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Abstract

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ABSTRACT

This paper proposes and describes a conceptual tool, namely the Rehabilitation (Assistive) Technology (RT) product taxonomy, as a framework for analysing Rehabilitation Technology products and extracting demand determinants. The ultimate objective of this work is to provide demand and supply related actors with a meaningful tool for identifying and focusing on specific aspects, which may be directly or indirectly related to existing or new products, so that demand and consumption allocation decisions can be targeted, evaluated and/or predicted.

KEY WORDS

RT product taxonomy, demand determinant

Introduction

It is often argued that the rapid technological growth has created, as many if not more barriers than those removed, confronting the ultimate objective of the socio economic integration of disabled and elderly people. Irrespective of the status and validity of the above statement, it is evident that in many areas of every day social activity (e.g. person-to-person communication), the emergence of new technologies (e.g. in Telecommunications) has brought about products whose effective operation demands considerable skills (both technical and non-technical), which may be hardly available to the ordinary population, let alone disabled and elderly people. On the other hand, some of the existing products do not meet (or meet partially) end-user requirements, others lack in quality, while yet some others do not meet the expected safety requirements.

In the light of the characteristics and peculiarities of the Rehabilitation (Assistive) Technology (RT) market, as identified and extensively analysed in (TIDE-CORE, 1992a; Stephanidis et al., 1993a; Stephanidis et al., 1993b; Sandhu et al., 1993; Carruthers et al., 1993), it has become evident that the decision making required for a company to identify timely and respond appropriately to variations in demand and consumption, is a complex process that requires careful and targeted planning.

Towards this objective, a conceptual tool is proposed which serves the purpose of gaining an understanding of how demand can be determined in the RT market, through focusing and assisting the decision making process, at different levels, on the issues which are critical for the demand for RT products and services. In other words, the conceptual tool proposed and described in this paper provides a methodological approach for analysing existing or future RT products in relation to certain criteria which characterise their presence in the market. Moreover, it can be thought of as a tool facilitating navigation through complex decision making search spaces towards point(s) of optimum exploitation of the identified opportunities.

A multi-purpose conceptual tool

The proposed conceptual tool for analysing and determining the demand for RT products and services is constructed to satisfy the following conditions. First of all, it should be sufficiently expressive to accommodate a relevant subset of the critical issues related to demand forecast in the RT market. In this context, the tool should possess the required flexibility to enable assessment of existing product lines and reveal the reasoning behind their relative success. In addition, such a tool should be able to predict, qualitatively, the relative potential economic activity of new RT products, on the grounds of some distinctive characteristics. Secondly, the conceptual tool should be capable of identifying the entities of the market of a product (e.g. active actors and factors involved) which, if influenced, may lead to potential increase of the relative economic activity of the product. Finally, the tool must be formal to facilitate a consistent and systematic approach to the on-going work in the RT field.

The proposed conceptual tool, takes the form of a taxonomy and consists of a set of criteria relating to the economic environment, market structure, product based criteria and technology related criteria. It should be noted that the identified criteria are indicative and not an exhaustive list of all the critical issues that may need to be addressed. This set of criteria will be called *the RT product taxonomy* and they are depicted in the diagram of Figure 1, which highlights the intended use of the taxonomy.

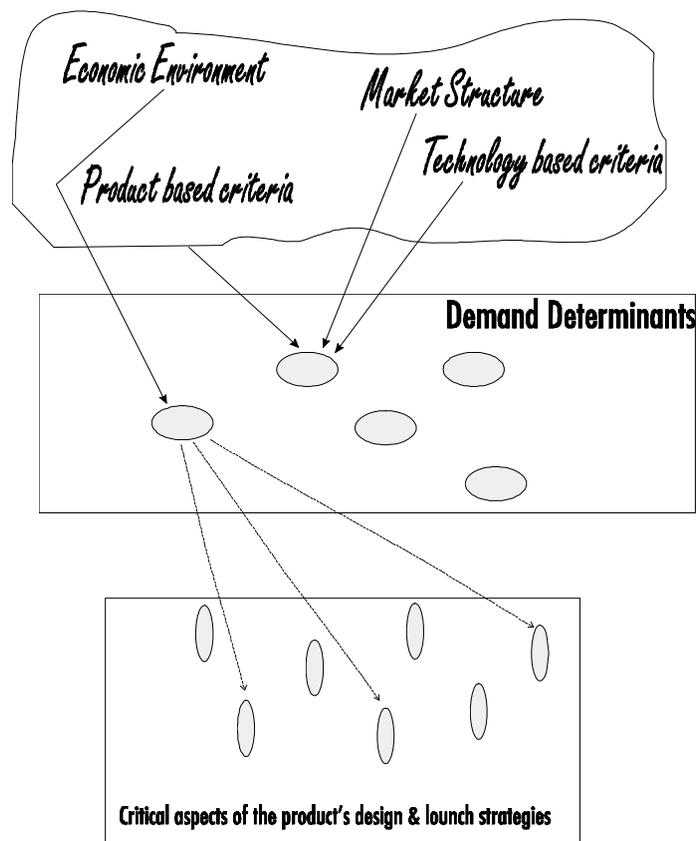


Figure 1 : The intended use of the taxonomy

(i) Economic environment

In defining and/or assessing methods for approaching new markets, a critical issue which is frequently ignored or misunderstood is the economic environment which accounts for the price

levels, rate of growth, potential growth as well as various institutional factors which may predominate the market. Such factors are mainly external factors to the company, but nevertheless, they have considerable influence on the way the company operates at present or will have to adapt in the future. Through a careful consideration of the structural characteristics of the RT market (i.e. market size, target population characteristics, size and type of competitors, their relevant technological positions and focus, the innovation strategies they pursue, etc.) as well as the type and intensity of competition (e.g. dominant competitive strategies, sources of competitive advantage, projected expenditure on technology, etc.), the company is able to assess its own strengths and weaknesses compared to other RT actors. Moreover, the company is able to identify emerging threats, their underlying sources and potential impact, as well as strategic alliances and partnerships for exploiting opportunities for innovation.

(ii) Market structure

In the case that a market exists, identifying the market structure for particular product lines is critical for the manufacturer, as the entire economic activity of the company may depend upon the outcome of this task. Indeed, pricing policy, output levels and costs, are strongly related to the type of the market structure. For example, the Rehabilitation Technology market in Europe is fragmented and oligopolistic in principle. Such a conclusion permits reference to a body of existing knowledge which describes the valid range of courses of action available to the oligopolist, in terms of a set of "models of oligopoly" (Koutsoyiannis, 1980).

On the other hand, product innovation is very often concerned with creating new niche markets. In this case, the market structure does not even exist. Therefore the manufacturer is more concerned with the size of the potential market, ways of maintaining market leadership if imitators enter this niche, etc. The term "first mover advantages" is frequently used to describe the motivation leading to the search to build new markets through product innovation.

Although oligopoly seems to be the prominent market structure in the European Rehabilitation Technology market, there are product markets operating under the conditions of a different market structure. Such markets are usually fragments of a wider market (e.g. product fragmentation or geographical fragmentation), but nevertheless comply to different norms of operation. Moreover, apart from the market structure for a particular product, the intensity of the competition is often a critical factor for the operation of the market. For example, a highly competitive oligopoly operates differently from a less competitive oligopoly. In addition, oligopolies may also differ depending on the prominent competitive strategy (i.e. product differentiation, price, product quality, etc.). Thus, when analysing existing or new product lines, the type of the product's market must be identified and investigated.

(iii) Product-based criteria and significance of present or anticipated future economic activity

In addition to the market structure criteria, the RT product taxonomy must be capable of assessing existing product lines in terms of their importance and performance with respect to their relative current or future potential economic activity. In other words, there are products with outstanding potential, others which have reached the saturation stage, and others whose economic activity in relative terms may or may not be significant. Moreover, the assessment of a product's economic activity should take place in the context of various product based criteria. The following criteria have been found very useful:

- the product's target market, that being either a small or large scale market;

- the type of product (e.g. tool versus appliance¹);
- the purpose of the product (i.e. wheelchairs aim to assist the user in performing a function, whereas robotic arms aim to replace a function);
- the existence of economies of scale;
- the form of support a product is associated with (i.e. tangible versus non-tangible²);
- the method of provision (i.e. on-loan or otherwise);
- the intensity of care that the product is aiming to provide³ and the relative location of the carer and the cared for⁴;
- barriers to entry, tariffs, subsidies, etc.

A product which is currently associated with significant economic activity in relative terms, is wheelchairs. Another product line with considerable future potential is alarm systems. The product taxonomy should be capable of verifying such hypothesis or empirical findings. In other words, it is required to explain why wheelchairs experience such a significant level of economic activity and more importantly, why alarm systems are regarded as a product line of outstanding future potential. To facilitate this, technology based criteria are included.

(iii) Technology based criteria

Technology-based criteria, amongst other things, characterise the concept of innovation (Vernardakis et. al, 1993). Innovation is usually realised either as a new product or a new process/method. Additional aspects to be elaborated by applying technology based criteria are the direction and rate of technological change, technology spin-off effects, the present and future role of technology synergies, etc. Such technology based criteria justify the argument that alarm systems is a product line with outstanding future potential since it signifies the beginning of a new area of development, that of the smart house and the electronic devices which are required in such an environment (TIDE-TMS, 1991). It is therefore important for the RT actor to be aware of such innovative tendencies and of the underlying technologies, so that decisions regarding investment in technology and effective market strategies can take place.

¹ An appliance is a type of product whose underlying technology operates nearly independently of the user and, as a result, the effective use of the product is not controlled by the user; a tool on the other hand is a product whose effective operation is usually dependent on the user. Note that the "tool-appliance" construct can be applied either at the level of the product or at the level of a part or function of a product, with considerable implications for the design and launch strategies of the product.

² Tangible supports refer to all RT products and services which may be needed by people with special needs (i.e. disabled and elderly people). Intangible supports, on the other hand, cover a variety of social and emotional contributions including companionship, intimacy, re-assurance and psychological security. As far as tangible care is concerned, it is common to distinguish between health care and social services.

³ There are distinctions based on the intensity of care required by the various groups of people with special needs. This covers both tangible and intangible care. Sinclair and Williams, in (Gullen et al., 1991) argue that the intensity of care required by people with special needs can be considered as short-interval, long-interval and critical interval care. Short-interval care accounts for all those actions which are required by the client on a regular basis and at relatively short time intervals. Examples of this type of care are feeding and dressing. Long-interval care is also required on regular basis, but with greater time intervals between each specific instance of need. Shopping for example may be classed under long-interval care. Finally, critical-interval care refers to those forms of care which must be provided at the time of need, no matter the time interval. Help with toileting is an appropriate example here.

⁴ Distinctions can be made based on the relative location of the carer and the cared-for. For example, the relative location of the end-user with respect to the co-ordination centre has been found to be a strong determinant of the demand for alarm systems in Finland (Ekberg, 1993; TIDE-CORE, 1992b).

Consequently, careful selection and appropriate utilisation of technology is an equally critical issue which should be addressed when attempting to analyse demand for existing or new products. In the European RT market, the technological spectrum is substantially wide. It includes traditional RT technologies which have been exploited (and characterise the vast majority of present date products), RT technologies which, as yet, have not been utilised in the RT market, and technologies which are not necessarily RT technologies, but have reached maturity and can be transferred in the RT market (Vernardakis et al., 1993).

Moreover, an attempt should be made to evaluate the different directions in which the exploitation of technological advancements follow or could follow in the future with respect to existing or new products. In general, it is expected that some of the new and technologically advanced products and services will be useful and accessible by disabled and elderly people, others irrelevant or inapplicable, while on the other hand, others could actually introduce hindrances. Such hindrances may be attributed to the product or service itself or its intended use, while in some cases they may also arise from the type of technology adopted. Consequently, it is made possible to derive future extrapolations regarding the impact of those technologies on the market, their exploitation and deployment into new products, thus determining the extend to which future mismatch between user requirements and new products and services can be prevented.

In summary, a minimum set of criteria have been identified as critical for determining demand for, and facilitating analysis of, RT products. This set of criteria are depicted in the diagram of Figure 2 and formulate an RT product taxonomy; they also constitute the proposed conceptual and analytical framework for the characterisation and assessment of RT products.

Discussion

Rehabilitation Technology is a multi-disciplinary field which demands active participation of professionals and users. It is imperative, that such groups can be facilitated to concentrate on the different aspects of the Rehabilitation Technology market pertaining to their perspective and involvement. However, it should be noted that irrespective of the particular world view adopted or the perspective used for analysing the market (i.e. demand versus supply), it is extremely important to identify a common denominator which will take account of the impact of a given product on the intended user.

The RT product taxonomy, as introduced in this paper, provides a conceptual tool which can accommodate many different perspectives of analysis depending on the criteria to be applied and the target objectives of the analysis. Some of them are briefly elaborated in the following paragraphs.

(a) *Product focus and analysis*

The taxonomy can be quite useful in analysing a particular product, in terms of:

- the product's market structure,
- importance and performance levels,
- whether or not economies of scale for the particular product exist
- what are the underlying technologies,
- whether or not innovation is critical to the product success
- the type of innovation (e.g. product innovation, process innovation, supply pull, demand push)

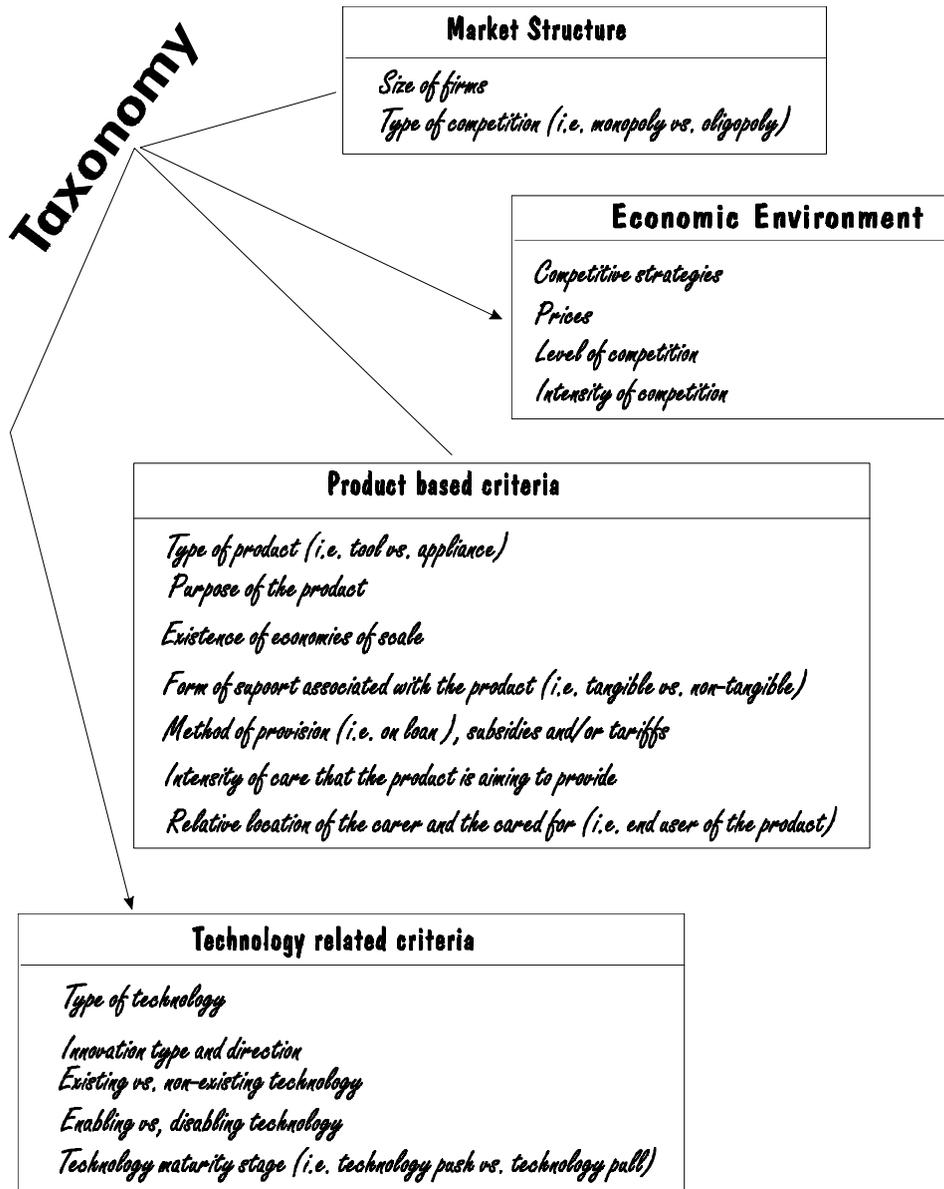


Figure 2 : The constructs of the Rehabilitation Technology product taxonomy.

Additionally, the taxonomy may be used as a guide to extracting the determinants of demand for existing or future products. During such an analysis, additional important issues are revealed such as the role of the intermediaries, the overall awareness of consumers and professionals relative to a particular product, etc. Moreover, assessing the performance and importance of the product's relative activity will outline current and future trends in consumer's purchasing behaviour as well as the technologies that need to be employed in the production process. It will also highlight the restructuring required to take place in an organisation's workforce to accommodate the introduction of new technologies or a change in the current production methods. Finally, the ability to identify products with outstanding potential and their constructive assessment is likely to direct the company's research and development activities towards technology sectors which are prominent or will become prominent in the production of the product; thus, breaking current barriers and introducing new opportunities for both the consumer and the product itself. Hence, from such an analysis, links can be established between technologies and products, application domains and needs of users within these domains,

manufacturers and areas of specialisation as defined by a particular set of needs or an application domain or even the set of technologies employed.

(b) Indication of deductive factors influencing certain aspects of the demand for this product

The product based criteria, which formulate a component of the taxonomy, serve a two-fold purpose. First of all, they provide the explicit constructs which influence the demand for that product (e.g. existence of economies of scale versus small scale markets, appliance versus tool, product associated with tangible versus intangible type of support, method of product provision, demand for end-user resources required for the operation of the product, etc). Apart from the immediately obvious value of such constructs for qualifying demand related aspects of a particular product, such criteria imply additional considerations (e.g. deductive determinants of demand) which may prove to play a crucial role in determining the demand and consumption patterns of the intended users. For example, given the appropriate product-based criteria, it is possible to extrapolate the influence of deductive factors (such as the influence of filtering, user involvement, etc.) on a particular end-user or product. In the following example, several related issues are further elaborated by referring to two products which both provide tangible form of support, are covered by a national provision system, but belong to different product categories (one being a tool and the other being an appliance). The example, provides an indication of the type of analysis which can be facilitated by the RT product taxonomy, the relevant criteria depending on the objectives of the analysis and the influence of certain factors such as user involvement and role of intermediary actors on a specific function such as the selection of a product.

The prominent recipient of RT services, as already stated, is undoubtedly disabled and elderly people. There is evidence to suggest that the user's involvement in a technical aid's life cycle, namely feasibility, development, design and implementation stage is critical, if the aid is to serve its purpose successfully (Gullen et al., 1991). On the other hand, user's involvement in the field of Rehabilitation Technology, has traditionally been limited due to several factors, some of them being lack of education, training, the gap between the end user and the manufacturer which is continuously becoming wider. Furthermore, an equally important factor is the "attitudes" of end users. Such attitudes vary, depending on the user group being considered.

In an ideal situation, disabled and elderly people would be highly motivated, knowledgeable and financially independent. A user who possesses these three attributes is able to substantially influence many functions of the provision system. But in real life, it is very unusual for a user to possess the knowledge, level of motivation and financial resources required to ensure active involvement or influential participation in the various decision-making activities of any provision system.

In general, the decision about the solution for a particular end user can be also influenced by various parties such as :

- medical doctors and health professionals;
- rehabilitation professionals;
- families of end users.

Co-operation amongst all parties mentioned above should ideally be the desirable means for ensuring that the appropriate solution is chosen and prescribed. However, there are many factors which may restrict this co-operation and its outcome. Such factors include, amongst others:

- the kind of solution regarded as appropriate;
- the user's cultural level;
- the user's motivation to undertake the challenges of independent living;
- financial restrictions, etc.

In this section, the discussion focuses on the issue of the user's involvement in selecting the preferred solution, and consequently demand. The importance of this involvement becomes apparent when one considers that it is the end user who has to live with this solution, not the professional prescribing it. Therefore, the user should be encouraged to play a more active role in deciding what, when and how to use the solution.

To be able to play such a key role, however, the user's awareness should be raised with respect to the broad spectrum of issues involved. Various limiting factors may restrict the involvement of users during the selection of a solution, forming barriers which need to be overcome. The more prominent of these factors are as follows:

- user's involvement in selecting a solution is sometimes restricted by the kind and purpose of the solution itself;
- user's involvement in selecting a solution may also be restricted by the amount of skills demanded for the appreciation of the potential benefit and value associated with a particular solution;
- user's involvement in selecting a solution may finally be restricted by the level of competence which increases slowly compared to the rate of technological growth.

Although the above limiting factors may lead to different barriers restricting user involvement in selecting a solution, the major obstacle influencing this involvement results from the interrelation and the parallel influence which all three restricting factors may exercise. In other words, in most cases it may be that all of them influence the selection process (e.g. the type of solution in conjunction with the increased amount of skills demanded for appreciating the purpose and function of this solution, as a result the solution's underlying technology, may in turn lead to lack of competence).

Examining some of the variables influencing user involvement, some important aspects of the solution selection process, and consequently demand, are revealed highlighting the characterisation and provisional assessment of potentially successful corrective actions.

The discussion that follows will concentrate on the argument that the user's decision space, in the context of the aid selection process, is largely dependent upon the degree of the user's reliance upon the device. In other words, the user's decision space is a function of the purpose of the device. Several possible outcomes are examined which highlight the multiplicity of factors which become relevant. A diagrammatic representation of this function is depicted in the diagram of Figure 3.

On the x-axis the purpose of the device is addressed. As one moves away from the origin of the axis, the relevant devices are those aimed at replacing a function (e.g. prostheses and orthoses). In contrast, points closer to the origin of the axis correspond to devices whose functional purpose is to assist the user in activities of daily living (e.g. moving around the workplace).

For devices lying further away from the centre of the Cartesian axis the decision space⁵ of the end user and consequently the corresponding involvement are reduced. On the other hand, this space is likely to be increased for products which assist the user performing certain tasks of daily living. In fact, it could be argued that in the latter case the end-user demands considerable freedom of choice whereas in the former case the user is totally dependent upon the professional expert.

⁵ The end user decision space depicts the capacity of the end user to consciously and purposefully influence the product selection process as well as the ultimate choice of technical aid. As the competence and level of expectation of an end user increase, so does the corresponding decision space.

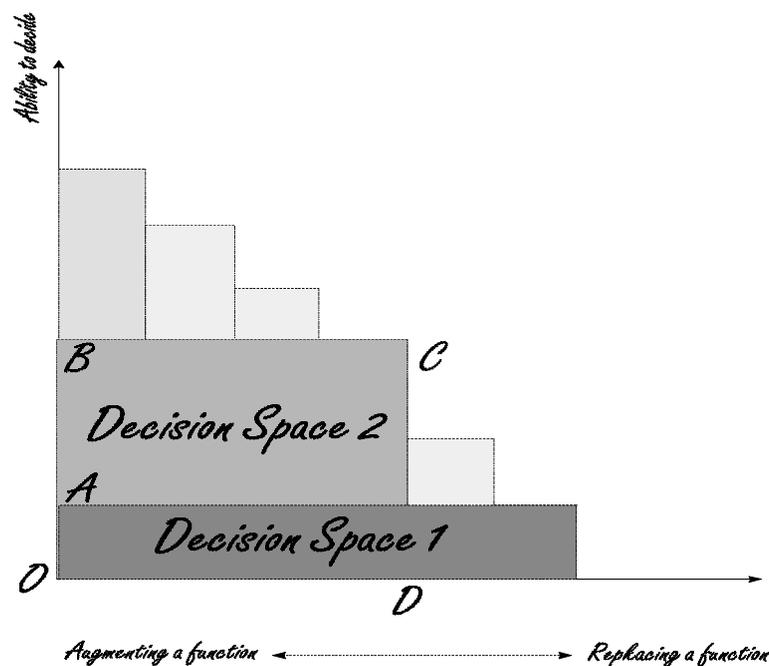


Figure 3 : Purpose of device versus end user decision space

The above argument, is diagrammatically represented by the curve of Figure 3. The diagram illustrates a function $y=f(x)$ whose value for $f(x)$ is reduced as x departs from the centre of the axis. To illustrate this issue, any two particular technical aids can be chosen and explained. For convenience, wheelchairs and robotic arms will be selected and evaluated in the context of the present discussion.

A robotic arm is a technical aid whose functional purpose is the replacement of a specific function. Hence, according to Figure 3, it is located at a distant point F, on the x-axis. Wheelchairs on the other hand aim to satisfy primarily some of the mobility needs of disabled and elderly people. It is quite frequent, however, that the selection of a particular wheelchair is also influenced by other types of human need which may be referred to as secondary needs. It becomes apparent, therefore, that the functional purpose of a wheelchair is considerably different from the functional purpose of a technical aid, such as robotic arm, whose objective is the replacement of a specific function. Thus, let a particular wheelchair type be located at point D on the x-axis.

An additional aspect which should be addressed is the fact that the difference in the purpose of the two devices (e.g. assistance versus replacement of a function) is obviously reflected on the design and specification of the products. Hence, in the case of the robotic arm the user is either totally dependent upon the professional's advice or can only demand a relatively small decision space, this being represented by the rectangular OAEF, in Figure 3, whereas in the case of the wheelchair, the user is likely to demand considerable freedom of choice and may dominate the selection process. The latter decision space, represented by the rectangular OBCD in Figure 3, may also be the result of the influence of the various secondary needs which may be fulfilled by the use of the particular wheelchair, and consequently the various application domains in which this product can be used.

The above argument is also supported by the quite different levels of skill and competence required by the respective users of the two products, in order for them to be able to appreciate the technological characteristics of each product and their respective use.

It can therefore be seen that the professional may be required to play a twofold role, namely an advisory role and frequently the role of the decision maker. A prerequisite for the professional,

to be able to play such a key role, is "well-structured" and "all-around" knowledge of the RT market. Unless such a condition is met, there is a potential risk arising from subjective decision making by the Rehabilitation professional or the intermediary actor on behalf of the end user. Such decisions may be suboptimal for the end user and give rise to conflicts of opinion (and/or interest) between the end user and the intermediary actor. This highlights the requirement for formal education and continuous training for rehabilitation professionals, so that they become aware of state of the art developments.

Upgrading of existing knowledge, in the light of on-going technological developments, however, is an issue which is closely related to this work. In particular it is important to identify and analyse the relationship between the rate of technological development and specific variables whose influence is critical. A statement of issue, is therefore, whether or not knowledge resulting from technological development is effectively communicated to the wider spectrum of interested users, (disabled and elderly people and rehabilitation professionals). Today's highly fragmented and oligopolistic RT market does not facilitate the effective communication of the results of technological development amongst the relevant actors. In particular, rehabilitation professionals often find themselves in a position where they are not fully aware or able to appreciate the distinctive attributes of different solutions which can be made available to the client⁶.

(c) The RT product taxonomy as an evaluative and/or predictive tool

The discussion so far, has focused on the definition of sets of criteria which constitute a framework, the RT product taxonomy, for analysing RT products and extracting demand determinants. However, the scope and implications of such a framework may be substantially extended to facilitate additional aspects (e.g. evaluation and prediction), depending on the subset of criteria which could be selected. Thus the RT product taxonomy may be appropriately constructed (i.e. through selective choice of criteria) to enable evaluation of RT products as well as prediction of certain key aspects. In this context, there is a wide range of issues to be addressed or form the subject of evaluation or prediction. Some examples are:

- *products may be evaluated according to the requirements for training and education of the user as a result of some product based criteria such as the appliance versus tool construct⁷;*
- *evaluation of the outcome of functional assessment and isolation of the cases where professional judgement may not serve the best interests of the end-user⁸;*
- *identification of functions or attributes of innovative RT products which may provide opportunities for mass production, accommodation of a wider spectrum of needs and end-users (i.e. not necessarily restricted for use by disabled and elderly people), etc.*

Obviously, the above examples are only indicative of the range of relevant issues which could be facilitated by the RT product taxonomy. Additional "horizontal" aspects of this market, such as aspects of innovation in the RT market, may also be appropriately accommodated and addressed by specific criteria of the taxonomy resulting in identifying conditions, requirements

⁶ A "solution", in this context refers to an existing technical aid, modified technical aids and adaptations.

⁷ It has been argued in (TIDE-CORE, 1992a; Vernardakis et al., 1993) that in the case of an appliance the user should be trained how to operate the product, since the effectiveness of the operation is beyond the users control, whereas in the case of a tool the user should be trained both on how to operate the product as well as on how to operate it effectively and efficiently. The above aspect raises numerous considerations which must be addressed by the designer/developer/producer of the product.

⁸ see earlier example.

and opportunities for innovation in this market (see Vernardakis et al., 1993, where the RT product taxonomy is used as a building construct for a model of innovative RT products). Depending on the use of the taxonomy (i.e. evaluative versus predictive), there are certain conditions to be observed, with respect to the selection of appropriate criteria, which will guarantee useful and meaningful results. Thus, for example, if the taxonomy is to be used as an evaluative tool, then the selected criteria would probably be independent of the analyst's aims and objectives. Whereas, if the taxonomy was to be used as a predictive tool, then the criteria to be selected would probably be dependent on what the analyst is attempting to predict.

Conclusion

The primary objective of this paper has been to define and present in a brief and concise manner a conceptual tool, namely the Rehabilitation Technology product taxonomy, and demonstrate the use and implications of such a tool in analysing products and extracting demand determinants. Four categories of relevant criteria have been identified and described as the constituent elements of the taxonomy, indicative of the kind of constructs which should be addressed. The taxonomy is proposed as a flexible tool which can be appropriately reconstructed to accommodate the objectives of a specific analysis. This reconstruction involves the selection of study-specific criteria out of a superset of relevant and related constructs as has been outlined in this paper. Consequently, the RT product taxonomy provides a framework for analysing Rehabilitation Technology products and extracting demand determinants. The ultimate objective of this work is to provide demand and supply related actors with a meaningful tool for identifying and focusing on specific aspects, which may be directly or indirectly related to existing or new products, so that demand and consumption allocation decisions can be targeted, evaluated and/or predicted.

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References

- Carruthers, Humphreys, A., S., Sandhu, (1993) : The market for Rehabilitation in Europe : A demographic study of need, in Rehabilitation Technology, Ballabio, E., Plancencia-Porrero, I., Puig de la Ballacas, R., (Eds.), ISO-Press.
- Gullen, K., Moran, R., (1991) : Technology and the elderly, Work Research Centre and EKOS, Dublin.
- Koutsogiannis, A., (1980) : Modern Microeconomics, Second Edition, The Macmillan Press Ltd.
- Sandhu, J., McKee, I., Carruthers, S., (1993) : The role of evaluation in the development of RT products, in Rehabilitation Technology, Ballabio, E., Plancencia-Porrero, I., Puig de la Ballacas, R., (Eds.), ISO-Press.
- Stephanidis, C., Vernardakis, No., Akoumianakis, D. (1993a) : The demand, supply and provision system of the RT market in Europe : a modelling perspective, paper submitted for publication.

- Stephanidis, C., Akoumianakis, D., Vernardakis, N., Fairhurst, C., M., Lidaki, C., Marinaki, L., Papadopoulou, M., (1993b) : Exploiting the value of models in the Rehabilitation Technology market", Proc. ECART-2 Stocholm, Sweden.
- Stephanidis, C., Vernardakis, Akoumianakis, D. (1993) : A methodological approach for modelling the RT market in Europe, FORTH / ICS, TR - 090, Heraklion, Crete.
- TIDE-CORE (1992a): Draft Deliverable No. 4, "Models of selected market areas/segments of the RT market", Hoensbroek, The Netherlands.
- TIDE-CORE (1992b): Draft Deliverable No. 5, "Model Validation", Hoensbroek, The Netherlands.
- TIDE-TMS, (1992): Sector report "Inventory of know-how centres, key specialists, appropriate projects and the assessment of possible consortium partners and potential prime *contractors*".
- Vernardakis, N., Stephanidis, C., Akoumianakis, D., (1993) : A conceptual framework for determining critical aspects of innovation in the European Rehabilitation (Assistive) Technology market, paper submitted for publication.