well as the level of involvement of each decision-influencer in this process. For example, the model enabled the derivation of product, service, and supplier consequences and benefits. Subsequently, the benefits were classified and clustered in order to identify the main value-adding elements for business customers. The confirmatory phase of the study aimed to consolidate these findings.

That is, the presence or absence of phenomena within the defined contextual setting could then be used to confirm or disconfirm the exploratory findings [Johnston, Leach, and Liu, 1999; Woodside and Wilson, 2003].

### ***Case Company Description***

The case company (the name of which has not been disclosed for reasons of confidentiality) was selected using theoretical sampling [Strauss and Corbin, 1998]. Firstly, the company has a high reputation for successful marketing. Also, the simplicity of the company's competitive scenario and strategic response, relative to larger and more complex manufacturers of other high-tech, innovative medical systems, made this company attractive. Lastly, the company was chosen because its open magnetic resonance scanners had largely been developed, and were now undergoing evolutionary change. This made it possible to identify, determine, and develop value elements; and was in comparison to other companies where this process had progressed less.

With a 2005-turnover in excess of €30 billion, the case company is one of the world's largest electronics manufacturers. One of the company's five divisions is medical systems. More than 30,000 people are employed in this division, which is a leading manufacturer and supplier of imaging systems through its X-ray and magnetic resonance business group. The division introduced its first magnetic resonance imaging scanner in 1983, and currently the company commands 25 percent of the worldwide market for imaging systems.

The division's marketing department has two main responsibilities. Firstly, portfolio management is responsible for the upstream and downstream application of imaging technology into commercial products. Secondly, clinical science and application is responsible for the development of new product applications and customer support.

Competition is intense with rationalization occurring within the industry. The continuing upward trend in healthcare costs in developed countries – the USA now spends 15 percent of its GDP on health care – is increasing pressure on product prices and leading to changes in buyer segmentation with differences in the balance between private and public healthcare, age and disease profiles, and the level of private health insurance that is carried.

Four main types of business customers are identified: university, teaching, and community hospitals together with private clinics / specialized imaging centers. There are varying levels of perception of the differences between product types, with magnetic resonance imaging systems increasingly being seen as differentiated. Also, market research provided by the case company identifies that patients have distinct preferences with regard to medical examination procedures, and may be prepared to pay for more choice. This provides the context in which the company requires a better understanding of the connection between product, service, and supplier attributes and benefits, as well as business customers' requirements, purchasing process, decision-making unit, and decision-influencers.

### ***Data Collection and Analysis***

To build the case, data was collected using a number of methods. Firstly, to increase the authors' familiarity with the issues at hand, the case company made available a variety of written documentation, including annual reports, research and development reports, promotional materials, benchmark studies, and business customer records. Also financial and other data relating to the subject of the study were made available. In addition, the study involved a widespread search for industry and consulting reports and also academic papers. Over 90 documents were reviewed for the study. All of this data was very comprehensive, particularly with respect to customer benefits and value elements. Following the interviews

(see below), further information provided by the interviewees, or sourced by the authors, was examined.

Secondly, key managers within the case company, as well as decision-influencers in the business customers' decision-making unit were interviewed, both formally and informally, over a period of time. With regards to business customers, all four types of hospitals participated in the study; and the decision-influencers interviewed held clinical, operational, or business responsibilities in the purchasing process. Also, a focus group discussion was conducted with four experienced product and portfolio managers in the case company to explore the value elements identified and to develop a consensus view of the customer benefits offered by the different value element groups. For all sets of interviews, interviewing continued until saturation occurred – that is, when no extra interviews yielded additional insights [Strauss and Corbin, 1998]. Each interview lasted between 60 and 90 minutes. In total, 14 interviews plus the focus group discussion were conducted with the case company, and 18 interviews were conducted with business customers. In total, this process resulted in a transcript of 125 pages (font size 12, single spaced). All of the interviewees had been involved in the development of the magnetic resonance imaging scanners or in the purchasing process for such products, and were therefore judged as the richest source of information for investigating the issues at hand.

For the value elements of patient and clinical differentiation, the findings from the interviews were corroborated by feedback from end customers; this feedback was obtained through a survey of 175 patients attending a university hospital.

Together, the above multiple methods for collecting data added to the robustness of the study's findings, compensated for the weaknesses of any one data collection method, improved the quality of the final interpretation, and helped ensure triangulation [Jick, 1979; Strauss and Corbin, 1998; Yin, 1994]. The unit of analysis was the case company or each of



the business customers and their decision-making unit. Therefore, information from each set of interviews and the secondary sources were combined into one final case manuscript.

For the interviews within the case company, questions focused on the benefits that the magnetic resonance imaging scanners offer business customers, and the value elements underlying these benefits. Also, hospitals suitable for interviewing were identified in this process. For the final sample eight hospitals were selected: four hospitals that had purchased an open scanner and four hospitals that had purchased a closed scanner. For each type of scanner, the four hospitals covered the full range of hospital types. For the interviews with the business customers, questions focused on their purchasing process, decision-making unit, and decision-influencers. It also involved the identification of benefits and the classification of value elements that the hospitals required.

In the exploratory phase, data gathered from the case company was analyzed in order to confirm the research problem. This, together with data gathered by a literature review, was then analyzed to suggest a tentative customer value analysis model. In the confirmatory phase, data reduction was largely done by within-case analysis, with benefits and value elements being identified for subsequent use in data displays. The data was also compared to the customer value analysis model, which was used as the frame of reference [Yin, 1994]. The hospital cases were then compared to analyze similarities and differences, and to gain greater understanding of the phenomenon. Theoretical categories were elaborated on during open and axial coding procedures [Strauss and Corbin, 1998]. Throughout the analysis, we tacked back and forward between literature on value and the data, which led to the development of a number of theoretical categories and sub-categories [Spiggle, 1994]. Such practices are consistent with case studies in general, as well as studies on value marketing [e.g., Beverland and Lindgreen, 2006; Wood, 1996].

Throughout the study, a number of methods for improving the quality of the research were adopted. Firstly, industry experts were used to help select the case company and, subsequently, the business customers; four researchers provided independent interpretations of the findings; multiple interviews were conducted; and interviewees were given the opportunity to provide feedback on initial findings, all of which reinforced reliability. While colleagues performed independent coding of the transcripts, interviews were conducted by the same interviewer, thereby reducing the role of bias [Lincoln and Guba, 1985; Strauss and Corbin, 1998].

## ***FINDINGS***

### ***Purchasing Process, Decision-making Unit, and Decision-influencers***

The purchasing process was based on Webster and Wind's (1972) model. In the light of the data obtained, however, this model was modified into only three purchasing stages: identification of benefits of and acquisition of product budget; identification of product specifications; and evaluation of alternatives and selection of product manufacturer.

Turning to the analysis of the hospitals' purchasing process and decision-making units, these have also been modified by the findings from the research. The model originally proposed that underlying customer attitudes influenced behavior. Building on the data derived from the case study, the attitudinal element of the model is now divided into two parts: firstly, the motivational level representing the basic needs of the customer and, secondly, the cognitive level, the strategy of the customer. The behavioral level remains unchanged. In the course of analysis, the organization charts of the four different types of hospitals were analyzed and then generalized across each of these business customers in order to arrive at a representative understanding of the composition of decision-making units at hospitals, as is identified in Figure 1.

{Insert Figure 1 about here}

The different decision-influencers were categorized into three groups: business, operational, and clinical users. With hospitals under increasing pressure to provide higher quality of health care at lower costs, the process that hospitals go through when placing an order for expensive high-tech, innovative medical products has changed dramatically [Crago, 2002]. Decision-making units were traditionally made up of physicians and nurses being involved from the medical and clinical / administrative perspectives respectively. Nowadays, however, such units also include people with business responsibilities, as well as people in charge of operational aspects of running the medical systems.

### ***Customer Benefits and Value Elements***

The initial research problem was stated as the development of a model for understanding the benefits and value elements that business customers are requiring from high-tech, innovative imaging scanners, and the gain of insights into customers' purchasing process and decision-making unit. A customer value analysis model was developed as a means by which this problem could be addressed and was the reference point for the subsequent analysis. The initial model was developed from a literature review. During the course of the study, this model was adapted in two main ways. Firstly, the collected data was iterated against the model in order to identify the product, service, and supplier attributes and their consequences as benefits to the business customers. Secondly, the customer part of the model was adapted in the light of the data collected in order to demonstrate the insight into customers' purchasing behavior. Each of these two ways of analysis will now be discussed.

Detailed analysis of the interview data from the case company enabled a large number of possible value elements to be identified, which were then classified as product, service, or supplier attributes, as illustrated in Appendix 1. In line with the customer value analysis model, the research then sought to link these value elements with their consequences and subsequent benefits to the customer. The benefits and value elements are noted in Appendix 2. In analyzing the data, care was taken to fully understand and explain the route whereby product, service, and supplier attributes were linked to customer benefits. This was done by means of data displays; illustrative examples are shown in Table 1. During the analysis, over two hundred such linkages were elicited.

{Insert Table 1 about here}

Under each of the three main categories of attributes a further seven subcategories were elicited during the analysis. These are illustrated in the fully annotated customer value analysis model included in Figure 2, and include return on investment, patient differentiation, clinical differentiation, clinical performance, ease of use, supplier reputation / differentiation, and brand.

In total, 53 value elements across these seven subcategories were identified in the exploratory phase (Appendix 2). Through an iterative process of combination, recombination, redefinition, and recategorization these were reduced to a total number of 49 elements. The 49 elements are grouped within three main categories: product, service, and supplier, summarizing the attributes sought by decision-influencers as illustrated in Figure 2.

{Insert Figure 2 about here}

The attributes and categorization will now be discussed in further detail, and illustrative quotations are included to support the findings. For a summary of the benefits and value elements per type of decision-influencer, please refer to Table 2. The percentages refer to the degree that decision-influencers within a particular group agreed on the element being of high importance.

### ***Product Attributes***

This category comprises the largest number of attributes, which are aggregated into three main subcategories: return on investment, patient differentiation, and clinical differentiation. With such expensive capital goods in a public service environment it is not surprising that there is considerable focus to price and the initial investment decision, and the subsequent returns over the life cycle of the equipment:

*"Next component of it are the investments, so which equipment you must buy next year.*

*That is derived from our so-called MIR (i.e., long range investment plan radiology). At this moment, this is defined until 2016."* (Business manager, teaching hospital)

Price was identified as the single most important product-related factor. The importance of the absolute product price together with the price of the various options available was clear from interviewees; however, life-cycle costs and the associated costs of upgradeability were also significant. These factors enabled the relative cost of the machine over its operational life to be determined:

*"Moreover, there is always a negotiation to what extent upgrades are in the price for a certain period."* (Business manager, academic hospital)

Price-related factors were by far the most important criteria for clinical and business decision-influencers, but substantially less important for operational decision-influencers. However, when considering efficiency factors relating to the day-to-day use of the equipment

patient throughput / efficiency was by far the most important criterion for the operational decision-influencers. This was also important for business decision-influencers, but much less so for clinicians. The relative importance of these criteria to each of these groups of decision-influencers is summarized in Table 2.

Of the other return on investment attributes in this category the level of agreement was greater. However, percentage uptime was universally considered to be important.

The second subcategory of product attributes relates to patient differentiation and the healthcare experience. Here all the decision influencers agreed at a high level that the comfort of the patient environment was the most important characteristic. The decision-influencers showed some variation in view with respect to the speed of the diagnosis and the opportunity for the equipment to differentiate the hospital or clinic from competitors. This was particularly important to business decision-influencers. By contrast, operational decision-influencers were particularly interested in the speed with which patients could be scanned and the quietness with which the equipment could be operated. Both of these aspects would relate to a pleasant and efficient operating environment:

*"So if you come at a doctor who finds it necessary to do some diagnostics where MR is necessary, and subsequently you hear that you have to wait for 12 weeks for such an examination, and after that examination you must return at the doctor again who might be able to say: on the basis of the examination we have found something and now we go do that and that. Then a lot of time is lost. And by setting up an MRI center as we just have, we have been successful in drastically reducing the access time for examinations. It still depends a bit on the examination, which must take place, but you can generally state that people are helped within one or two weeks at this moment."* (Business manager, community hospital)

The final subcategory of value elements, clinical differentiation comprises five elements. The most important of these, and on which there is a high level of agreement amongst decision-influencers, concerns the availability of different types of imaging techniques. These are fundamental to the diagnostic procedure, but operational decision-influencers in particular value highly the opportunity to have a state-of-the-art system:

*"Newest of newest, because it goes very rapidly. Nevertheless, you see that that question always comes from somewhere in the hospital. If someone comes with something new, then everyone wants to try that."* (Operator, academic hospital)

### ***Service Attributes***

The second major category of value elements relates to service needs. This category is in turn divided into two subcategories: clinical performance and ease of use. Considering the first subcategory of clinical performance, the major difference between decision-influencers concerned image quality. Here clinicians rated this value element the highest, being nearly twice as important to them when compared to business and operational decision-influencers. The next most highly rated value element was parameter adjustability, which was important to all three types of decision-influences, but perhaps for different reasons. The clinician for the opportunity to implement a range of diagnostic procedures, whilst the operational decision-influencer may be interested in ease-of-use and efficiency and the business decision-influencer may be considering value for money. This is supported by the finding that business decision-influencers also rated interoperability, the ability to interface with other systems, over twice as high than the other two categories of decision influencers:

*"Ease of operation is of course for them important, the protocols, if you can join and can modify easily the parameters."* (Business manager, academic hospital)

The second subcategory of value elements relates to ease of use. All the decision-influencers rate highly the comprehensiveness of applications, by which one device can undertake a wide variety of diagnostic procedures. Ease of patient handling was rated by the operational decision-influencers as the most important factor for them:

*"You must have been in a magnetic resonance space sometimes – concerning the ceiling.*

*What is it about them: well, those patients who will lie and look at the ceiling and – I do not know if this is from (company name) or not, maybe not according to me – there are a lot of small holes in the ceiling and it just makes the patients a bit crazy. I think the trolley is also in fact very bad. What you expect of a trolley is that you can move a patient all by yourself... at least from bed to table, but that is in fact impossible."* (Business manager, academic hospital)

*"It must have a cardio pack, it must have this and this, it must have something of meaning for the internist, but you must also handle that normally in the sense of: you indeed need applications that actually prove their extra value"* (Business manager, community hospital)

Within the ease-of-use category the major difference between decision-influencers concerned patient handling. Operational decision considered this value element to be over three times more important to them than it was to clinical decision influencers.

### ***Supplier Attributes***

This category divides into two subcategories of supplier reputation / differentiation and brand.

There are eight value elements in the former subcategory with a number of differences between the various decision influencers being evident. Supplier innovativeness and the accuracy of the supplier representatives' information were not rated at all by operational decision-influencers for whom this attribute perhaps has a low profile. All decision-



influencers were concerned about service response time and technical support, and in this context the service infrastructure was also recognized by the decision-influencers. With regard to the association of decision-influencers with the brand, some of the findings are summarized in Table 2.

Overall, this table demonstrates the importance of relationships at the personal, product, and company level. In particular, company representatives have a key role to play in managing the relationship with the business decision-influencer. The perceived performance of the equipment and of the quality of the relationship will be important in gaining repurchase to which the decision-influencers generally appeared to be predisposed. Whilst the clinical decision-influencers rated the value element concerning products from the same supplier or family lower than the other two categories of influencers, the findings show that they are more likely to be influenced by word-of-mouth from friends and colleagues.

{ Insert Table 2 about here }

The understanding of the purchasing process, decision-making unit, and decision-influencers was elicited by iterating the case data against the original customer value analysis model. Using the model, it was possible to identify the customer value elements and benefits. By understanding the opinions of all decision-influencers involved, an added richness and depth of understanding of the relative importance of each of the value elements and benefits was obtained. Each of the business customers is driven by the basic motivation to acquire diagnostic equipment. However, each of the customer types can value the benefits differently.

## ***DISCUSSION AND CONCLUSIONS***

Understanding what customers of high technology, innovative medical systems seek in terms of benefits and value elements is still not fully understood. Our study has assisted in understanding the nature of the decision-making process, the involvement of various decision-influencers, and the differing value that each of them places on a range of product, service, and supplier value elements. The customer value analysis model has been shown to be a useful tool in relating product attributes to customer needs. Whilst this is applied within a clearly defined and narrow context the principle offers interesting possibilities for future applications.

It is evident that with high-cost equipment and the critical nature of its use the decision-influencers are critical to the purchasing process and successful sales. Whilst the headline price will attract considerable focus simply due to its magnitude, decision-influencers will also consider a wide range of other criteria that impinge upon the value in use of the equipment. These will include such issues as the ability to upgrade the equipment and extend its life cycle, the range of diagnostic procedures that it is capable of undertaking, and the opportunity to integrate with current equipment in order to provide seamless and efficient diagnostic services.

Whilst this study has considered the purchase process, the pre- and postpurchase stages are clearly of interest. It is evident that budgeting and planning are important for such major purchases, particularly in a public service environment. The study has also shown that postpurchase timescales can extend for 10 years and probably more, as equipment may well remain in operation once depreciated.

Product-based criteria are fundamental but not exclusive to a purchasing decision. All decision-influencers agreed that the patient experience was very important. From this it can be concluded that the opinion of the end users, the patients themselves, can indirectly influence the purchase. Uncomfortable patients can take longer to process through the diagnostic

procedure. Poorly planned systems can require patients to move or be moved from one place to another, whilst carefully planned systems allow patients to walk or be wheeled into place. As an example of the planning required to ensure ease of operation, even the location of the garbage bins was considered important to patient throughput in one hospital, with clear implications for the ergonomic design and ease of use of the equipment itself.

Patients may be naturally apprehensive at the prospect of an examination and the closed magnet device can be particularly distressing. This may even require the patient to be anaesthetized before the procedure can take place with inevitable consequences for cost, throughput, and efficiency. Less obvious, but nonetheless important factors such as the appearance of the device and the noise it makes can also impinge upon the patient's peace of mind to the detriment of the diagnostic procedure and efficiency of the process. Open magnet machines avoid the necessity for a patient to enter a cylindrical tunnel, but rather they are inserted sideways into the machine. Hence the patient-delivery system and the machine itself must be capable of coping with patients suffering from disabilities, obesity, and other factors that can reduce efficiency and effectiveness. Taking account of the patient's emotions and attitudes in designing not just machines but end-to-end systems and processes will more comprehensively address the value attributes that purchasing influencers seek.

As is well known in the context of industrial purchasing, relationships between supplier staff and business customer's decision-influencers in particular are extremely important. This influence can be extended to other categories of buyers; and suppliers should also consider the role of word-of-mouth and positive referral. Established suppliers potentially have the benefit of positive relationships and familiarity with their equipment, but should also understand the need for both hardware and software to seamlessly interface with products from other suppliers to provide comprehensive diagnostic solutions for purchasers. Finally, service and technical support are highly rated and particularly with such long product life cycles and the

critical nature of the application these service-based factors can be integral to the decision-influencers' perception of the supplier and product.

This study has sought to demonstrate the importance of intangible service- and relationship-based factors to the successful marketing and sales of high technology, capital equipment. This detailed and in-depth qualitative study has elicited 49 distinct value elements that are evaluated by the three categories of decision-influencers. The findings clearly indicate that different decision-influencers seek different combinations of value elements during the purchasing process. The study has highlighted the importance of intangible value elements such as patient comfort in the design not just of the equipment itself, but of the diagnostic environment and process. Appropriate service and technical support is critical to maintaining the relationship and eventually gaining repurchase.

### ***Implications for Manufacturers of High-Tech, Innovative Medical Systems***

For each of the three decision-influence categories identified, our findings compellingly demonstrate the importance for manufacturers of high-tech, innovative products to adapt their value elements, and selling arguments, throughout their customers' purchasing process. From these findings, we derive important courses of action that should be taken by industrial firms.

### ***First Stage of the Purchasing Process: The Role of Business Decision-influencers***

In the first stage of the purchasing process, manufacturers of high-tech, innovative products should focus on convincing business decision-influencers, who are identified as the principle decision-influencers (Figure 1). Regarding the tangibles value elements, and in order of importance, it implies focusing on four key elements: product price, patient throughput, product application availabilities, and patient comfort. In order to deliver these tangible value elements to industrial purchasers, manufacturers must especially focus on product design

issues during product development. Since product design determines the large majority of manufacturing costs [Ullman, 1992], design considerations will consequently influence the product's price, which also appears crucial at this stage of the purchasing process.

Also, product design has been found to influence both the amount of service support required and the way it can be delivered [Goffin, 2000]. This brings us to the service component of the value elements. Business decision-influencers focus more specifically on two subcategories of value elements pertaining to the product's ease of use: the comprehensiveness of the application and the interoperability between different sites and locations. Therefore, manufacturers of such products should not focus on its clinical performance during the first stage of the purchasing process. Indeed, it would be a waste of time and resources since business people appear to rely on clinical decision-influencers to assess the latter. Finally, manufacturers should build and emphasize their reputation by focusing on elements such as service response time, service innovativeness, and their brand name as a testimony of good buyer-seller relationships. In other words, buying their brand needs to be associated with the perspectives of good future bilateral relationships.

### *Second Stage of the Purchasing Process: The Roles of Clinical and Operational Decision-influencers*

This stage is an extremely important stage of the purchasing process for one good reason: a manufacturer will not get the opportunity to convince operational decision-influencers again given that these decision-influencers are present solely during this stage of the purchasing process. Practically, and for the product-related issues first, it means demonstrating the same value elements as those demonstrated to business decision-influencers; except for pricing, which appears less important for operational decision-influencers. Additionally,

manufacturers should provide greater attention to the scan procedure duration and to developing a state-of-art system. Further, it implies to establish that the offer encompasses good clinical support and adjustability. Lastly, the most critical concern for operational decision-influencers consists of making sure that the product permits easy patient handling. With limited time and resources, manufacturers of high-tech medical products should not focus on supplier-related value elements with operational decision-influencers. These findings can be explained by professional culture, which influences interpretations and strategies for actions [Howard-Grenville, 2006], as well as the need for possession of different types of knowledge [Sackmann, 1992]. Indeed, past research suggests that functional experience (i.e., operational decision-influencers) is influential in shaping belief structures, which can lead to differences in decision-making [Bowman and Daniels, 1995].

Even though clinical decision-influencers are also central at this stage of the purchasing process, we refer to their most valued elements in the following section. Industrial manufacturers should, however, take into account that the latter stakeholders are also key decision-influencers in the second stage of the purchasing process.

### *Third Stage of the Purchasing Process: The Roles of Clinical and Business Decision-influencers*

Since we have previously focused on the sought value elements of business decision-influencers, we formulate advice to create and demonstrate value to the clinical decision-influencers. Even though we expose the current findings at this stage of the purchasing process, it could be that a manufacturer will not gain the opportunity to engage in this third stage of the purchasing process without having convinced clinical decision-influencers in the second stage. The third group of decision-influencers does not significantly differ from business and operational decision-influencers regarding their expected product-related value.

If it is also mostly the case for service-related value elements, a fundamental concern for clinical decision-influencers lies in image quality. This was highly emphasized by all interviewees. Lastly, more than 50 percent of this group of stakeholders stated that their personal experience with the brand influences their perceptions of the value of the offering.

### ***Limitations and Future Research***

As in most research, this study has limitations that impact our interpretation of the findings, while at the same time suggesting directions for future research. These limitations must therefore be considered. Firstly, a limitation of our study can be found in the single-case approach. Although information was obtained from a representative sample of the case company's business customers and not merely from the relevant business division within the company itself, the approach still reflects the same company. Secondly, the research was limited to the purchasing phase, rather than also including the pre- and postpurchasing phases. Due to the high capital cost of the equipment concerned and the long service life, the customer activity cycle could extend over a period of many years. Also, the context of medical systems may limit the transferability of the findings. Follow-up studies covering additional cases over the entire activity cycle, as well as other industry contexts are needed to uncover the full range of possible customer benefits and value elements. Thirdly, end customer input was only indirectly achieved through surveys. Obtaining direct end customer input, particularly on the value elements, could increase the validity of the customer value analysis model. Fourthly, the study would be improved if it were conducted in real time and longitudinally, rather than relying on historical information and interviewee recall.

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**Table 1. Examples linking product, service, and supplier<sup>a</sup> attributes to customer benefits**

Product, service, and supplier attribute(s)	Feature(s)	Customer benefit(s)
"Trying to control the waiting lists is, of course, very important. That's an enormous issue. For some of the medical examinations we have waiting times for more than two months."	<ol style="list-style-type: none"> <li>1. Waiting list for medical examination</li> <li>2. Waiting time for medical examination</li> </ol>	<ol style="list-style-type: none"> <li>1. Patient throughput / efficiency</li> <li>2. Fast diagnosis of patients</li> </ol>
"We always want more than the supplier can deliver for a certain sales price. Purchasing negotiates about the price. I have remarked that we have some sort of partnering contract with the supplier. We have a special relationship with the supplier."	<ol style="list-style-type: none"> <li>1. Product sales price</li> <li>2. Partnering with supplier</li> </ol>	<ol style="list-style-type: none"> <li>1. Initial product price</li> <li>2. Buyer-seller relationship</li> </ol>
"Magnetic resonance imaging possibilities grow enormously fast. That you see really grows annually with about 10 percentage. Therefore, each system should be upgradeable. For example, we have sent in an application for an update of a scanner because we want to have mammo coils and punction tables so this is already considerably well defined. "	<ol style="list-style-type: none"> <li>1. New product development</li> <li>2. Product upgrading</li> </ol>	<ol style="list-style-type: none"> <li>1. Innovative products</li> <li>2. Software upgrading</li> </ol>
"A friendly design helps. Further, of course, all kinds of things to go with the scanner like music, the ability to watch TV – I always think of these features as being something of a private clinic to attract patients."	<ol style="list-style-type: none"> <li>1. Style of resonance scanner</li> <li>2. Patient distraction</li> </ol>	<ol style="list-style-type: none"> <li>1. Patient comfort and environment</li> </ol>
"Yes, the issue of understanding the system always comes back. When you have to teach people to operate the system. Let people work on the system without extensive training and education. What I really would want there to be is an agreement with the supplier to offer training and education."	<ol style="list-style-type: none"> <li>1. Short learning curve</li> </ol>	<ol style="list-style-type: none"> <li>1. Comprehensiveness of applications</li> </ol>
"Some patients suffer from claustrophobia. They are so claustrophobic that they do not dare be inserted into a closed scanner. There are also patients who are so big that they are not able to go into a cylindrical resonance scanner. What you also often see is that people have such a weight that it is not possible to place them in a cylinder. The table we use has a maximum of 150 kilograms, but there are still patients who succeed in putting down a larger weight on the balance."	<ol style="list-style-type: none"> <li>1. Claustrophobia</li> <li>2. Obesity</li> </ol>	<ol style="list-style-type: none"> <li>1. Patient scanning not done elsewhere</li> </ol>
"Yes, patients are really scared. We have to warn them of the noise before the medical examination starts. Then you give them the earphone and you switch on the radio at its hardest, and the patients still do not hear the radio because the radio simply is not loud enough."	<ol style="list-style-type: none"> <li>1. Noise</li> </ol>	<ol style="list-style-type: none"> <li>1. Low-noise scanning procedure</li> </ol>

<sup>a</sup> 'Supplier' refers to the company manufacturing the magnetic resonance scanners.

**Table 2. Benefits and value elements per type of decision-influencer**

Benefits and value elements [in percentage]	Type of decision-influencer		
	Business	Clinical	Operational
<b>Product-related</b>			
<i>Return on investment:</i>			
Entrepreneurial assistance	14	14	0
Patient throughput / efficiency	86	57	100
Initial product price	100	100	50
Product maintenance costs	29	29	0
Product option prices	14	14	17
Lifecycle costs / product upgradeability	14	29	33
Marketing assistance	14	14	0
Uptime percentage	57	43	50
Product discount options	29	14	0
<i>Patient differentiation:</i>			
Scan patients who cannot be treated elsewhere	57	57	67
Being different than competition	57	29	0
Diagnosing patients quickly	57	14	17
Scanning patients less sedated	14	29	0
Patient comfort environment	71	71	100
Procedure duration	14	43	67
Low-noise magnetic resonance procedures	14	29	50
<i>Clinical differentiation:</i>			
Product application availabilities	86	86	67
Product customization possibilities	29	57	33
Dynamic imaging	14	0	17
Possibility for using other modalities	29	14	17
Having state-of-art system	43	29	67
<b>Service-related</b>			
<i>Clinical performance:</i>			
Improved imaging during movements	29	29	0
Image quality	57	100	50
Clinical support	43	43	67
Parameter adjustability	54	71	83
Software upgradeability	14	29	33
<i>Ease of use:</i>			
Comprehensiveness of applications	100	71	83
Protocol availability	29	57	67
Proactive support of the manufacturer	14	0	0
Interoperability between different sites and locations	71	57	33
Doing the same on workstation and console	14	29	0
Easy data handling	57	43	33
Easy patient handling	43	29	100
Easy system description	29	14	17
Easy to install	29	43	17
<b>Supplier-related</b>			
<i>Supplier reputation and differentiation:</i>			
Service response time	57	43	33
Supplier innovativeness	57	43	0
Supplier product reliability	57	43	17
Supplier's multi-modality solutions	14	14	17
Technical support	43	43	33

Supplier accuracy	29	0	0
Regional service infrastructure	14	29	33
Availability during product lifetime	14	14	0

*Brand:*

Personal experience with brand and reps	43	57	33
Buyer-seller relationship	86	29	50
Product from current supplier	43	14	50
Product conforms to specifications	14	29	17
Home country manufacturer	0	33	33
Friend / doctor recommendation	29	43	17

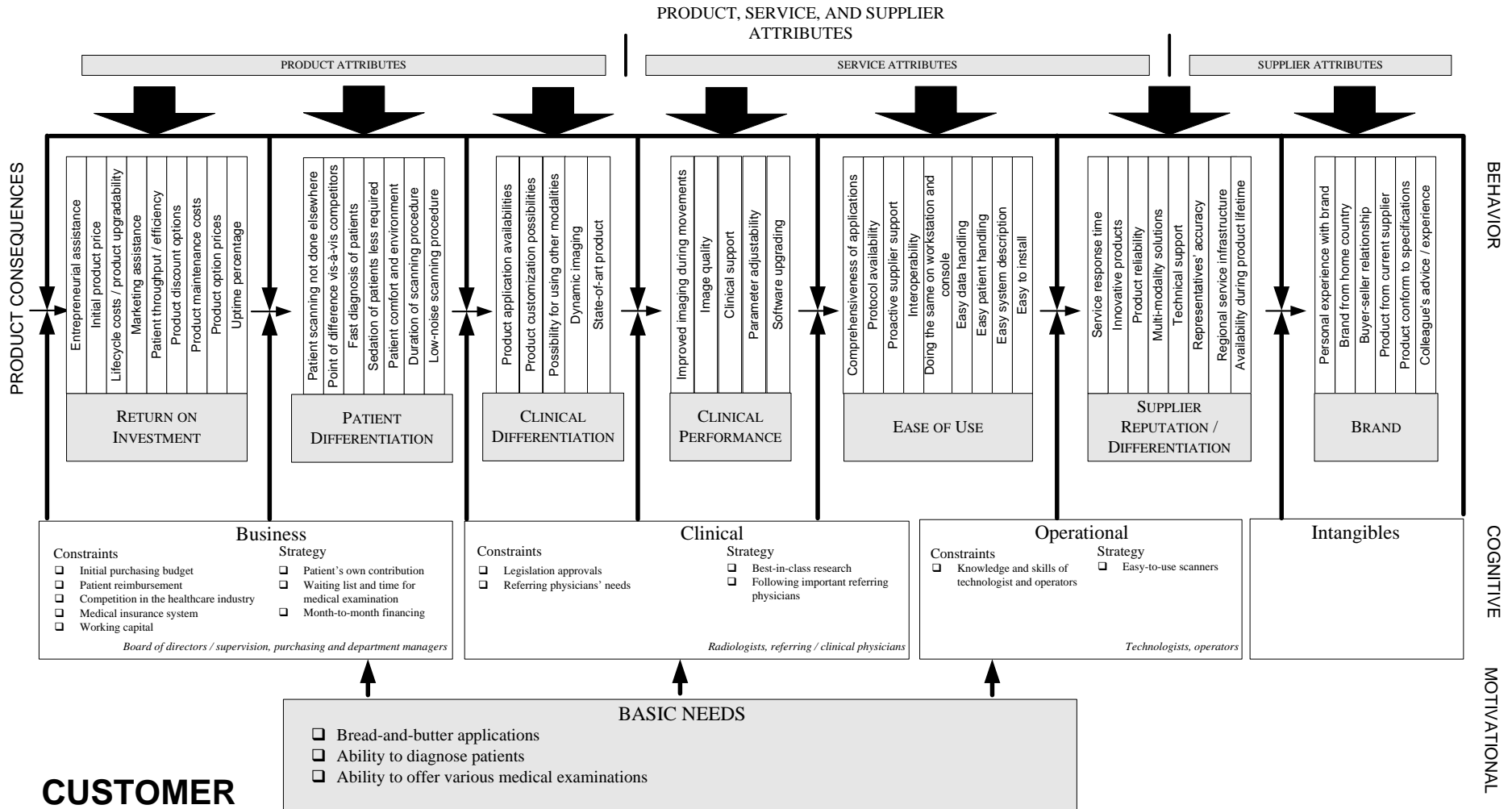
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**Figure 1. Stages and decision-influences in the purchasing process**

Stages	Clinical				Operational		Business			
	Radiologist	Referring physician A	Referring physician B	Clinical physician	Technical services	Operator	Board of directors	Supervisory board	Purchasing manager	Department manager
1. Identify benefits of and acquire budget for magnetic resonance imaging scanner	X						X	X		X
2. Identify specifications of magnetic resonance imaging scanner	X	X		X	X	X				X
3. Evaluate alternatives and select supplier of magnetic resonance imaging scanner	X	X		X			X		X	X

**Figure 2. Customer value analysis model**



## Appendix 1. Possible product, service, and supplier attributes

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### *Product attributes:*

(Lateral) moving table	Magnet type
Acoustic level of gradients	Magnet weight
Archival devices	Matrix
Bore length	Minimum ceiling height
C-arm	Minimum room size
Coil type (inner design)	Newest available technology used
Coil type (outer design)	Number of channels
Combined workstation and console	Number to market (1st, 2nd, etc.)
Computer room size	One magnetic resonance software platform
Contrast resolution	Open magnetic resonance technology
Cryogen refill frequency	Options available
Cylinder	Parallel imaging
Data acquisition speed	Parameter adjustability
Dedicated separated application packages	Patient aperture
Depreciation of the scanner	Pole diameter
Depreciation per year	Product installed base
Discounts	Product market share
Double doughnut	Product reliability
Double table use	Product user satisfaction ratings
Echo time	Product version
Equipment room size	Production costs
Field strength	Repetition time
Field of view	RF shielding
Flooring	Scalable RF system
Functional magnetic resonance imaging	Siting costs
Generic user interfaces magnetic resonance	Siting space
Gradient levels	Slew rate
Gradient strength	Signal-to-noise ratio
Image reconstruction time/speed	Spatial resolution
Imaging speed	Spectroscopy
Imaging volume	System performance
Industrial design	System reliability
Installation / implementation protocol	Table moves up/down
Installation costs	Table weight limit
Installation time (week / weekend)	Temple
Integrated transmit-receive body-coil	Total application packages
Level of scanner vibration	Upgradeable systems
List price	Uptime guarantee
Magnet room size	Width of patient bed
	Window availability in site

*Service attributes:*

(Patient experience) Design services	Online magnetic resonance community
After sales services	Online store
Annual maintenance costs	Onsite training
Applications help line	Operating lease with service
Applications training	Operational reports
Asset performance reports	Press and media communication kits
Bond (tax exempt)	Preventive maintenance program
Capital lease with service	Proactive support
Clinical protocol sharing	Profit sharing finance options
Clinical training / science	Promissory note
Contact vendor with console	Remote management
Customer communities	Service costs
Customer workshops	Service repair quality
Design and build services	Service response time
Distance learning	Service speed
Equipment services	Site planning services
Extended service coverage hours	Software upgrades
Fee per scan	Start-up application training
FMV lease	System enhancement training
Full-service contracts	Technical phone support
Installment loan	Technical support and training
Learning tools provided	Term loans
Lease agreement	Training and education modules
Lease with service	Training at vendor's location
Leasing options	Upgrade advisor
Maintenance agreements	Uptime guarantee
Managed trade-in LCB	User meetings
Market analysis	Utilization management
Magnetic resonance online FAQ or resources	Virtual training
Magnetic resonance imaging reimbursement	Web-based technical support tools

*Supplier attributes:*

Application specialists	Supplier engineering history
Brand awareness / value rating	Supplier financial performance
Collaboration with its suppliers	Supplier installed base
Compatible with other radiology equipment	Supplier market share
Continuous magnetic resonance development	Supplier mission
Experience with wide variety of sites	Supplier number of yearly patents
Generic user interfaces radiology	Supplier operating profit
Home country supplier	Supplier other products and businesses
Local or regional supplier representatives	Supplier part of conglomerate
One magnetic resonance software platform	Supplier performance
Products approved by law fast	Supplier promotion activities
Refurbished equipment department	Supplier sales volume growth
Sufficient representatives per potential customer	Supplier sustainability / corporate social responsibility
Supplier acquisitions and mergers	Supplier user satisfaction ratings
Supplier branding	Supplier vision
Supplier branding campaign	

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## Appendix 2. Possible customer benefits and value elements

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### *Return on investment:*

- Flexible financing
- Patient throughput / workflow / efficiency
- Initial price
- Yearly service/maintenance contract price
- Option prices
- Lifecycle costs (e.g., upgradeability)
- Marketing assistance
- Uptime percentage

### *Patient differentiation:*

- Scan patients who cannot be treated elsewhere
- Being different than competition
- Providing a better healthcare experience
- Diagnosing patients quickly
- Scanning patients less sedated
- Patient comfort environment
- Procedure duration
- Low-noise magnetic resonance procedures

### *Clinical differentiation:*

- Patient monitoring
- Number of available same products in market (1st to market?)
- Available applications and imaging techniques
- Customization possibilities of the system
- Real-time imaging (e.g., for interventional or treatment procedures)
- Off center scanning (e.g., motion tracking studies)
- Patient accessibility
- Having state-of-art system

### *Clinical performance:*

- Improved imaging during movements
- Image quality
- Clinical support of the vendor
- Parameter adjustability
- Software upgradeability
- CAD (more consistent diagnosing)

### *Ease of use:*

- Comprehensiveness of applications (e.g., may lead to short learning curve to use system)
- Protocol availability (e.g., to execute complex studies easily)
- Proactive support of the supplier
- Interoperability (between different sites and locations)
- Networking (between different imaging modalities)
- Purchasing options and services online
- Doing the same on workstation and console
- Easy data handling
- Easy patient handling

*Supplier reputation and differentiation:*

- Supplier partnering (other key company)
- Supplier ethical behavior / ethics / sustainability
- Service response time
- Supplier magnetic resonance market/segment leadership
- Supplier innovativeness
- Products user satisfaction (experiences of other users)
- Supplier financial reliability
- Supplier product reliability
- Supplier 's multi modality solutions

*Brand:*

- Personal experience with brand and reps
- Supplier brand
- Product (family) brand
- Home country supplier
- Friend / doctor recommendation

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