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Elements of Flowing Stream Strategy Crystal for Telecom Service Providers: An Empirical Validation

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Abstract

The telecommunication service provision business is highly competitive the world over. This makes strategy formulation a challenge for the sector. A new approach, that the continuity aspect of the organization ought to be managed concurrently with change forces to obtain the strategic objectives related to enterprise and customer, is gaining ground in management literature. This paper deals with determination of micro variables related to these four aspects of strategy formulation, which are continuity force, change force, enterprise factor and customer factor. After identifying Continuity and change forces as well as strategic enterprise and customer factors relevant to the telecom service sector from the literature, these are statistically validated. For this, response from senior telecom service sector executives to a structured questionnaire is elicited and analyzed. The paper goes on to give, in brief, application of these variables in strategy formulation steps using 'flowing stream strategy crystal' concepts.

Keywords: *continuity forces, change forces, customer factors, enterprise factors, flowing stream strategy crystal.*

Introduction

Strategy makers are facing most uncertain times these days. This has in turn made the job of business planning for future quite challanging. Strategy making, scenario planning and successful execution of strategies have become much more challenging due to uncertainties prevalent in the market. All this is making many business managers to throw up their hands in this era of radical uncertainty (Sawhney and Parikh, 2001). However all this uncertainty and turbulence of new economy is making strategy not less important as some may argue but more essential than ever (Porter, 2001).

This paper is about determining strategic factors for telecom service provision business in Indian context. Knowledge of company's strategic factors is very important for strategy development. Having determined the strategic factors, their periodic performance measurement is crucial for effectiveness of strategy deployment. The organization's performance evaluation periodically is necessary to see whether the intended strategy is working or not. Management has one perspective while assessing organizational performance which consists of parameters related to organizational efficiency and outcomes. These parameters are called *Enterprise factors.* Then there are measures from the customer's perspective which can be categorised as *Customer factor.* These factors are what customers really look for from the company e.g. price, trade

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terms, product quality, range of products, customer service, and delivery etc. In this paper, these two factors namely *Enterprise factor* and *Customer factor* have been termed as Strategic factors (Kenny, 2001).

From the operational point of view, an organization must maintain certain current characteristics, which can be called as *Continuity* forces of the company. These *continuity* forces in an Organization are those forces, which on one hand provide stability for current production, but on the other they add to inertia in an organization as well. These forces relate to existing infrastructure, expertise in existing/legacy technologies, current organizational structure, processes and people etc. Telecom service provision is a highly capital intensive business. Extensive investments are required in cable, land, buildings, exchange equipments, services and so on. These investments create its own set of continuity forces and inertial flywheel. At the same time, telecom service provision business is subject to high level of *Change* forces which are largely external to the organization. These *change* forces mainly relate to rapid technological and regulatory changes. The businesses are required to respond quickly to these changes if they have to survive in the market place. It is important to determine various elements of the forces. Towards this end, we will also determine in this paper, various elements of *continuity* and *change* forces which are critical for strategy formulation and deployment in Indian context. Strategy development and its deployment have to take into account the relevant *continuity* and *change* forces of the organization concurrently.

A flexible strategic framework will be needed to study the effect of *continuity* and *change* forces on strategic factors. This framework, known as *flowing stream strategy* framework (Sushil, 2012a), uses elements of *continuity* and *change* forces along with strategic factors in strategic analysis of the firm. The framework is about strategy formulation with confluence of *continuity* and *change* and it will be dealt in the beginning of the paper. In the subsequent sections, the elements of strategic factors namely *customer* factors and *enterprise* factors are gathered from telecom management literature. Similar study is done for *continuity* and *change* forces for telecom service sector. In the subsequent section, a questionnaire-based survey is conducted eliciting response from telecom service sector professionals and managers of Indian telecom operating companies. The results of this survey are analysed and the *customer* and *enterprise* factors as well as *continuity* and *change* force elements are validated.

Background Literature

Strategy should be the means by which an organization is able to achieve and sustain success. Yet most organizations fail to create an effective strategy (Mitreanu 2006). This is because technologies evolve, regulations shift, customers make surprising choices, macroeconomic variables fluctuate and competitors thwart the best-laid plans (Sull, 2007). In the past, the business environment used to be relatively stable and not so turbulent. This led strategy researchers to mostly come up with frameworks in strategic management which implicitly assumed a benign environment that is simple and not very dynamic (Chakravarthy, 1997). During stable times strategies could be framed using a planned approach around *continuity*. However, the effect of uncertainty or rapid changes in the environment has been that it is no longer possible to pre-plan prior to execution. Depending on the uncertainty in the situation, the organization will need flexible strategies, that is, be prepared for the change in the business environment on account of strategic surprise (volberda, 1997).

Strategy is like a roadmap or the game plan to go and reach from current state to a desired state and it cannot be made in vacuum. It needs to take into account the current reality or the continuity aspect the company. It, therefore, needs to first understand the 'as-is situation' before getting into 'how' of 'to-be' decision-making. Organizations cannot abruptly change from the

current state to a desired state. Even in a highly turbulent environment, a discontinuous change may not be desirable (Sushil, 2005). Growth strategies should take into account continuity aspect of the organization such as organizational processes, structures and employees existing skill set (Dewhurst et al.,2011). Thus, there are important bearings of continuity and change in strategy making and deployment. Mintzburg (1988), in his paper "Crafting Strategy", has recommended reconciling of change and continuity in strategy making. The concept of managing continuity along with change for better organizational performance has been around for a while for strategy making and deployment in view of a number of seminal works in the area, namely, Mintzberg (1988) "Crafting Strategy", Volberda (1998) "Paradox of flexibility" and Sushil (2005) "Flexible Strategy Framework for Managing Continuity and Change". In recent years, the concept of managing continuity and change concurrently has been well researched and applied across various domains (Nasim and Sushil, 2011; Bhat *et al.*, 2011; and Nasim, 2010).

Flexible Strategy Framework

By considering flexibility as a valuable strategic option in turbulent environments, the strategist reconciles the conflicting forces of change and continuity (Volberda 1997). It has also been argued by Sushil (2012a) that strategic management of change could be effected well with clear understanding of continuity aspect of the organization. There are certain vital and desirable areas along the continuity dimension of an organization, which can be effectively utilized for ushering change. Unlike the *'Blue Ocean Strategy* (Kim and Mauborgne, 2005), which aims to create new market spaces deploying a radical change strategy having discontinuities, flowing stream strategy dynamically employs the interplay of both change and continuity concurrently. A radical change strategy having underpinning of discontinuities can be applied rarely in the life time of an enterprise. *Flowing stream* has been symbolically used to represent the management of continuity and change concurrently. Just as flowing water stream exhibits characteristics of continuity and the continuous flow represents change, similarly organizations are acted upon by both, continuity and change, simultaneously. These need to be balanced side by side for bringing in effective change.

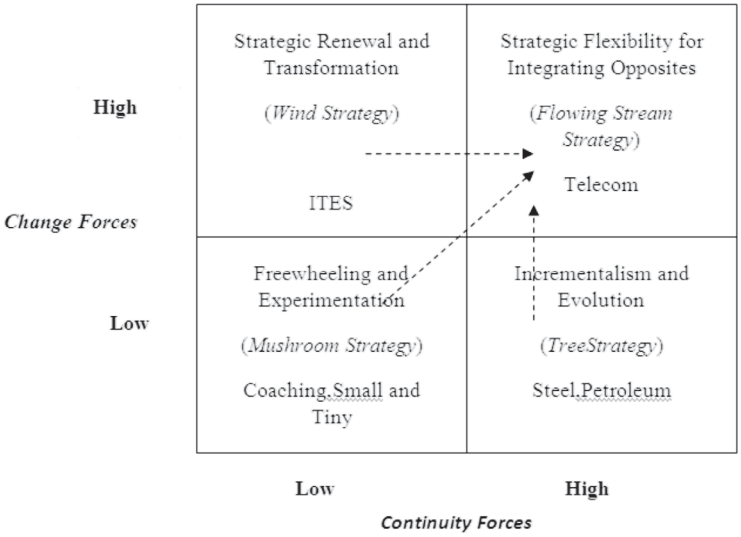

Figure 1: Continuity-Change Matrix

It has further been proposed that the combinations of continuity and change forces can be mapped on a continuity-change (C-C) matrix as given in Figure 1 (Sushil (2005)). Four extreme combinations of continuity and change forces are possible to provide an industry classification. Using these four continuity-change combinations a flexible strategy framework has been generated. The continuity as well as the change forces could be 'low' or 'high' and accordingly four combinations emerge which are: high continuity-low change (*tree*- fertilizers, steel), low continuity-low change (*mushroom*- coaching), low continuity-high change (*wind*- BPO), and high continuity-high change (*flowing stream*- Auto, Telecom, Pharma, Computers). The situation of high continuity and high change has been metamorphically represented as flowing stream.

The life trajectory of individuals and enterprises alike are living systems and their life journey can safely be treated as a flowing stream. Just like a flowing stream which finds its path naturally, successful organizations follow strategies for natural growth and opening up new vistas. Long lasting organizations also, despite gradual as well as radical changes during their course, maintain a strong sense of identity and continuity which is the hallmark of a flowing stream as well (Sushil, 2012a).

Implementation of flowing stream strategy framework in telecom service sector domain will requires managing continuity and change simultaneously. Application of the framework will therefore require identification of continuity and change forces pertinent to telecom sector on one hand and the identification of desirable strategic outcomes on the other. Strategic recommendations will be possible only when firstly these variables are known for the telecom service sector and then the relationships among them. The relationship aspect is brought out in the concept of flowing stream strategy crystal in the next section.

Flowing Stream Strategy Crystal

The continuity and change forces represent the current reality of the organization, whereas the strategic factors consisting of customer and enterprise factors depict the composition of the strategy. These four components and their relationships lead to crystallization of the flowing stream of the enterprise and are portrayed as flowing stream strategy crystal. The 'flowing stream strategy' deals with strategic flexibility to synthesize the paradoxically opposite forces of continuity and change. Analyzing this relationship crystal reveals not only the strategic change actions of 'reduce/raise' some factors, but also specifies which factors need to be 'maintained/ nurtured' to take advantage of continuity. This paper is about first determining micro variable of these four macro variables namely continuity, change forces and the strategic factors namely enterprise, customer. These are then used to draw the strategic crystal which is the starting point of flowing stream strategy formulation for the domain under study.

For doing a comprehensive strategy development using flowing stream strategy crystal, the strategy practitioner needs to determine micro variables relating to *change* and *continuity* forces as well as strategic factors namely *customer* factors and *enterprise* factors. Identification of these strategic factors along with continuity and change forces for telecom service provision business is the purpose of this paper. This is dealt in the subsequent sections.

Identification of Strategic Factors

There are two key stakeholders for any company. These are the customers and the management of the enterprise. Strategy making is the job of top management in the company and they are constantly grappling with the question as to what are those things that could lead a business to having a *competitive advantage*. *Strategic customer factors* are those things that an organisation needs to get right in order to succeed with *customers* and which lead to factors/measures which reveal the performance of the enterprise. Thus, the strategic factors have two parts

namely the customer factor and the enterprise factor. The critical customer and enterprise factors for telecom service providers have been culled out from telecom management literature as a first step.

Identification of Customer Factors

Following customer factors have been identified from telecom service provision related literature.

Product Price

Price is one of the most important parameter in customer's decision in choosing a service provider. There are many such references in literature such as that growing price pressures are increasingly being felt by incumbents. One of the biggest contributors to customer defection is pricing or fee structure of new market entrants (Teleservice News Sept 2009). Customers are tempted by lower prices, which acts as a trigger in switching loyalty from one operator to another (Roos and Friman, 2008). On one hand, high price is one of the reasons of slow adoption of mobile TV among mobile users apart from quality and reliability issues; on the other high price was however the main reason for giving up of mobile TV service among former users (Wieland 2007e). Today it is possible for consumers to seek low price for their telecom needs (Jelinski, 1998). It is observed in the developed world that as mobile phone service market is maturing, mobile-phone users are becoming more price sensitive (Dahlstorm, Deprez and Steil, 2004). There is plenty of evidence in the literature that price is an important customer factor.

Quality of Telecom Service

Numerous instances have been cited in management literature where quality of service (QoS) has been determined as an important determinant by consumers in choosing or changing their service provider. It has been found that when customers perceive a decline in the quality of the service, e.g. in the audibility or audible range and so on, they experience a reaction trigger to change their service provider (Teleservice News Sept 2009). Improving quality of service is important for high satisfaction level in case of mobile services in India. Satisfied customers are price tolerant. They stay loyal to their current mobile service provider in the face of price increase and they are more profitable (Balaji 2009). Quality of service leads to customer satisfaction, which in turn leads to customer loyalty. Customer retention is primarily dependent on quality of service (Guslaffson *et al*, 2005). In Puerto Rico's highly competitive mobile market, customer service is the one factor that ultimately decides which company takes the business (Hernandes 2009).

Consumer research indicates that quality of service is the second most important driver of switching after price. Business as well as residential consumers are interested in quality of service comparisons (Ofcom, 2006a). Spreng and Mackoy (1996) showed that service quality leads to customer satisfaction.

QoS parameters like call performance and reliability is the No. 1 factor consumers have in assessing their carrier and is nearly twice as important to consumers as the No. 2 factor, brand image and is more than double the third factor i.e. cost (Smith, 2007). The price of telecom service is at rock bottom in India. In such a market, quality is an important factor in determining the overall competitiveness of service providers (Sridhar and Jain 2004). Quality of Service is seen to be an important customer factor.

Product Rate Plan Innovation

This attribute is another big differentiator in the choice of a service provider. If you make new product or offering which is really simple e.g. let the customer sign up with one click and

make sure that the offering is sensible simple and useful, your customer will wait for the next such product from you (Leslie, Alex (2008). Wireless rate plans are often perceived as confusing and difficult to compare. Rate plans offered by the operator have a considerable bearing on customer's choice of operator. Customers with optimal rate plans are found to stay significantly longer with the wireless carriers than those with the non optimal ones (Wong, Ken Kwong-Kay 2009).

Ability of the operator to offer content rich engagements and innovative next-generation applications such as Triple Play; bundled IPTV, VoIP (voice-over-IP) and a high speed broadband network supporting You Tube videos, on-demand hi-def movies and long-distance calls will only fuel their growth in future (Ferguson and Brohaugh 2008).

It has been seen that service providers grow by innovating around new products, services and applications that expand the market and excite customers (Seidenberg, 2009). Further, to remain competitive and increase their revenues, 3G telecommunications operators have developed value-added services, such as multimedia messaging, video calls, and Internet access. In fact, new forms of mobile services such as streaming TV, banking, trading, and shopping, have also been available (Teng, Lu and Yu 2009).

Brand Image of the Operator

Brand image reflects the customer's perspective about what he/she receives from brand (Kamakura *et al*., 2003). Customer's expectations and resulting satisfaction thereof with a product or service are often influenced by its brand image (Dobni and Zinkhan 1990). Brand image pertains to the perception or mental picture a customer holds of a brand and is formed through his/her response, whether reasoned or emotional. Intangible assets make up most of the value, as high as 70 percent, of Merger and Acquisition deals. In most cases, brands account for a considerable portion of these assets (Knudsen *et al*, 1997). Among the hierarchy of criteria for choosing a mobile operator, price is the most important followed by service quality, brand image (Rahman *et al*., 2011). Smith (2007) states that brand image is the second most important factor for consumer in choice of an operator after quality of service.

Identification of Enterprise Factors

Following enterprise factors have been identified from telecom service provision related literature.

Market Share

Market share of a telecom operator determines its relative position in the market place. It also determines whether it is dominating the market or is a laggard and is in an also ran category. Market share performance is the organic growth a company records by gaining or losing a share of the market. Market share is an important metric that the management uses in order to judge the effectiveness of marketing campaigns including branding initiatives, advertising campaigns, CRM programs and any other revenue generation effort. Market share metrics are more important than return on investment (RoI) measurements, the reason being that it is a relative measurement against external benchmarks. Market share tells us how companies are doing relative to their competition.

Customer Satisfaction

Customer satisfaction is defined as "the number of customers or percentage of total customers, whose reported experience with a firm, its products, or its services (ratings) exceeds specified satisfaction goals". It is a measure of how products and services supplied by a company meet or surpass customer expectation (Farris *et al*., 2010). Unlike the monopoly era when telecom

operators were required to satisfy their customer needs, today they should be ensuring customer delight to remain successful in the highly competitive marketplace. Service providers must keep improving their quality of service to retain their loyal customers and order to increase their market share and profitability. This is what makes it a key performance indicator of the business and a key element of business strategy. How does a company find out whether its customers are satisfied? The best way to find out whether your customers are satisfied is to ask them by conducting an independent customer satisfaction survey.

Average Revenue per Unit (ARPU)

ARPU can be understood as total revenue divided by the total subscribers for a particular time period. Generally ARPU is the amount of money that an operator generates per subscriber per month. Industry associations and country regulators bring out operator wise this information. It helps not only in understanding how the industry as a whole is faring but also assists in benchmarking a particular player against others or industry average (Avasthy, *2003*). This is what makes ARPU an important performance indicator for the operator.

Earnings before Interest, Tax, Depreciation and Amortization (EBITDA)

EBITDA is an indicator of a company's financial performance. It is generally calculated simply as *revenues* minus *expenses*. The expenses do not include interest, taxes, depreciation, and amortization. EBITDA is used to analyze and compare profitability between industries and companies (Fan, 2006). EBITDA allows one to analyze the performance of the company's operations while eliminating all non-operating and non-recurring items such as depreciation and amortization, interest expense, taxes and one time charges such as professional fees, or other non-recurring costs. EBITDA as an earnings measure is of particular interest in cases of telecom operating companies as they have large amounts of fixed assets which are subject to heavy depreciation charges. As EBITDA is essentially the income that the company has free for interest payments, it also indicates it ability to borrow money for expansion or merger/acquisition deals. Thus In general, EBITDA is a good performance indicator for telecom operating companies as they have significant assets as well as are saddled with a significant amount of debt financing.

Compounded Annual Growth Rate (CAGR)

CAGR is defined as the year-over-year growth rate of an investment over a specified period of time. It gives the growth rate of a company on an annualized basis. This parameter remains widely used, particularly in growth industries or to compare the growth rates of two investments because CAGR dampens the effect of volatility of periodic returns. Telecom service provision being a growth industry, it is quite a useful parameter to compare the company growth rate with industry growth rate or to compare growth rates among companies of this industry. CAGR thus is a measure which tells as to how a particular service provider is performing vis-à-vis industry or its competitors.

Network Rollout and Product/Services Innovation Speed

It is endeavour of every operator to roll out its network as fast as possible and ahead of its competitor. The operators are also under pressure to catch up with its major rivals. Not only this, the operator need to have an aggressive network rollout lest more competition rushes in. Faster network rollout also results into the fastest way to generating network revenues. Thus this parameter spells out one critical company performance parameter.

Productivity per Employee

This is an important ratio that looks at a company's revenues in relation to the number of

employees they have. This ratio is most useful when compared against other companies in the same industry. Ideally, a company wants the highest revenue per employee possible, as it denotes higher productivity. If a company is able to increase its Revenue per Employee, then it can share this productivity gains with their employees through higher wages. There is increasing realization that Financial performance (seen through balance sheets, cash flow reports, and income statements), though, no doubt is and will remain the principal metric for evaluating a company and its management, but it's time to recognize that financial performance increasingly comes from returns on talent, not on capital (Bryan, 2007).

Identification of Continuity Forces

Following continuity forces have been identified from telecom service provision related literature.

Existing Infrastructure

It makes more business sense to utilize existing infrastructure such as cable ducts to expand into new product and services such as high speed broadband through Fibre to the Home (FTTH). For example FTTH rollout can be cut down to half if existing cable ducts can be used compared to laying out a new cable duct (McClelland, 2007). Another example of exploiting existing was seen in NTT's strategy of implementing "Multimedia that can start today" business plan, NTT utilized its existing buried copper cable and the available existing network technologies namely the digital ISDN communication system as a platform to provide various application services to customers. The result of this strategy of utilizing existing copper asset base and digital network was that Japan quickly surpassed Germany (Deutsche Telecom) in ISDN dissemination (Kodama 2001),

Current Customer Base

Retention of customer is not only a challenge for a telecom operator but presents new revenue earning opportunities. If you have in-depth customer knowledge, then they can be segmented and targeted customer campaigns can be launched around consistent, personalised customer service and innovative products for them. Having a large customer base helps in all this and is desirable continuity force. A telecom service provider has many points of customer contact say when customers call in with their enquiries, pay their bills online, or for any other reasons. This way they get many opportunities to up sell (the process of upgrading purchases to higher priced, higher value goods) and cross sell (selling complementary goods) customers (Chou, 2011). In fact, 85% of incremental revenues for international telecom companies is derived from customer interactions - when customers call in with questions, pay their bills online, or for any number of reasons. Thus as the market starts to saturate, having a large customer base helps the operator on shifting its focus from acquiring new customers to maximizing the lifetime value of current customers.

Core Competencies

Cable & Wireless ignoring the importance of its historical key capabilities of operating in diverse international markets sold off its profitable but seemingly less attractive businesses. These businesses though were less glamorous but had historically developed core capability which went missing in C&C when these core businesses were sold off but were sorely needed in managing newly acquired IP based businesses (Turner 2003). This went contrary to Collins and Porras (1994) approach of conservatism where growth is generated through the continuities provided by the enterprise's traditional core business (Turner 2003).

The process of change from geographically diverse business to focused one on IP based core business was needed to be more pragmatic with the new core business built on continuities

provided by its key assets and capabilities (Turner 2003).

Organization's Structure, System, Processes and People

Any organizational transformation exercise has to take into account its existing structure, system, processes and people. Many successful organizations continue with their structure, systems and processes because they feel comfortable with the same because of it simplicity despite pressures of changing them for reasons of seeming cost benefits (Marmol and Murray Jr., 1995). It is very important to take into account the existing organizational structure, systems, process and people before embarking on a growth strategy. It is worthwhile for the management to examine whether the changes desired are in line with the existing practices, or whether the process can take care of increased work load and people are skilled enough for new jobs (Dewhurst, Martin, et.al., 2011). These organizational realities are critical continuity force to be kept in mind while drawing up organization strategy and implementation thereof.

Expertise in Existing Technology

Organizations have expertise on the existing domain technology in the present. It is well known that all technologies are getting outdated and the rate of obsolescence is becoming faster and faster. If an organization wants to retain its competitive advantage it has keep on transforming itself with induction of new technology be it in its production processes, marketing or business processes. However since the organization has already invested heavily in a particular technology, got its people trained on that technology it would want fully exploit the existing technology before moving on to a new technology. Even though it may be desirable to undertake a quick sequence of focused incremental shifts in the long term strategic direction which may give superior returns, yet implementation of these steps are very difficult. Technology poses even bigger problem in this than operational shortcomings and organizational inertia. It is partly because technology is very deeply embedded in operations and organization and partly because information systems based on current technology are rigid (Brown and Hagel III, 2003).

Organization Culture

Organization culture reflects employees' views about *"the way things are done around here."* Organization culture also determine as to how employees feel and act and what type of employee are hired and retained by the company. Evidence suggests that organization members are more inclined to embrace change when the organization's culture is aligned with the mission and goals of the company (Mallinger, Goodwin and O'Hara, 2009). One of management's toughest tasks is changing company culture because changing organization culture is about winning the hearts and minds of the people you work with. This takes a lot of persuasion.

Company's Ownership Aspect

Company ownership are of many types. Some are privately owned and not publicly traded. Some are widely held private companies which are publicly traded and have to abide by regulations. Some are wholly owned government companies. Some are family owned private companies. It has been seen that the family owners take keen and very personal interest in managing the company. Whereas in a public company, board members, though many in number, come and go. There may be a few replacements every year with the result that and there are always some who are less informed. In the private-equity-owned firms, the board members are highly informed and follow the business very closely. This is because they often have a substantial stake in it.

Identification of Change Forces

Following change forces have been identified from telecom service provision related literature.

Competition

The kind of competition a service provider faces in the marketplace determines its strategy towards adoption of a technology. Instances are numerous where the competition is acting as a great change force on the company. This can be seen in the case of BT and France Telecom in their choice of broadband access strategies. France Telecom is moving much faster in adoption of Fiber to the Home (FTTH) technologies compared to BT for the simple reason that it is facing stiff FTTH competition from Illiad group in the marketplace whereas BT has no such competition (Wieland 2007).

Incumbent operators are facing serious brand image transformation threats from their competitors which are positioning themselves as providing fantastic user experience, innovative product and services and a great company to work for and so on (Wieland 2007b). One objective of deregulation in US was to make the old communications companies face more competitive pressure and in turn to become more innovative and efficient as a result (Koselka, 2001). Incumbents have been losing market share in Europe and US, revenue and profits due to competition (Beardsley, 1998; Beardsley et al., 2004).

NTT DoCoMo has been facing fierce completion from its rivals KDDI and Softbank Mobile in Japanese market. Due to fierce price competition NTT DoCoMo's ARPU has been falling compared to its rivals (Wieland 2007c). Competition in telecommunication service sector is a serious change force being experience by telecom operators around the world.

Emerging New Technologies

Emerging new technologies coupled with deregulation of telecom service sector had very high impact on the telecom service business. The existing telecom networks of incumbent telephone companies in developed nations which were designed solely to carry the voice traffic were not ready to handle the boom in digital data. Internet Protocol (IP) and packet switching technologies brought in convergence of voice, video and data. The telecom service providers were not ready for the transition from traditional *circuit-switched networks* to networks based on Internet technology and business challenge thereof (Eugster, Christopher C., Besio, Gregory J. and Hawn, Jeff, 1998). In mobile telecom space, 3G is driving a strong migration from cell phones to smart phones. VoIP Internet Protocol (IP) based technology changes and consequential Data traffic over take of traditional voice telephony forced Cable & Wireless (C&C) to redefine their strategic focus towards high growth IP data traffic services and corporate customers. C&C in order to implement its changed strategic thought acquired many IP based small businesses in the US and Continental Europe (Turner 2003).

The emerging Information and communication technologies had created a new and high growth multimedia business market. NTT faced a significant transition period of technology change from analog to digital changing the voice only 'analog telephone" business to a new future of 'new business using multimedia'. NTT was required to change from a telephone company to a multi-media company (Kodama 2001).

Owing to the significant development in the ûeld of information and communications technologies (ICTs) over the past decades, mobile telecommunications technologies have evolved rapidly. Several different new standards, such as the global system for mobile telecommunications (GSM), wireless application protocol (WAP), general packet radio service (GPRS), code division multiple access (CDMA), and high speed downlink packet access (HSDPA), have been

implemented. Moreover, even while third-generation (3G) mobile communications system have not entirely replaced earlier ones, further fourth-generation mobile communications systems are already under consideration by international standardization bodies (Teng et al., 2004). Radio, television, PCs, laptops, smartphones and the internet have all become part of people's everyday lives. Sensing growing demand of consumers multimedia services anytime-anywhere, wireless service providers have invested heavily in upgrading their networks to the next generation standard (3G) (Malhotra and Kubowicz Malhotra 2009). Emergence of smartphones and emerging new tecnologies of 3G/4G/LTE are going to have tremendous impact on the way the service providers will conduct business and generate revenue. Emerging new technologies are impacting telecom service provision business in many ways.

Governmental and Regulatory Telecom Policies

Regulatory changes have significant impact on strategic choices of an organization. There are many such examples the world over. While posing significant competitive threats in its core market as a result of deregulation, an organization may be lured into seemingly lucrative unknown market as has been seen in case of Kingston Communications of UK city of Kingston upon Hull (Turner 2002).

Regulation has revolutionized the Nigerian Telecom market from a single monopoly market to a duopoly and then a wholly unregulated market. Such revolution has already taken place within the UK and US markets and is now being positively implemented in Nigeria (Ojiako and Stuart 2006).

In the early 1990s, European governments introduced new laws on telecommunications that regulated the opening of the telecom market and ended the monopoly of public telecom operators (van Marrewijk, 1997). In 1997, the European governments committed themselves in the general agreement on trade in services to restructure their national telecom markets according to a specified time schedule to create a global telecom market that is accessible to all participants (Steinfield, 1994). As a consequence, each government faced, at national level, the difficult task of dismantling the power of the national operator and opening up the home market for new and foreign competitors (Noam and Kramer, 1994). Deregulation and subsequent policy changes by governments in their telecom markets have affected the telecom businesses in these countries.

Globalization

Globalization has been an important change force in in telecom sector evolution. The emergence of European Virtual Users Association (EVUA) in Europe presents a case to point the impact of globalization in developing and developed world. An important development underlying the fundamental changes in the telecom sector has been the growing number of multinationals and rise of organisational networks. Telecommunication is responsible for bridging time and place and is therefore seen as an important force behind the globalisation of economy and technology and the networking of organisations (Castells, 2000). Therefore, multinationals have put much emphasis and finance into the development of high quality corporate networks. Public telecom operators have not managed to meet the needs of multinationals for a long time. In Europe, the 50 largest multinationals that united to form the European Virtual Users Association (EVUA) successfully claimed in the European political centres in Brussels the need for cheap and easy-to-reach international services and reliable service. The EVUA members wanted just one provider to deal with, a service called "one-stop-shopping" (van Marrewijk 2004).

Deregulation in Australia not only affected the operating company but affected the equipment manufacturers as well. Telecom Australia (Telstra) increasingly sought to expand its technology

source, and with the deregulation of the telecommunications industry in 1992, Ericsson found itself operating in a radically altered environment. There was thus the need to create a more responsive, customer-oriented, competitive organization and the new managing director effected significant changes to the organization structure (Graetz 2000).

Changing Customer Needs

In current times, customer needs are becoming more diverse and are often changing from day to day. This is putting tremendous strain on the resources and capabilities of the companies and particularly sales organizations (Davie, Christopher, et.al., 2010). The consumers have become increasingly sophisticated, demanding about what they want, and hence micro-segmented. This is resulting into premium-priced brands losing their shine as consumers are increasingly trusting only their own ability to seek value. Multiplying user needs and the market segment even for the most homogeneous of product categories is making the job of companies and their marketers ever more challenging (George, Michael, et.al., 1994).

Mergers and Acquisitions

Mergers and Acquisitions (M&A) are strategic tools in the hands of management to achieve greater efficiency by exploiting synergies and growth opportunities. Mergers are motivated by desire to grow inorganically at a fast pace, quickly grab market share and achieve economies of scale (Banka, 2006). Implementation of M&A strategies in turn act as a change force on the resulting entity. It is in the integration phase of an acquisition, where the change management effectiveness lies, that is when often deals go wrong; some studies blame poor integration for up to 70 percent of all failed transactions (Palter and Srinivasan, 2006).

e-Business Processes

Telecommunications today is increasingly a commodity business. For traditional telecom companies, maintaining customer loyalty and delivering growth in the face of fierce price competition and new market entrants requires them to go through an e-business transformation. They need to develop online capabil-ities across their entire business operations, from back-room processes and logistics to customer service and sales. This is an essen-tial step for capturing and retaining today's savvy customers, who expect the same kinds of benefits from all technologically oriented service pro-viders. An e-business transformation will not only reduce costs in the long run, but also is a prerequisite for effectively delivering digital goods and services in today's world that bring new revenue growth (Severino, Carlos *et al*., 2011)

Verizon's CEO states that by shifting the bulk of IT expenditures from maintenance of the existing system to the development and support of new business capabilities, the company has changed an internally oriented IT organization into one focused firmly on markets and customers. Verizon's IT organization is innovating more and more aggressively now (Appel and Yeboah-Amankwah, 2005). E- Business process is one change that no telecom operating company can avoid. It has to embrace it as fast as possible if it wants to remain competitive.

Validating Strategic Crystal Elements

The continuity and change forces along with strategic factors namely customer factors and enterprise factors which were identified from the literature need to be further validated, for their Indian context relevancy. This was done by conducting a survey eliciting response from senior telecom executives and experts closely associated with Indian telecom service sector.

Expert Survey - Purpose and Methodology

Identifying the strategic factors comprising of customer factors and enterprise factors from the

literature of telecom domain is important first step but they need to be further validated, for their relevancy to Indian context. The importance and sensitivity to context has been emphasised by researchers in country specific studies (Islam, 2010; Bryman, Stephens and Campo, 1996). Keeping this in view, the strategic factors pertinent to India have been determined by conducting a survey eliciting response from telecom professionals and experts closely associated with Indian telecom service sector.

An idea engineering exercise, done earlier for e- Government domain in Indian context (Nasim, S. and Sushil, 2010), has been adapted in this paper for validation of strategic crystal element variables in the context telecom service provision business. A survey was conducted eliciting response to a structured questionnaire (Appendix) from telecom service sector professionals of both private and public sector in India. A judgmental sample of 54 experts in the area of telecom service, with substantial experience and understanding of the field, responded to the structured questionnaire which was administered and responses received either electronically or personally collected in hard copy. The experts responses based on a five point scale were received and were analyzed to finally select and validate the continuity and change forces as well as strategic factors comprising of customer factors and enterprise factors which are relevant for India. Based on the literature review, seven continuity, seven change forces, four customer factors and seven enterprise factors were identified for validation from experts. The descriptive statistics have been presented for all the four set of variables in Table 1, 2, 3 and 4. These statistics uniformly present higher mean (more than three) median (four and above), and mode (four and above) of the distribution and a high cumulative percentage of experts (65 percent and above). These statistics, therefore, provide a fair basis of accepting these variables.

However, to authenticate the survey results, one sample t-test of significance has been used to compare the mean value of each o f the strategic factors with a specified constant called test value which is taken to be mean value greater than 3 seem to be a reasonable test value for hypothesis testing. The basic hypothesis for validating the continuity and change variables may be enumerated as follows :

Null hypothesis (HO) There is no significant difference between the observed mean and specified mean value for the variable (customer factor or enterprise factor).

Alternate hypothesis (H1) There is significant different between the observed mean and specified mean value for the variable (customer factor or enterprise factor).

Thus, a variable would be accepted as valid if the significance value of the t-statistic is less than 0.05 (95 percent confidence interval) indicating a higher level of acceptance of a strategic crystal element variable.

Results and Discussion

The expert responses received have been analysed in the following section. This analysis reveals a strong agreement on all the four set of variables namely; strategic cusomer; enterprise factors, and continuity; change forces.

Customer Factors

An analysis of the experts responses reveal a strong agreement on all the strategic customerfactors identified (Table 1).

Table 1: Analysis of Customer Factors

S.No.	Proposed Strategic Customer factors in Telecom Service Sector	Mean	Median	Mode	SD	Cumulative Percentage of experts who agreed /strongly agreed	*t*-value (test value =3)	Significance value (two tailed)(95 percent confidence interval)	Accept the change force as valid if significance value <0.05
1	Product price offering by the operator	3.94	4.00	4.00	1.16	77.6	6.220	.000	Accept
2	Operator's Quality of Service	4.65	5.00	5.00	0.68	94.8	18.220	.000	Accept
3	Operator innovativeness in introducing product and services in the marketplace	4.39	4.50	5.00	0.69	91.4	15.208	.000	Accept
4	Operator's Brand image	3.89	4.00	4.00	0.78	77.6	8.667	.000	Accept

Out of the four customer factors, all were accepted as the significance value was much less than 0.05. Majority of the experts (76 percent) believed that all the factors identified namely price, quality of service, speed of innovative product offering and brand image of the service provider are important determinant in selection of service provider by the Indian consumer. Quality of service has been rated as the most important parameter for the customers followed by operator innovativeness with mean scores of 4.65 and 4.39 respectively. An overwhelming majority of experts 94.8 and 91.4 percent respectively also agreed with this order of importance for the consumer. Price has been rated as third most important factor with mean score of 3.94 and 77.6 percent of experts either agreeing strongly or very strongly with it. What is coming out is that Indian consumers are not so price sensitive as they are made out to be. They would want their operator to provide excellent quality of service over and above other factors. Operator brand image has come out as very near to price as criteria for operator selection with mean score of and percent experts agreeing/strongly agreeing. The possible explanation could be telecom services are still mostly consumed by relatively well off people who want quality of service over and above everything else and for whom brand image of the operator is almost as important as price.

Enterprise Factors

Management of the enterprise would want to measure its performance on these factors. An

Table 2: Analysis of Strategic Enterprise Factors

S.No.	Proposed Strategic Enterprise factors in Telecom Service Sector	Mean	Median	Mode	SD	Cumulative Percentage of experts who agreed /strongly agreed	*t*-value (test value=3)	Significance value (two tailed)(95 percent confidence interval)	Accept the change force as valid if significance value <0.05
1	Market share of the operator	3.60	4.00	4.00	1.05	70.7	4.341	.000	Accept
2	Customer satisfaction levels	3.50	4.00	4.00	1.11	65.5	3.424	.000	Accept
3	Average Revenue Per Unit (ARPU)	3.77	4.00	4.00	0.85	77.6	6.876	.000	Accept
4	Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA)	4.12	4.00	4.00	0.53	94.9	16.032	.000	Accept
5	Company's network rollout speed	4.08	4.00	4.00	0.43	98.3	14.962	.000	Accept
6	Compounded Annual Growth Rate (CAGR) of the company	4.36	4.00	4.00	0.69	94.8	19.211	.000	Accept
7	Productivity per employee of the company	4.25	4.00	4.00	0.68	93.1	13.896	.000	Accept

analysis of the experts responses reveal a strong agreement on all the seven continuity forces identified for which the t-value has been found to be significant in order to accept (Table 2).

From Table 2 it is seen that experts have validated all the seven identified factors as the significance value is much less than .05. More than 70 percent professional have either agreed or strongly agreed with all the seven to be relevant enterprise performance related strategic factor. Network roll out speed has been rated as the most important of all these factors with 4.36 mean and 98.3 percent of experts saying so. This makes sense as network rollout speed determines the enterprise ability to expand fast and hence associated first mover advantage increasing its monetization capability.

Next important parameters are financial parameter which is company earning related namely EBITDA and CAGR. Both have been rated almost equally important with mean value for EBITDA being 4.12 and CAGR being 4.08. In case of EBITDA, 94.9 percent and in case of CAGR, 94.8 percent of surveyed experts have either strongly or very strongly agreed with these parameters indicating importance of these parameters for the enterprise. This is not surprising as EBITDA tells about financial soundness of the company and CAGR tells as to where the company growth stands in comparison of industry

growth and that of its competitors. Productivity per employee is also given quite a high importance by the experts. Mean value for this parameter is 4.25 and 93.1 percent experts have either strongly or very strongly indicated their preference for it.

ARPU has also been considered fairly important parameter as experts giving this parameter a mean score of 3.77 and 77.6 percent of them either strongly or very strongly indicating their preference for it. Surprisingly market share has been rated the least important of all the parameters among all though has not been rejected either. Mean score given for market share is 3.60 with 70.6 percent of experts either agreeing or strongly agreeing with it being a strong indicator of company performance.

Continuity Forces

An analysis of the experts responses reveal a strong agreement on all the seven continuity forces identified for which the t-value has been found to be significant in order to accept (Table 3).

Table 3: Analysis of Continuity Forces

S.No.	Proposed Continuity force in Telecom Service Sector	Mean	Median	Mode	SD	Cumulative Percentage of experts who agreed /strongly agreed	*t*-value (test value=3)	Significance value (two tailed)(95 percent confidence interval)	Accept the change force as valid if significance value <0.05
1	Existing telecom infrastructure	4.12	5.00	5.00	1.39	79.3	6.140	.000	Accept
2	Current Customer Base of the company	4.55	5.00	5.00	0.50	100.00	23.557	.000	Accept
3	Company Core Competence	4.34	4.00	4.00	0.57	94.9	17.691	.000	Accept
4	Existing Organizational Structure System and Processes	4.43	5.00	5.00	0.67	93.1	16.068	.000	Accept
5	Existing technology expertise	4.13	4.00	4.00	0.78	87.9	11.076	.000	Accept
6	Organizational Culture in the Company	4.13	4.00	4.00	0.66	91.4	13.113	.000	Accept
7	Company ownership aspects	3.53	4.00	4.00	1.06	65.5	3.829	.000	Accept

Among these seven continuity forces accepted, the existing customer base has emerged to be the most significant continuity force with maximum means score of 4.55 and 100 percent of experts either strongly or very strongly agreeing with it to be so. In importance continuity force of customer base is closely followed by Company 'Core Competence' and 'Current Organisational Structure System Processes' with respective means scores of 4.34,4.43 and 94.9, 93.1 percent of experts respectively either strongly or very strongly agreeing with these to be so.

Next in order of important continuity force is 'Organisation Culture' with mean score of 4.13 and 91.4 percent of experts either strongly or very strongly agreeing with this. This is followed by the continuity force namely 'Existing Technology Expertise' with mean score of 4.13 and 8 7 . 9 percent of experts either strongly or very strongly agreeing with this. Both these continuity forces have been rated high on importance because both are closely related to human resources of the organization and their existing skills. Though management may want to monetize the existing telecom infrastructure as much as possible this has not been rated as high as other continuity forces. However this continuity force has not been rejected either with mean score of 4.12 and 79.3 percent of experts either strongly or very strongly agreeing with this. The last identified continuity force namely 'Company ownership aspect' has the least mean score of 3.53 and 65.5 percent experts have either strongly or very strongly agreed with this to be an important continuity force. This continuity force as per experts has the least bearing on strategy but important enough not to have been rejected.

Change Forces

An analysis of the experts responses reveal a strong agreement on all the seven change forces identified for which the t-value has been found to be significant in order to accept (Table 4).

Table 4: Analysis of Change Forces

S. No.	Proposed Change force in Telecom Service Sector	Mean	Median	Mode	SD	Cumulative Percentage of experts who agreed /strongly agreed	*t*-value (test value=3)	Significance value (two tailed)(95 percent confidence interval)	Accept the change force as valid if significance value <0.05
1	Intensity of Competition	4.39	4.00	4.00	0.49	100.00	21.554	.000	Accept
2	Emerging new telecom technologies	4.46	5.00	5.00	0.62	93.1	17.792	.000	Accept
3	Governmental and Regulatory Telecom policies	3.98	4.00	4.00	0.73	87.9	10.152	.000	Accept
4	Globalization	4.00	4.00	4.00	0.74	89.7	10.164	.000	Accept
5	Changing customer needs	4.51	5.00	5.00	0.50	100.0	22.923	.000	Accept
6	Mergers and Acquisitions in Telecom service sector	3.63	4.00	4.00	0.85	69.0	5.701	.000	Accept
7	e-Business processes	3.60	4.00	4.00	0.95	75.9	4.817	.000	Accept

Among these seven change forces accepted, 'Changing customer needs' and 'Competition' have emerged to be the most significant change forces with respective means score of 4.55 and 4.39. All experts have either strongly or very strongly agreeing with these to be so. These two important change forces are closely followed by 'Emerging new technologies' with means scores

of 4.4655 and 93.1 percent of experts either strongly or very strongly agreeing with it to be so.

Next in order of important change force is 'Globalization' with mean score of 4.00 and 89.7 percent of experts either strongly or very strongly agreeing with this. This is followed by the continuity force namely 'Government policy and regulation' with mean score of 3.98 and 87.9 percent of experts either strongly or very strongly agreeing with this. After this, the change force namely 'e-Business' follows with mean score of 3.60 and 75.9 percent of experts either strongly or very strongly agreeing with this. The last identified change force namely 'Merger and acquisition' has the least mean score of 3.63 and 69.0 percent experts have either strongly or very strongly agreed with this to be an important continuity force. This change force as per experts has the least bearing on strategy but important enough not to have been rejected.

Synthesis of the Expert Survey

The result of the expert survey reveals that the mode value is 4 or more in case of all the four customer factors and hence experts have endorsed all the four customers factors culled out from the literature. However, among these four, quality of telecom service and operator's innovativeness in introducing product and services in the market place has been much more strongly endorsed by the experts compared to the other two customer factors, namely, product price and brand image.

Similarly the mode value for all the strategic enterprise factors has been found to be 4 or more. Among the seven enterprise factors identified from the literature, the experts have strongly endorsed network rollout speed, earning before interest, tax, depreciation and amortization (EBITDA); compounded annual growth rate (CAGR); and productivity per employer. The other three enterprise factors, though accepted by the experts as significant, have not been so strongly endorsed. These are market share, customer satisfaction and Average Revenue Per Unit (ARPU).

The result of the expert survey has also clearly strengthened the basic conjecture that both forces of change and forces of continuity are high in telecom service sector (Mode>/=4). This is reflected in the fact that all the change and continuity forces identified from the literature were strongly endorsed by the experts. All the forces driving change in the sector as identified from the telecom management literature were found to be statistically valid in Indian context. Some of the basic drivers of change include forces of changing customer needs, emerging new telecom technologies, government and regulatory telecom policies; and competition. As per the experts, the remaining change forces like, the e-business processes, globalization, and mergers and acquisition through statistically accepted as valid change forces, do not seem to be strongly driving change in the context of Indian telecom.

Similarly so far as micro-variables relating to continuity forces are concerned. Seven forces of continuity were identified from the literature and all of them were endorsed by the experts as significant in Indian context. One of the most significant continuity force, as unanimously endorsed by the experts, is the customer base of the company, the other being core competence, organization structure, system and process; and organization culture. Continuity forces, namely, existing telecom infrastructure, existing technology expertise, and company ownership aspects though endorsed by experts though accepted as valid continuity forces have not been so strongly endorsed by the experts.

The paper has thus determined the four set of micro variables related to telecom service provision business. These four components and the relationships among them are depicted as flowing stream strategy crystal. Following the methodology of drawing strategic crystal diagram

(Sushil, 2012b), the strategic crystal for telecom service provision business for India can be drawn as follows (Figure 2).

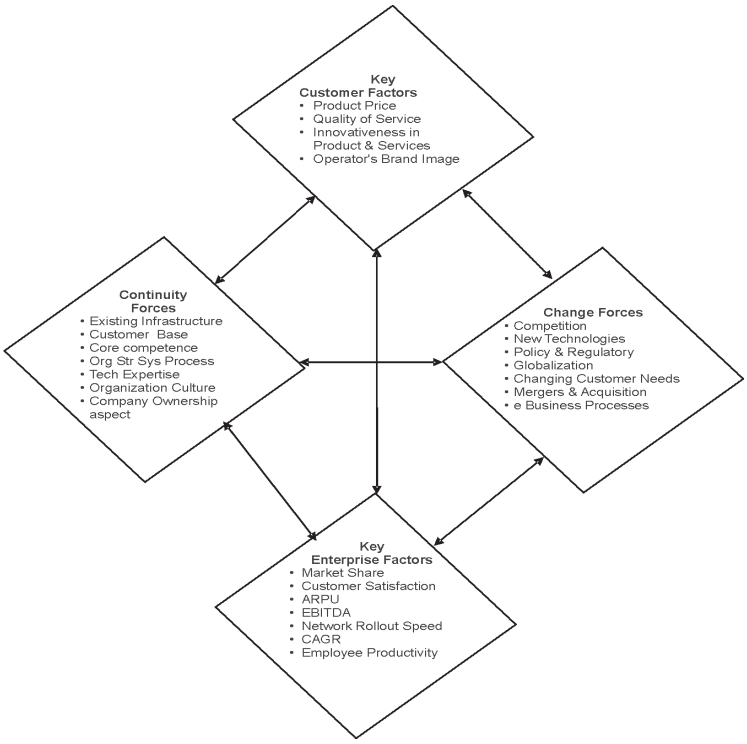

Figure 2: Flowing Stream Strategy Crystal for Telecom Service Provision Sector

Conclusions and Further Directions

Determination of elements of strategic crystal, namely, continuity and change forces; enterprise and customer factors in the context of telecom service provision business; and finalization of strategic crystal diagram are important starting steps of flowing stream strategy formulation in the context of Indian telecom service sector.

The next steps of flowing stream strategy formulation (Sushil, 2012b) which can be built up further are summarized below.

- Mapping of continuity and change forces on continuity change matrix and determine whether it lies in the high change – continuity quadrant.
- Categorize the change – continuity forces using the VDB (Vital, Desirable and Burdensome) and impact (High, Medium and Low) analysis of change forces.
- Determine 'how' these forces (continuity and change) are interrelated and they relate in that manner. This can be done using Total Interpretive Structural Modelling (TISM).
- Determine how the strategic factors are linked with the reality of continuity and change forces in the strategic crystal. Determine how these interactions can be interpreted.
- Having known the relationships in the strategic crystal, both the strategic factors i.e. customer factors and enterprise factors can be landscaped in terms of 'As-Is' and 'To-Be' strategies for a specific case organization/sector.

- Key channel strategies are selected and their trajectories guided depending on categorization of continuity and change forces. These strategic trajectories can then be aligned with strategic directions or the strategic intent.

This paper thus has given the important first step of determining the macro and micro variables pertinent to telecom service provision domain and development of flowing stream strategy crystal thereof. Strategy formulation based on flowing stream strategy can be undertaken from hereon for the domain or the case organization.

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Appendix: Structured Questionnaire for Expert Survey

S.No.		Response scale
Statements describing the customer factors		
1	Price is an important consideration in customer's buying decision of a telecom product or services.	Strongly agree (5) Agree (4) Neither agree nor disagree (3) Disagree (2) Strongly disagree (1)
2	Quality of telecom service (QoS) (speech quality, extent of network coverage, fault repair service, credibility in billing service etc.) is one of the main criteria in customer remaining loyal to an operator.	
3	A customer is attracted into buying a telecom product or service from an operator who offers a variety of packages inducts innovative products/rate plans on a regular basis without any delay.	
4	Brand image of a service provider is an important criterion for the consumer in its buying decision of a telecom product or a service.	
Statements describing the enterprise factors		
5	Market share is an important indicator of a telecom operator's performance	
6	Customer satisfaction measured by an independent agency is a strong indicator of service provider's performance.	
7	Average Revenue Per Unit (ARPU) is a good indicator of service provider's performance in terms of its acceptability among consumers.	
8	A high value of Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) is very good indicator of company operations.	
9	A high Compounded Annual Growth Rate (CAGR) is desirable as it implies that the company is growing from year to year. Comparing company CAGR with industry CAGR will tell on management's performance among operators.	
10	The ability of an operator to roll out network fast or bring new product or services to the market fast is a good indicator of performance of company's business processes.	
11	Productivity per employee of a telecom company is a good indicator of quality of its human resource, its motivation level and competency.	
Statements describing the continuity forces		
12	Existing telecom infrastructure such as cables, cable ducts, optical fibre cable and systems, GSM/CDMA tower and equipments, voice and data exchange and transmission equipments of a company are critical for the future growth of the company business.	

13	A large customer base of the service provider can be effectively used to enhance company business and develop new revenue streams for future.	
14	Core competence of the company should not be lost sight of while making new business plan or while implementing it.	
15	Existing organizational elements such as structure, systems, process and people are important for effective implementation of business plans.	
16	Expertise in existing technology (GSM,TDMA \switching and transmission, DSL based broadband technologies etc.) will continue to have important bearing on future growth of company business.	
17	Existing organization culture should not be ignored while formulating and implementing company strategy.	
18	Company ownership aspects (predominantly known domestic business house or leading multinational or Government) are important determinants of company success in the marketplace.	
Statements describing the change forces		
19	Open competition in telecom is forcing operators/service providers to change the ways of their doing business.	
20	Fast emerging technologies in telecom (Internet Protocol (IP) based voice and data, 3G, 4G and Long Term Evolution (LTE), WIMAX technologies etc.) are forcing operators to invest in these new technologies, learn and rollout services based on these technologies fast.	
21	Changes in Government policy or regulation whether to protect Government interest, meet the universal service obligations, ensure level playing field among the operators or formulating and enforcing rules pertaining to new technologies etc. force service providers to adapt to such changes and modify their business model accordingly.	
22	The effect of globalization in telecom where international telecom players are a big player in domestic telecom business influences the telecom operations of service providers.	
23	The customers are demanding newer and newer services (anytime anywhere broadband services, streaming video, gaming mobile TV and Internet, mobile banking/e-commerce) based on new and emerging technologies which is forcing companies to respond quickly to these ever-changing consumer needs.	
24	Mergers and Acquisitions among telecom companies to consolidate operations have been unleashing forces of change in merged or acquired companies.	
25	Introduction of e-business practices (Enterprise Resource Planning (ERP) packages, computerised billing and customer service business processes) affects the company operations such as retraining the employees, rendering legacy systems/procedures useless and so on.	

S B Khare is currently Principal General Manager in Bharat Sanchar Nigam Limited, an incumbent telecom service provide in India having a history of more than 150 years. He has worked extensively in all the fields of telecom service provision business namely Satcom, telecom switching and transmission technologies, network planning, execution, operations, training, strategy planning and execution, spanning more than 32 years in India and abroad. He holds a Bachelor of Technology degree in Electrical Engineering from IIT Kanpur and an MBA from MDI Gurgaon. Currently he is a PhD Scholar at IIT Delhi.