ECONOMIC VIABILITY OF TECHNOLOGY CONVERGENCE: A STRATEGIC ANALYSIS OF OPPORTUNITIES FROM FIRM'S PERSPECTIVE

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Background

The information and communication technology (ICT) sectors are technologically converging rapidly for past few years. Major determinants of this process are technological innovations coupled with the liberalization of the telecommunications market. Both of these factors lead to a further process of mergers and alliances by firms in order to attain advantageous positions in the newly emerging markets or to retain existing ones. Since technology convergence is a wholly new phenomenon seen from an economic perspective, high risk and uncertainties are invariably associated with it.

Technology convergence can be defined as a process by which the telecommunications, broadcasting, information technologies and entertainment sectors converge towards platform independence resulting in a unified market structure. This effectively means that a terminal (e.g. a television, computer, mobile phone or other such devices) is able to access data independent of type or size, e.g. any textual or multimedia content. The medium of transmission, thus, becomes irrelevant.

Technology convergence is supposed to occur between telecommunications, IT (including ubiquitous computing) content (media, entertainment, business information) and services.

The representative science of today that consists of contents, computers and communications provide four stages for business strategy: channel enhancement, value chain integration, industry transformation and convergence. Business convergence seamlessly integrates customers and business partners into companies to build networks, focuses on their core competences, and outsource non-core business components. Business convergence is the unification of business functions, which creates the basis for new "value added services" for business and customers that will increase revenue and margins in an increasingly competitive and connected market.

Rationale of Technology Convergence

We still struck with basic idea of technology convergence like what is the need of it? Is technology convergence profitable? What is the economic rationale of technology convergence? And why technology convergence is getting so much favor from the producers' side? We try to answer these questions with the following reasons, which make technology convergence a realistic possibility and a future necessity:

- Possibility of digitization of all types of signals that means merging of different sectors into a unified market, which were previously separated.
- Remarkable decrease in costs of voice and data transmission, which could be possible due to improvement in compression technology and reduction in infrastructure cost.
- For the enterprises it is a survival necessity to adapt to the converging environment
- Business convergence (It merges two or more business unit's competitive values to overcome the existing limitation of each business unit. It is a strategy that enterprises who face with the limitation of ongoing growth with their own technologies or business models merge or ally their competitiveness to improve their own technology or business model or to make a unique creative business model) is supposed to create a new business model.

Economics of Technology Convergence

The technology convergence has wide economic implications for both demand and supply sides. Consumers (business as well as home users) are benefited by interactive access to information independent of the terminal they might be able use in a given context. On the other hand, significant opportunities open up for suppliers in a growing market. These opportunities are however fraught with certain risks since operations in this market involve costly investments and high operating costs. Firms should, therefore, possess sufficient resources (i.e.

funds, technical knowledge and human capital) to finance these (investment) activities. Firm can adapt different new strategies to cover up the costs and lessen the risk of being a novice either by the means of mergers, acquisitions or alliances.

Considering the market, till now we do not see the market reflecting any clear trend for such goods. Unclear market trend affects firm decisions about the production and consumers attitude towards the product, which may further lead to inventory problems. Though firms with correct foresight can gain enormous strategic benefits.

Investing in new and challenging markets may involve high setup cost for a firm, but the opportunity cost of not investing is even higher. A firm always has many luring reasons e.g. prices of the product, total demand of the product, market capture, profitability, long run market dominance by merging etc) to invest in emerging markets. Taking the prices of technologically converged goods into consideration, we find that prices for such goods are very high in the market (e.g. 'Times Life' magazine of 'Times of India' (Nov 27th 2005) describes that Nokia has unveiled a 'N92' phone with integrated digital TV, this mobile phone can receive up to 50 TV channels and the revealed prices are approx $849.99!), particularly if we consider the case of developing countries then we can say that the prices are not easily affordable. Ironically, the wealthy segment of customers (in developing countries) is usually affected by the snob effect to a very high degree and thus they try to maintain the distinguishing features of their consumer behavior consequently a firm gets proper encouragement to risk investments in these risky but rather attractive markets. Still a firm may face problems such as:

- After a huge investment, market may not be mature enough and even may remain immature for years.
- Demand deficiency may bankrupt the firm
- Presence of competitors and their services
- Other cost effective technology may take place in due course of time

Factors Affecting Firm's Decision for Investment

The final effect on firms will be conditioned by factors namely:

- Demand conditions,
- Market maturity,
- Technical uncertainty and
- Regulations imposed by the government.

A Firm can decide invest (with huge fixed costs and a possibility of pre-market dominance by others) if demand and market uncertainties are very low in that case a firm may hopes to enjoy economies of scale and scope in long run to maintain the profitability. Demand uncertainty exists because consumers are neither thoroughly informed nor aware about such technological convergences and their relative benefits and if they are informed, the major portion of consumers lacks purchasing power. Small firms have to think a lot before deciding to make expensive investments because they will be facing high competition from their bigger counterpart firms. Market uncertainty can be lowered by government interference through regulations but when the market itself is not fully grown, it becomes tough to regulate it effectively, though there are regulations on electronic & mobile commerce but these are just specific services provided by the technologically converged devices.

Effects of Demand Uncertainty

There can be endogenous or exogenous demand uncertainties prevailing in the market:

- Demand uncertainty is endogenous in monopolistic competition due to rival reactions from other competitive firms
- Demand uncertainty is exogenous when it is due to consumers' lack of information about the variety of the product available or may be for other reasons i.e. government policy and business cycle.

Firm's reaction to the demand uncertainty can be viewed ex ante and ex post:

- Ex ante –
    1. No production decision until demand and cost are know to the firm,
    2. It can fix the price for the product,

3. Fix prices and quantity of the product and accept inventory.

- Ex post –
  1. No changes are made for the entire output while excess supply is disposed by lowering prices
  2. Production is not flexible and can be adjusted at increased level of Marginal cost
  3. Sales may be equal to output or a firm may face backlog orders situation where D>S or another situation of inventories where D<S.

The demand uncertainty for the high priced multi-functional device has forced firms to provide some intermediate solutions to the consumers, for example if a consumer wants to use the interactivity facility provided by intermediate solutions through his/her cable television which is a broadcasting devise which uses one way broadband transmission. To overcome this, there may be two proposed solutions. The first one is to install a one-way cable modem for which the consumer needs extra phone line, an analogue modem and a cable modem as well. This solution suggests that most of the expenses are done by the consumer, while cost and risk for the firm is very low. Another solution suggests two-way cable modems, which uses expensive instruments and reduce the numbers of subscribers at each node due to more traffic in the same pipe. Under this solution, most of the cost is incurred by the producer.

The Role of Market Surveys and Innovation in Business Strategy

To overcome with the demand uncertainty issue to an extent, firm try to guess the consumers attitude by advertisements and market surveys before launching its R&D program. But be it radical innovation or incremental innovation, consumers’ reaction remains uncertain and it requires a high level of effort to induce consumers to buy the product. This shows that the challenge for telecommunications and cable firms is to have the ability to change consumers’ attitudes. Firms try to get a clear idea by systematic studies before entrusting large sums of money to new product releases. And these are, typically, concept testing, product testing, and market testing.

Economic impact of an innovation depends on its diffusion. The diffusion of a product can be understood as the process of its market adoption. The market adoption is favored by the improvement of the product itself (amending problems related to its functioning) and the creation of a set of complementary products, which may originate bandwagon effects and accelerate the diffusion process. Compatibility issues also matter a lot in the case of the ICT because each part of the system must dovetail with the other. And this particular issue can create barriers to entry for the new firms. The existence of incompatible items can limit the competition in the markets. Moreover, the multiplicity of incompatible systems can bring about diseconomies of scale, and higher costs can limit the market acceptance of the products.

There are many economic factors behind the process of mergers and alliances that is taking place, resulting in an important move towards vertical integration. Considering technical uncertainty, it favors less integrated forms of co-operation, because then the risks are spread among more firms. While market uncertainty favors more integrated forms, because the difficulty in foreseeing all relevant contingencies originates high transaction costs and even the existence of economies of scale is another factor that favors integration.

Another big concern for the firms' is to know if it enjoys the management capabilities to tackle the diversified strategic problems faced while adopting new integrated production lines, Because the managers' play a very important role in achieving high levels of profits. Its becomes a necessary step for a firm to correctly analyze the managerial attitudes towards risk whether it is risk averse, risk neutral or risk taking behavior.

Implications of Technology Convergence

Technology convergence phenomenon has wide applications for various fields e.g. market for its services, consumer behavior, producers risk, uncertainty analysis, economies of scale and scope etc. Technology convergence can have its impact on various service sectors like marketing, business consultancies, tourism and banking, knowledge management, new media industry and others. Technology convergence also affects the society in different ways e.g. culture, life style, life standards, social psychology, communications and public relations and others.

Concluding Remarks

Finally speaking, the main considerations for the analysis will depend upon the cost and profit functions of the firms: what degree of demand uncertainty a firm is facing? How much money can a firms risk in the market? Is it ready to produce under the government regulations? How well is the firm prepared to risk its profits? What does the firm think about the break-even points for its survival? Do the employees feel job risk and does it affect their productivity? Does the firm enjoy significant managerial capabilities to compete with the rivals? What is the extent of expenditure on advertisement and R&D? Do the consumers feel benefited from such a market? How does market surveys and innovation by firms affect the consumers' behavior by altering their choices and preferences and to what extent? These are basic issues a research study should primarily focus over.