

Situation room analysis in the Information Technologies Market

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It would be interesting and scientifically rewarding to investigate the possibilities of designing a “sheltered” *situation room* for the Information Technologies and Telecommunications services and products market. The proposed framework might be employed during any phase of the life cycle of an IT&T service or product, i.e. from the early design phases up to the phase of its launching into the market; it aims to be utilised by the various actors involved in the IT&T market, such as the industry e.g. software developers, network infrastructure suppliers, horizontal service providers, e.t.c., policy makers, regulation, legislation and standardisation bodies, as well as the R&D community and end users.

In this paper an approach is presented which builds on the notion of a situation room; the latter term is broadly used in the context of military operations and has specific semantical connotations. We, deliberately, exploit the term’s ‘past’ and propose an analytical scheme based on it, which aims to assist planning initiatives and decision making in the application domain of the Information Technologies and Telecommunications (henceforth: IT&T) market.

The foundations of the framework to be established are independent from the characteristics of any national IT&T market context, being thus in accordance to the concepts of the emerging global Information Society and an international IT&T market. However, the framework can be customised to describe specifics of any national market context.

IT&T market requires a separate examination from other types of market, since it possesses idiosyncratic characteristics, such as these of innovation, technological change, transfer of technology and technology diffusion, which require the development of a design space where different scenarios will be subject to *in vitro* assessment and evaluation. Where for other markets it might be sufficient to employ a descriptive model with both quantitative and qualitative attributes, and utilise a simulation oriented approach in order to examine market behaviour under different circumstances, the IT&T market obeys to a set of non homogeneous rules and ‘laws’ that act in such ways so that forecasting is not trivial to perform even in cases where - in other application domains - well established forecasting techniques would be employed and stereotypical decision making procedures be used without any reconsideration.

The proposed framework aims to be utilised by the various actors involved in the IT&T market, such as:

- the industry - in particular small and medium enterprises (henceforth: SMEs) (e.g. software developers, network infrastructure suppliers, horizontal service providers, e.t.c.),
- policy makers,

- regulation, legislation and standardisation bodies,
- the R&D community, and finally
- end user organisations.

The employment of the framework may take place during any phase of the life cycle of an IT&T service or product, i.e. from the early design phases up to the phase of its launching into the market.

The latter is of great importance when considering the current trends in the development of IT&T services and products, where mixed phases approaches and bottom-up methodologies have 'outstreamed' well established methodologies such as the *Waterfall model* and the *Spiral model*. Such a non-systematic (even chaotic) behaviour in the development and marketing lifecycles of IT&T products can not be encountered with traditional methods. It is in this respect that we propose the use of *situation room* analysis to assist decision making.

The proposed approach

The proposed approach may be viewed at two different levels:

1. Viewing the market of IT&T services and products as a system to be studied as a whole, i.e. consisting of different and various elements. Modelling at this level will be henceforth called *interproduct modelling*.
2. Viewing each member of the previously mentioned system separately, with primary focus to its constituents. This second modelling level will be henceforth called *intraproduct modelling*.

Interproduct modelling: This level could be also called macroscopic since it aims mainly to the abstraction and classification of product- and service-specific characteristics and to the examination of characteristics and rules that are driving the life cycle of the various IT&T services and products; in this respect, the modelling of IT&T services and products market may provide means to assist decision making at the level of strategic planning for the different involved parties in that market.

Involved parties in the IT&T market include amongst others:

- software developers at the level of the provision of development platforms;
- software developers at the level of the particular applications;
- telecommunications and network operators and infrastructure providers;
- terminal suppliers;
- providers of special services;
- regulators, policy makers, governmental agencies with appropriate responsibilities;
- regional and local authorities that may encourage and promote the usage of the particular services and products;
- national and international standardisation bodies;
- e.t.c.

Full account of the views of all involved parties should be taken by using schemes and techniques such as stakeholders analysis, in terms of specifying a “continuous space” for each of the involved parties where any decision / act in the IT&T market is assessed and evaluated, in the light of the different (possible) scenarios that are usually existing concurrently in the market.

Intraproduct modelling: In this level, each product is viewed and examined with respect to its constituents, and modelling of the factors that are “driving” the market profile of IT&T services and products is carried out.

It is easy to anticipate that each product is unique as it is the result of a development process that has converged to the support of a set of functionalities and characteristics in a specific way; the technologies used to develop a product, as well as a set of both objective and subjective benchmarks that characterise a product (e.g. MIPS or transfer rate, and usability respectively) constitute the product’s profile.

Work to be carried out in this level aims to the rationalisation of the different factors by means of examining each one factor separately as well as the interdependencies and interactions that are developed under different circumstances between different sets of them.

Similarly to the first level, a continuous space needs to be defined that will characterise a product in terms of its constituent technologies and characteristics.

The proposed methodologies

A set of techniques and methodologies are employed that come from different disciplines:

Game theory: Game theoretical models and algorithms will be used for the description of the IT&T market at both levels. More specifically at the interproduct level, the different products can be viewed as ‘competing’, and the various actors that “drive” the IT&T market as acting competitively or in cooperation (e.g. by forming coalitions), in order to satisfy specific (market) goals.

Moreover, at the *intraproduct* level we have the different product characteristics that are “competing” between each other (while they also sometimes “cooperate” by forming coalitions too). Evolutionary game theory may especially be used to describe the interactions developed between the different actors in both levels.

Cost-benefit analysis: Quantitative estimates of the costs borne by the various actors in the IT&T market under the different scenarios will be provided, while also a quantification of the benefits, at least on a relative basis. Extensive use of cost-benefit (henceforth: CB) analysis techniques will be made.

Whenever CB analysis becomes impossible, since the benefits can not be valued even at a relative basis, *cost-effectiveness* analysis will be employed, which is a commonly used technique employed in various fields such as the public health, etc. In contrast with CB analysis, cost-effectiveness analysis does not place a monetary value upon the benefits and it is in this respect that it might be viewed as an alternative to CB, since the market

development scenarios offer both tangible benefits (as short term consequences of specific costs) as well as intangible ones that can not be assigned any monetary value with a high certainty coefficient - at least for a short term, while there is a high degree of uncertainty as far as the long term is concerned.

As cost - benefit analysis is a procedure for making long run decisions, the majority of traditional CB methodologies relies on comparing the present value of the particular costs with the present value of the benefits. For instance, a hypothetical IT&T market regulatory action should only then be undertaken if the present value of the benefits exceeds the present value of the costs.

Since such an approach would ignore the distinctive nature of the IT&T market (due to an idiosyncratic “coupling” with the terms of innovation, technological change, transfer of technologies and technology diffusion), and be therefore criticised as myopic, forecasting techniques will be also used. In addition to using forecasting techniques, a deliberate semantical enhancement of the notion of “cost” will take place in order to reflect total quality costs. In this respect, the term of cost should indicate (operating) total quality cost, as the latter is associated with both the cost of control as well as the cost of failure of control for any market situation.

Mathematical modelling and simulation: Use of mathematical modelling techniques and a limited conduct of simulated market situations will also take place in order to *in vitro* emulate the effects that different market structures might have on the domain of IT&T services and products. The investigation of the different possible IT&T market scenarios can build on probabilistic models where each one of the identified scenarios is supported with a specific probability.

The different costs and benefits of providing adaptable / adaptive IT&T services and products (i.e. services and products that can be adapted proactively or dynamically to the particular market conditions) will also be examined in this phase.

More specifically, pathways will be investigated so that traditional regulation methodologies, which can be characterised as monolithic in the way they analyse situations rather than proceed to a synthesis of the involved issues, might be replaced by novel ones.

A word about risks

The main risks of the proposed work lie both in the difficulty of selecting quantitative data for the validation and verification of the models developed as well as the diversity of the factors that are anticipated to be found significant. In order to gain “control” these risks, theoretical work for the establishment of a situation room should run in parallel with case studies from the different IT&T market.