Business planning and modelling of ICT operators

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1. Introduction

Competitive advantage prods the firm to provide superior value to the customer and superior profits for its business. These advantages are also called positional advantage because they determine the rank or position of a particular form in the industry as **a leader in either cost or differentiation.** The competitive advantage inevitably leads to creation of superior value output through the firm's utilisation of its resources and capabilities.

Traditional Information Communication Technologies (ICT) systems provide basic value for most people, such as radio, TV, telephony, and Internet data. ICT systems introduced the last 20 years provide extra value beyond the basic value. A service with **extra value** is often referred to as value-added service. The extra value spurs the subscriber to use their system more and allows the operator to drive up their average revenue per user (ARPU). ICT systems with a more pronounced extra value automatically gets a larger customer base. In some case (e.g. Irridium satellite mobile) the extra value is not large enough to support a positive business case, and these services will disappear from the market.

Both suppliers and consumers of ICT services aim at maximising the benefit or surplus they receive. The suppliers aim at maximising the profit, which is the difference between revenue and cost. The consumers aim at maximising the consumer surplus, which is the difference between consumer value (a.k.a. utility or maximum willingness to pay) and price.

Economies of scale are defined as a reduction in the cost per unit resulting from increased production, realized through operational efficiencies. The average cost per unit will decline when more service units are offered. The cost of providing bandwidth for all services over one network will be less than the sum of the costs of providing bandwidth for each service over a separate network.

Economies of scope are when the cost of performing multiple business functions simultaneously proves more efficient than performing each business function independently. They have a positive effect on service costs as a result of usage of same technology. Due to the reduced number of network-technologies used in the converged network, cost of installation, reparation and maintenance will be smaller than in a not-converged network. This effect, however, is more difficult to measure.

2. Business planning

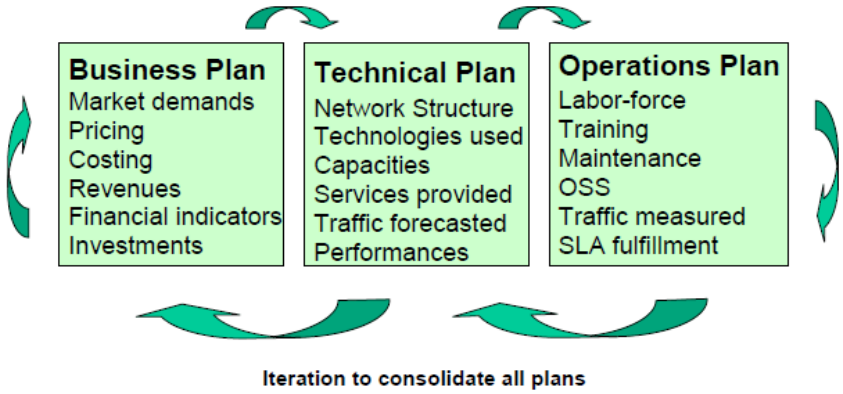

Figure 1. Relation between technical, business and operational plans (ITU-T,2008).

Business planning encompasses all the goals, strategies and actions that you envision taking to ensure your business's survival and growth.

Profit-making business planning is all the general business planning that must be done to start and run a successful business. The best known example of this type of business planning is the business plan. The business plan isn't a do-it-and-forget-it business planning exercise but a living document that needs to be updated throughout the lifecycle of your business.

Once the business has officially started, profit-making business planning will center on setting and meeting goals and targets. While some businesses make business planning an annual event, business planning is most effective when it's done frequently and consistently. The business planning process of reviewing progress on business goals and targets and setting new ones should take place at least monthly.

A **business plan** is a formal statement of a set of business goals, the reasons why they are believed attainable, and the plan for reaching those goals.

Different types of business plans are possible:

- strategic business plans for evaluating a strategy:
  - aid for making internal decisions for the whole company (strategic guidelines at the national level, all markets)
- tactical business plans for specific projects:
  - aid for making internal decisions for a particular area, or a market segment
- short term business plans for management control:
  - aid for monitoring the implementation of projects
  - preparation and follow-up of budgets

Typical structure for a business plan

- cover page and table of contents
- executive summary
- business description
- business environment analysis
- industry background
- competitive analysis

- market analysis
- marketing plan
- technical plan
- operations plan
- management summary
- financial plan
- attachments and milestone

3. Business model design

Business modelling is the process of planning and designing business models—it is an important input to strategic management, usually by assuring the qualitative results.

A **business model** is a framework for creating economic, social, and/or other forms of value. The term business model is thus used for a broad range of informal and formal descriptions to represent core aspects of a business, including purpose, offerings, strategies, infrastructure, organizational structures, trading practices, and operational processes and policies.

We adopt the STOF framework for ICT business models proposed by (Faber, 2003). The STOF model consists of four domains, namely the service domain, the technology domain, the organisation domain, and the financial domain, each of which interacts with the others and is affected by market dynamics, technological developments and regulation.

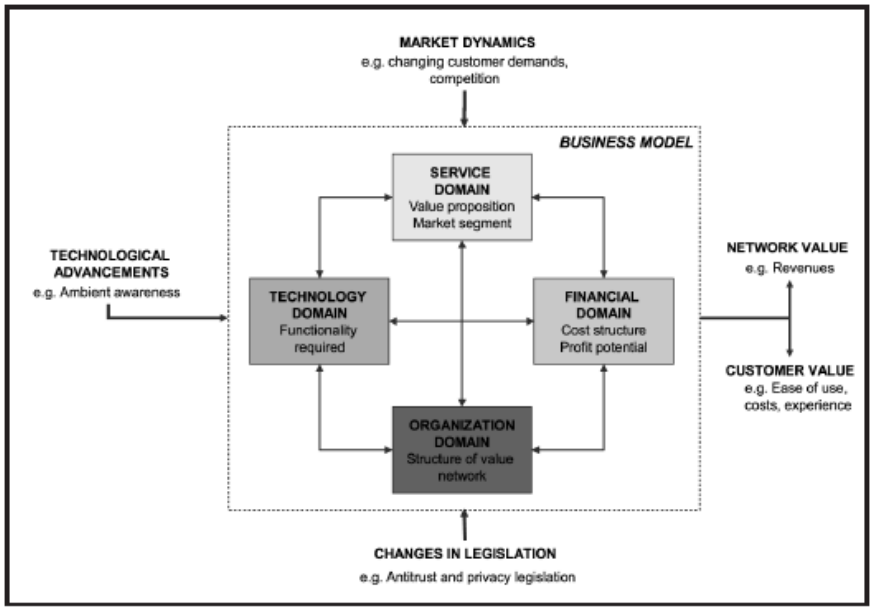

Figure 2. STOF model (Bouwman, 2008).

The four STOF domains include the following business model components (ECOSYS, 2004; Gjerde, 2007; ITU-T, 2008):

- Service domain
  - market segment
  - value model
  - service portfolio
  - competitive strategy
- Technology domain
  - technology model
- Organisation domain

- players, roles and relationships model
- integration model

- Financial domain
  - revenue model
  - cost model
  - pricing strategy

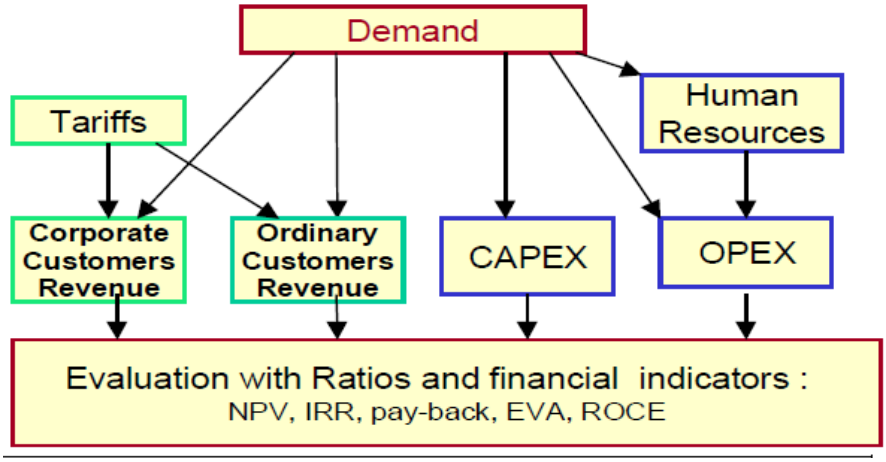

Figure 3. Business model structure (ITU-T, 2008).

3.1 Service domain

3.1.1 Market segment

A **market segment** is a group of people or organizations sharing one or more characteristics that cause them to have similar product and/or service needs. A true market segment meets all of the following criteria: it is distinct from other segments (different segments have different needs), it is homogeneous within the segment (exhibits common needs); it responds similarly to a market stimulus, and it can be reached by a market intervention. The term is also used when consumers with identical product and/or service needs are divided up into groups so they can be charged different amounts. These can broadly be viewed as 'positive' and 'negative' applications of the same idea, splitting up the market into smaller groups.

3.1.2 Value model

In order to generate revenue the company needs to offer some benefit (value) to the customers. Such value is derived from the operations, collaboration, or cooperation between the actors involved in its creation, distribution and consumption. Both customer's and provider's perspective are taken into account (consumer's value and company's value). From the company's perspective, defining a customer's value is an intrinsic component of a business model.

An important ingredient when designing a business model is to create a value model. The value model consists of:

- **Value proposition** includes identification of the key value drivers and elements, which enable the company to differentiate itself from the competitors, and

- **Value configurations** includes network of partners, which describe how the value is created, who contribute to it (i.e. relationships), and how it is distributed and finally, consumed. Value configurations reflect different value creation logics.

Several configurations are identified and described in the literature and used in the practice for both business and strategic purposes. These configurations focus on different aspects like transaction cost, network effects/externalities, strategic relationships, information asymmetry, branding and marketing, etc. These are not always contradictory, but rather partially overlapping.

In this report, we have adopted the concept of "value network" instead of the traditional company-specific "value-chain" approach. We define **value network** as a network of relationships that generates economic and other types of value through dynamic exchanges between two or more participating players. The exchanges may be tangible or intangible in nature.

Three primary activities are identified in the value network configuration:

1. Network promoting and contract management includes the promotion, branding and building the network, acquiring the customers, and managing contracts/agreements for the service provision. The complexity of the contracting/negotiation process increases with the increase in volume of customers.
2. Service provisioning links the people attached to the network, and also collects the payment from them. It includes the activities of service provision, billing, accounting, charging (with different charging schemes), etc.
3. Infrastructure operations make the infrastructure capable of supporting the customers in accordance to the contracts. It includes both physical and information infrastructure.

3.1.3 Service portfolio

The set of products/services offered by a company is called **portfolio**. The portfolio conveys the value proposition of the company. In order to design a successful portfolio, the value drivers of the business sector needs to be identified. To maintain and develop the market position over time, every company needs continuous research & development to evaluate prospects for new products/services that can replace or extend the current portfolio.

Some companies, e.g. AT&T, ask user groups for suggestions of features of new services and applications. Apple (S. Jobs) tend to rely more on experts for innovation of successful services and applications.

Careful R&D on new technology, customer behaviour, market trends, etc. is necessary but not sufficient for the portfolio to become successful. A second major requirement is an accurate economic model of the prospects of the portfolio. Before any new item is launched its expected impact on the profitability needs to be assessed. The demand from customers is critically dependent on the functionality, quality and price of the services in the portfolio. Advanced functionality and high quality is not a guarantee for a large demand. If the long-term profit gain is not large enough the profit expansion should be avoided.

Different customer segments have different needs and may respond to the offered portfolio differently. Services that are classified as must-have services by some segments may just be classified as nice-to-have services by other segments. A differentiated portfolio is a standard strategy to achieve a positive business case.

The utility (or maximum willingness to pay) for a given technology and service normally decays with the age of the customer. As the user gain more experience with the service its perceived utility tend to increase.

3.1.4 Competitive strategy

Competitive strategy is tantamount to competitive advantage. When a certain firms achieves rate of profit that is ahead of others the said firm is considered as having sustainable competitive advantage over other firms in the industry. Generally speaking the common goal of all business strategies is to attain and maintain sustainable competitive advantage. According to Michal Porter's theory there are two basic types of competitive advantage: the cost and the differentiation. Cost advantage happens when a firm provides the product or services that are similar to its rivals but at a much lower cost. Differentiation advantage happens when a firm provides a product or services that exceed the quality of competing products. These advantages are also called positional advantage because they determine the rank or position of a particular form in the industry as a leader in either cost or differentiation. Resources pertain to the firms assets that are used in the creation of cost or differentiation advantage. Examples of resources are the patents and trademarks, propriety knowledge, installed customer base, reputation of the firm and brand equity. Capabilities pertain to the ability of the firm to effectively utilise its resources. Example of which is the capability of the firm to bring a certain product or service to the market faster than its business rivals. The resources and capabilities of the firm pay the way for its distinctive competencies. These competencies in turn lead to innovation, efficiency, quality and customer responsiveness for the creation of a cost advantage (lower cost structure) or a differentiation advantage.

In Porter's Generic Strategies the basic factor in determining the profitability of a firm is the attractiveness of the industry where it operates and the secondary determinant is the firm's position in the said industry. A firm that is occupying leading position can achieve superior returns even in a industry that may have below-average profitability.

Target scope	Advantage: Low cost	Advantage: Product uniqueness
Broad (Industry wide)	Cost leadership strategy	Differentiation strategy
Narrow (Market segment)	Focus strategy (low cost)	Focus strategy (differentiation)

Table 1: Porter's generic strategies.

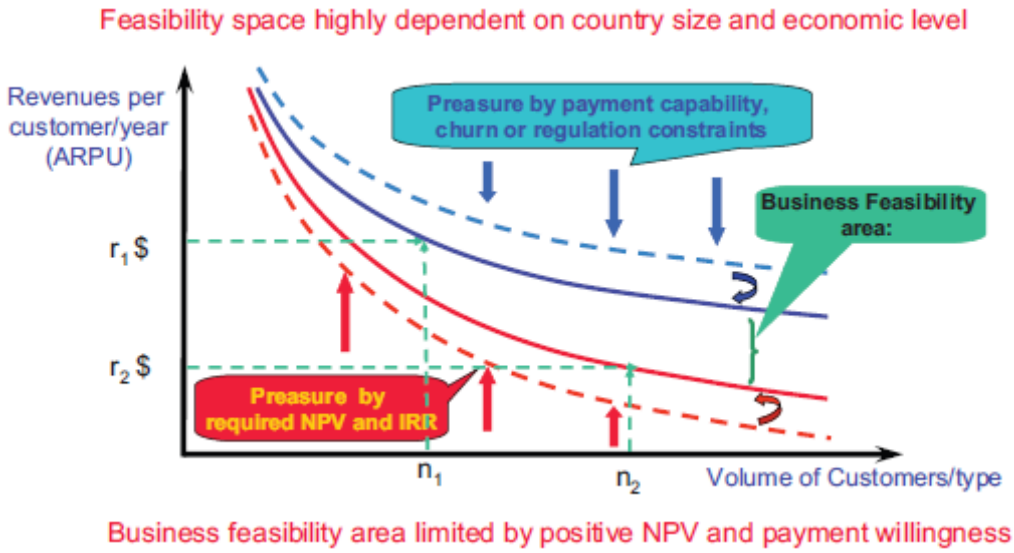

Figure 4. Key factors in competition: business feasibility (ITU-T, 2008).

3.2 Technology domain

3.2.1 Technology model

Communication networks are classified into voice, data and integrated networks. Voice networks have traditionally provided more intelligent network services than data and integrated networks. Data and integrated networks are based on the end-to-end principle which rely on end systems to enhance the service provided by the network. In principle this means that recovery from information transfer errors is initiated by the end systems and that the media coding/compression scheme may be adaptive to available network capacity.

Communication networks consists of a core network that interconnects end systems via access networks. Private core networks offers services to a restricted set of organizations. Public core networks offers services to everybody and charge a fee for using the network. Public core networks are classified as Public Switched Telephone Network (PSTN), Public Switched Data Network (PSDN), or

The PSTN is implemented by circuit switching while PSDN and PSIN are implemented by packet switching. The PSIN solution provides economy of scale by using a single network infrastructure for all services which access the network via a common host-network interface. Realizing the PSIN by a packet-switched network allows the use of statistical multiplexing by taking advantage of that connections sharing the same links often have non-overlapping peak rate periods. Statistical multiplexing allows efficient network utilization and is the main advantage of packet switching over circuit switching.

Interactive multimedia services with loss and delay requirements calls for careful management of network resources. Preventive control mechanisms forms the basis for traffic control in integrated networks. Traffic enforcement and connection admission control are part of preventive traffic control which aims at keeping the risk of network congestion within tolerable limits. Services that tolerates some delay and throughput variability can be managed by reactive flow and congestion control.

An important issue is the effectiveness and efficiency of the traffic engineering (TE) mechanisms. Effectiveness is measured in terms of proximity to the optimal TE solution in terms of QoS, GoS and operator profit, i.e, revenue from customer charges minus total network cost. Today, TE finds it practical use in the regional domain of Internet, i.e. in the shared network betweeen the local exchange and the backbone network. In the backbone domain packet loss and queueing delays are avoided by over provisioning of network capacity. An efficient TE solution in the regional network will result in fewer rejected connection requests and will increase the revenue.

3.3 Organisation domain

3.3.1 Players, roles and relationships model

Players: participating entities in a business model. It can either be 1) a business entity that provides services or 2) customer that consumes services.

Roles: functionalities of players in a business model. A player can take one or more different roles.

Relationships: illustrates the exchange of information between two roles/players/layers in the system. These information exchanges can be of two types: 1) business related (e.g. billing method, tariffing schemes, SLA negotiation, etc) or 2) technical (e.g. signalling, management, payment method, etc).

Role	**Description**
End-user	An entity taking up this role is the ultimate consumer of services and content provided in the ICT ecosystem.
Subscriber	An entity taking up this role pays for the services and content provided in the telecom ecosystem and has a direct relationship with the provider.
Service operator	An entity taking up this role provides basic communication services such as voice and video telephony to subscribers over ICT networks (fixed-line and mobile). A service operator doesn't own the networks. It enters service level agreements (SLAs) with access and core network operators for network capacity.
Access network operator	An entity taking up this role owns and administrates the access networks (local loop) such as DSL or mobile base stations and provides transport or bearer services to the service operator.
Transmission network operator	An entity taking up this role owns and administrates the transmission networks such as optical backbone networks and provides transmission services to the core network operator.
Core network operator	An equity taking up the role owns and administrates the core network elements such as the PSTN and mobile switches, routers and offers core network capacity to the access network operator.
Network equipment vendor	An entity taking up this role primarily manufactures either by themselves or through original equipment manufactures (OEMs) network elements and related services and distributes them to network operators (both access and core) as well as service providers.
CPE vendor	An entity taking up this role primarily manufactures either the

	equipment (CPE) such as desktop computers or mobile terminals used by the end-users.
Distributor	An entity taking up this role act as the retailer for CPE and/or service subscriptions.
Value-added service provider	An entity taking up this role provides services that are complementary in nature or add value to the basic set of services provided by a service operator.
Third party billing service provider	An entity taking up this role provides billing services to the service operator, value-added service provider or content aggregators. This role acts as a financial intermediary (or clearing house) between two or more service operators. In return, it gets a share of the revenue earned by the operators.
Regulator	Regulator's primary role is to maximise the social welfare by laying down rules and guidelines essential for sustaining a competitive market and technological environment and acting as a facilitator or mediator between service operators, subscribers and network operator. Regulator plays a neutral role in the ICT ecosystem and acts as a representative of the government.
Service integrator	An entity taking up this role provides the service platform functionality that enables roles, offering services and applications access to subscribers, without requiring an extensive knowledge of the underlying ICT system.
Content producer/owner	An entity (business or individual) that takes up this role would develop and maintain content applications such as games, music etc.
Content provider	An entity taking up this role publishes and sells the content developed by itself or by other content producers.
Content aggregator	An entity taking up this role acts as an intermediary between service operators and content providers for offering a portfolio of content (such as games, music or ringtones). It takes the content produced by Content providers, and converts it into suitable format depending on the context (terminal capabilities, location, personal indications/preferences, etc.). It usually offers several types of content at single stop (e.g. a content portal) combining music, video, films, books, etc.

Table 2: Definitions of roles in a ICT ecosystem (ECOSYS, 2004).

See (ECOSYS, 2004) for a roles and relationships reference model for telecommunication business models.

3.3.2 Integration model

Vertical integration refers to the extent to which a player controls the production and distribution of services in a value chain.

Horizontal integration occurs when a firm in the same industry and in the same stage of production is being taken-over or merged with/by another firm which is in the same industry and in the same stage of production as of with the merged firm.

3.4 Financial domain

3.4.1 Revenue model

The revenue model states how to generate revenue from customers. On Internet, business models are often based on advertising and free usage, possibly extended with a premium model that gives extra content at some minor fee. Revenue sources for ICT operators include payment for services, content, rental of customer premise equipment, and advertising. The demand from customers and the pricing of services determine the amount of revenue. ICT players may implement revenue sharing with some other player(s), in order to establish stable revenue streams and reduce the risk taking.

Future advertising systems will be directed, interactive and personalized. Subscribers will have possibility to respond the commercials presented at the terminal display. They can ask for information that are relevant to their specific interests. The ICT system can learn the preferences of each subscriber and present personalized commercials. Intelligent advertising may be implemented by a learning system based on AI techniques (Aghasaryan, 2008). The next generation advertising systems have great promise to change peoples' behaviour and attitudes towards commercials.

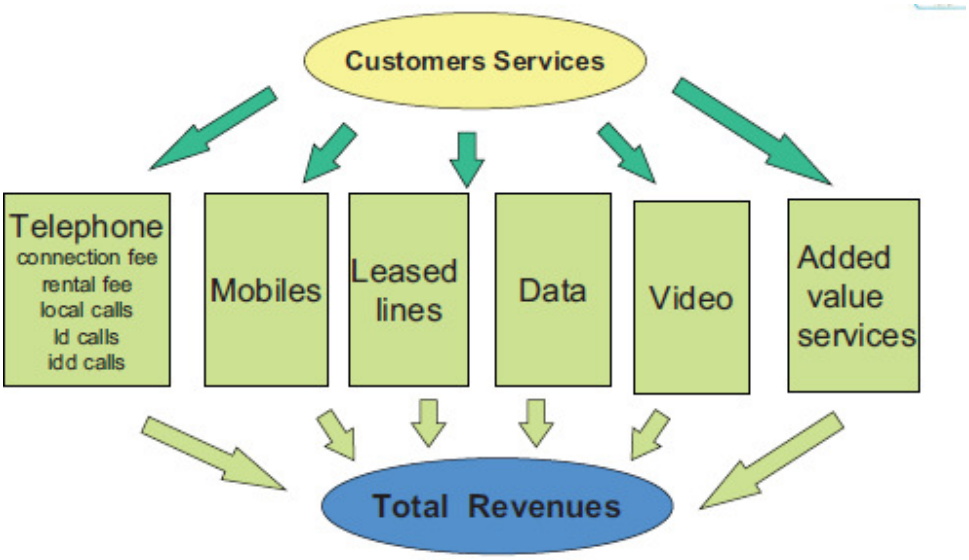

Figure 5. Services revenues calculation (ITU-T, 2008).

3.4.2 Cost model

Cost modelling provides input information for several kinds of decisions. Knowing the cost per service is very important for pricing decisions, benchmarking, profitability analysis, simulation for possible introductions of new technology or services etc. It is necessary that the cost modelling and allocation process is performed as correct and fair as possible.

3.4.2.1 Definitions

Capital expenditures (**CapEx**) costs contribute to the fixed infrastructure of the company and they are depreciated over time. They are needed to expand the services to the customers.

Operating expenditures (**OpEx**) costs do not contribute to the infrastructure itself and consequently are not subject to deprecation.

Variable costs are expenses that change in proportion to the activity of a business. In other words, variable cost is the sum of marginal costs. It can also be considered normal costs. Along with fixed costs, variable costs make up the two components of total cost. Not all variable costs are direct costs, however; for example, variable manufacturing overhead costs are variable costs that are not a direct costs, but indirect costs.Variable costs are sometimes called unit-level costs as they vary with the number of units produced.

Fixed costs are business expenses that are not dependent on the activities of the business. They tend to be time-related, such as salaries or rents being paid *per month*. This is in contrast to variable costs, which are volume-related (and are paid *per quantity*.)

Direct costs are expenses that would not have been made if the product/service where not produced.

Shared costs are defined as cost of the usage of resources which are shared amongst several processes/services. They can be divided in a fair way, e.g. according to bandwidth usage.

Joint costs refer to costs of resources which are inherent to each other whereby providing the first resource will also provide the second resource and vice versa.

Common costs are defined a joint costs for which the resources are not directly associated to the product or services sold. They are mainly seen as overhead.

3.4.2.2 Cost classification

Classification of CapEx costs:

- network infrastructure (shared)
    - e.g. equipment
- network software (shared)
    - e.g. network management system
- non-telco specific infrastructure (common)
    - e.g. land and buildings

Classification of OpEx costs:

- OpEx for network in operation
    - telco-specific continuous cost of infrastructure (shared)
    - maintenance (shared)
    - reparation (shared)
    - service provisioning (direct)
    - pricing and billing (shared)
    - operational planning (shared)
    - marketing (direct)
- OpEx associated with setting-up the network
    - up-front planning (shared)
    - first-time installation (shared)
- non-telco specific OpEx
    - non-telco continuous cost of infrastructure (common)
    - non-telco specific administration (common)

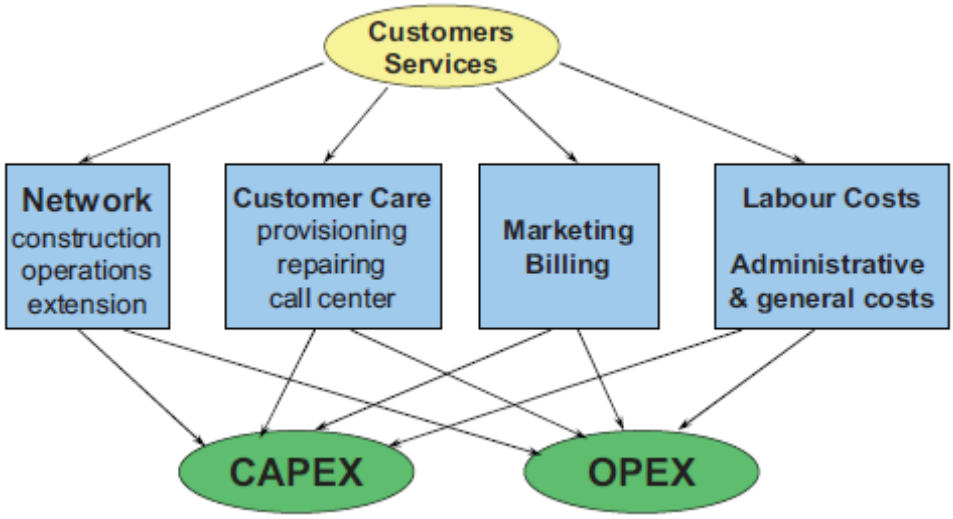

Figure 6. Expenses calculation (ITU-T, 2008).

Telco-specific continuous cost of infrastructure includes costs for floor space, power and cooling energy, and leasing network equipment. **Maintenance cost** can be seen as the cost of preventative measures such as monitoring and maintaining the network against possible failures. Repair costs include diagnosis and analysis, travel by technicians to place the failure, fixing the failure, and testing to verify the repair. **Provisioning and service management cost** includes testing, service provisioning, service move or change, and service cessation. **Pricing and billing cost** includes sending bills to customers and ensuring payment. **Operational network planning cost** includes all planning performed in an existing network such as day-to-day planning, re-optimisation, and planning upgrades. **Marketing cost** includes promoting a new service, providing information concerning price, etc.

Up-front planning cost includes planning studies to evaluate the building of a new network, changing the network topology, introducing a new technology or new service platform, etc. **First-time installation cost** includes actual connecting and installation of the new component into the network, as well as the necessary testing of the component and its installation.

Non-telco continuous cost of infrastructure includes leasing infrastructure not related to the network itself such as buildings to house the personnel, energy for desktop PCs, heating, cleaning of buildings, etc. **Non-telco specific administration cost** includes employee payroll administration, office support staff, human resource department, etc. Non-telco-specific administration and non-telco-specific cost of infrastructure can jointly be seen as "overhead" costs.

3.4.3 Pricing strategy

Both suppliers and consumers aim at maximising the benefit or surplus they receive. The suppliers aim at maximising the profit, which is the difference between revenue and cost. The consumers aim at maximising the consumer surplus, which is the difference between consumer value (a.k.a utility or maximum willingness to pay) and price.

Factors to consider the design of pricing scheme include technology risks, availability of resources, competition, supplier and consumer behaviour, price discrimination and regulation.

Any new technology has risks associated with unexpected costs, compatibility problems, system failure, immature standards, arrival of new and better solutions.

Resource consumption in a telecom network may be evaluated by mathematical modelling followed by analysis and/or simulation. The network capacity (transmission speeds, buffer memory) needed to provide a desired QoS for a given traffic demand may be calculated from probability models of network traffic. Dynamic (state-dependent) pricing policy can be shown to be optimal. However, **time-of-day pricing policies** with a single price parameter (volume charge) is efficient and may bring near-optimal revenue (Paschalidis, 2002).

A revenue-maximizing provider may set substantially different prices for two services even if they have very similar resource requirements. This is consistent to what is happening in other industries (e.g., in air travel all passengers receive essentially the same service but can pay very different prices).

The choices made by suppliers and consumers dictates the supply and demand on the market. The market dynamics under monopoly, perfect competition and oligopoly may be modelled and analysed with various mathematical tools. An excellent example is game theory which was first studied in the context of oligopoly markets by Cournot, and Bertrand in the 19th century. The work by Neumann and Nash laid the foundation of the field of game theory in the mid 20th century. Game theory is today an established part of econometrics.

We can identify three types of price discrimination. With **first degree price discrimination** (also called personalized pricing), the supplier charges each user a different price for each unit of the service and obtains the maximum profit what it would be possible for him to extract. The consumers of his services are forced to pay right up to the level at which their consumer surpluses are zero. In **second degree price discrimination**, the monopolist is not allowed to tailor his offer to each customer separately. Instead he posts a set of offers and then each customers can choose the offer he likes best. Prices are nonlinear, being defined for different quantities. A supplier who offers 'quantity discounts' is employing this type of price discrimination. Of course his profit is clearly less than he can obtain with first degree price discrimination. The idea of **third degree price discrimination** is market segmentation. By market segment we mean a class of customers. Customers in the same class pay the same price, but customers in different classes are charges differently. This is perhaps the most common form of price discrimination.

Service bundling is an example of second degree price discrimination that is popular among IPTV operators. Service bundling is believed to have a positive impact on ARPU and customer churn. The triple play service package includes telephony, Internet data, and IPTV. The price for the triple play package is lower than the price for the sum of individual services.

The **regulators** monitor the market and may take actions against unfair pricing, barriers against fair competition, cartel formation, etc. Regulators implement the political policies chosen by the government. Regulators normally attempt to maximise the welfare of the market players, i.e. total benefit (surplus) of all suppliers and consumers.

4. Examples of ICT business models

ICT players may use one of several business models:

- basic service provisioning model
- vertical bundling model
- capacity reseller model for content
- bit-pipe model

In the **basic service provisioning model**, the user buys service from the service operator. The subsribers can either be an individual or business organisation. Service operator acts as the

main responsible player against the subscriber. In order to carry out its business, the service operator needs to buy network access and transport services from the network operator. Network operator is a player who operate both access and core portions of a network infrastucture.

In the **vertical bundling model**, the service providers takes on the additional roles as content aggregator. Service operator is the key player in this model having a direct relationship with the subscriber base, providing content through a portal and billing the subscriber for the services. By assuming the role of content aggregator, a service operator can gain greater control of the value network. This is also known as vertical bundling.

In the **capacity reseller model for content**, the third party such as content aggregator provides content top the subscribes using a service operator's network capacity. Here, the service operator resells a part of its capacity and also provides billing services on behalf on the content aggregator. The content aggregator in turn has to pay for the billing service and capacity usage to the service operator. A revenue sharing model can also exist between these players for content usage. These revenue models may differ depending on the type of content provided.

In the **bit-pipe model**, content provisioning is done by content aggregators. Here, the third party offers content to the subscribers over service operator's network capacity. A third party billing service operator (such as credit card agency or banks) will provide billing services on behalf of the content aggregator. The service operator bills only its subscribers for the transport of data, hence the "bit-pipe" model. Content aggregator and third party billing service provider are the key players in this model.

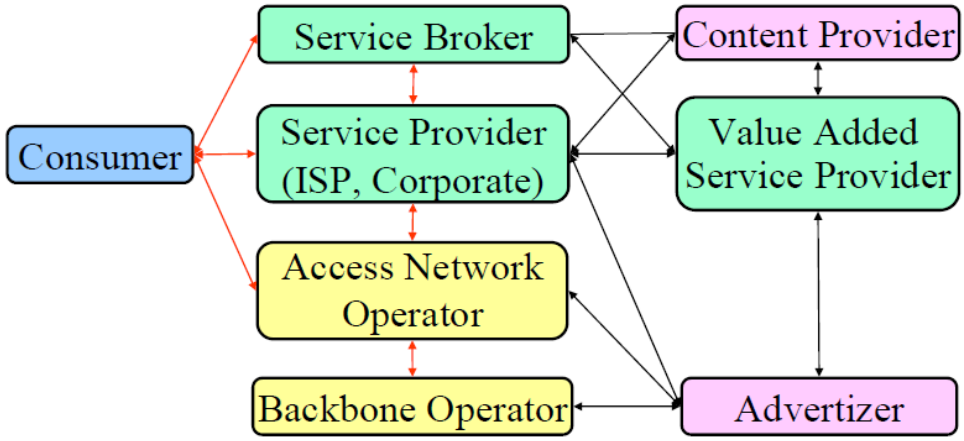

Figure 7. Reference business model

5. Analysis of business models

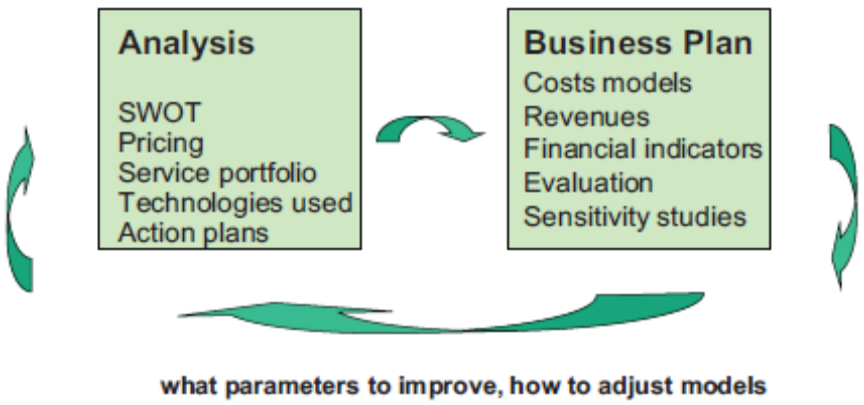

Figure 8. Interaction between analysis and business plan (ITU-T, 2008).

5. Analysis of business models

5.1 Quantitative analysis

5.1.1 Adoption of new ICT technology/services

Different models can be used for modelling the adoption of a new technology or service. These models typically resemble an S-shaped curve for presenting the adoption as a function of the time. Different mathematical formulations can be used for these S-curves, leading to slight variations in the adoption models. Often used models within literature, both in telecom and more in general, are Rogers, Bass, Fisher-Pry, and Gompertz. Roughly speaking, information used for properly estimating the parameter values of these models can be gained from two sources:

1. Fitting of the mathematical adoption models to existing adoption data available. This requires sufficient data to be available and thus requires an existing customer base. For new ICT technologies/services this might not always be the case.
2. Extrapolation from existing comparable technologies. In the case of IPTV we could make an extrapolation based on telecom broadband adoption on one hand and broadcast television (color or black and white) on the other. For television as well as broadband adoption, there is a lot of information available.

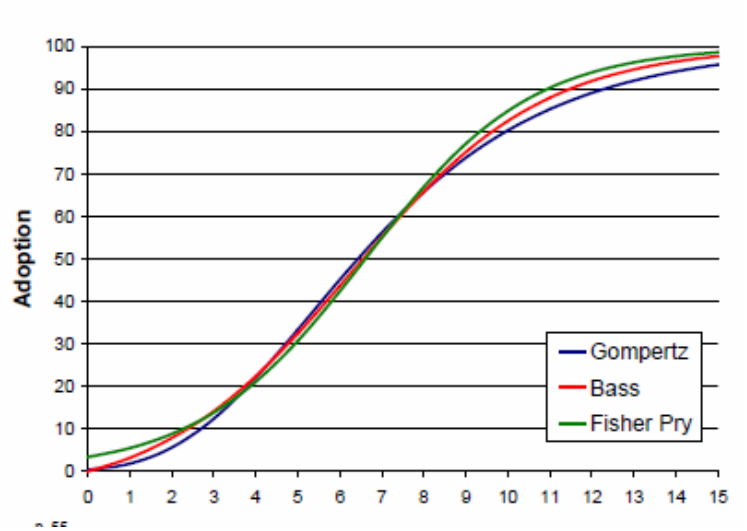

Figure 9. Cumulative market share as function of time (Verbrugge, 2008).

(Soto,2007) propose the following techniques for market and demand forecasting:

- Historical projection: ARMA, ARIMA, etc.
- Analogy with other demands
- Evolutionary (grow lifecycle)
- Causal on orginating factors
- Scenarios (alternatives and feasibility)
- Visionary (imagination)

5.1.2 Modelling demand from ICT subscribers

New customers arrive to the ICT operator market at a characteristic rate Λ [customers/day]. The customers are shared among the available ICT operators according to customers' perception of offered functionality, quality, and price. The customers choose among the available operator firms with the objective of maximizing their own net benefit or consumer surplus, defined as the difference between the consumer value (a.k.a. utility or maximum willingness to pay (WTP)) and the price for the service. Economic theory states that WTP is the sum of money that makes half a group of people choose a particular measure if that was the cost they had to pay. The other half would value the measure lower and would not be prepared to pay so much.

A rich body of experimental research in mathematical psychology says that consumers choose brands in an inherently probabilistic way. Random-utility models (RUMs) are based on a probabilistic model of individual customer utility. They are useful for several reasons. First, probabilistic models can be used to represent heterogeneity of preference among a population of customers. Second, can also model uncertainty in choice outcomes due to the inability of the firm to observe all the relevant variables affecting a given customer's choice including intrinsic and extrinsic factors. Finally, the econometrician typically does not know the true functional form for the utility function.

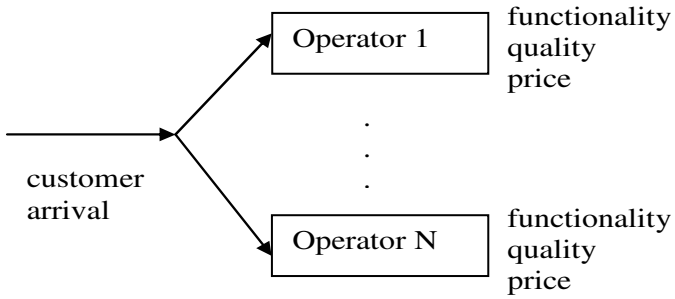

Figure 10. Customers' choice of ICT operator.

5.1.3 Financial indicators

A business plan presents the calculation of the financial indicators that enable the managers to evaluate the financial performances of an enterprise in order to take best decisions for the overall operation. The following financial indicators characterise the profitability of the business case:

- Payback period
- Net Present Value (NPV)
- Return on Investment (ROI)
- Internal Rate of Return (IRR)
- Net Cash Flow (NCF)
- Discounted Payback Period (DPP)
- Discounted Cash Flow (DCF)
- Operating income
- Revenue per service class

5.2 Qualitative analysis

The star model (Landow, 2008) is loosely based on Porter's Five Forces. Developed in 1979 by Michael Porter, the Five Forces group microeconomic forces within the marketplace into the following five categories: bargaining power of customers, the bargaining power of suppliers, the threat of substitute products, the threat of new entrants, and industry rivalry (Porter, 1998). This idea provided companies with a method of analyzing a market in order to predict what forces affect a product offering, resulting in an analysis on how the microeconomic influences work.

Major metrics of the star model:

1. **Power Against Suppliers**: This metric will allow each company to be rated at its current level of bargaining power with respect to the suppliers of the end products. The power of supply affects the costs of producing a product and will be reflected in the value chain.
2. **Power Against Customer Bargaining:** This metric evaluates the customer's bargaining power with an IPTV service provider. The questions for this parameter also discover costs the company passes on to consumers and if the company's service to customers is unique.
3. **Power Against New Entrants:** As part of this metric, companies are evaluated based on their vulnerability to new entrant competition. Questions will also help evaluate the evel of resistance the company poses to new entrants.
4. **Power Against Substitution:** This metric will help evaluate companies based on the ease of customers substituting a product offering with another competing product. The parameter evaluates the market power of the company with respect to the product being offered. Specific questions target if there are high start-up costs for entrants,

whether nor not there are exit barriers for companies divesting from the market and if the product can be replicated by others.

5. **Power Against Competition:** This metric will be used to evaluate the level of competition that the company faces in the overall market, otherwise known as *rivalry* within the market. This metric evaluates whether the company is operating under healthy competitive environment. Questions relate whether the company holds the patents and intellectual property rights for goods and services.

Minor metrics of the star model:

A. **Customer Loyalty: Stable Customer Base.** This metric evaluates steps taken by a company to influence and encourage customer loyalty. A higher rating will indicate the company's ability to retain its existing customer base. Additionally, the parameter is also indicative of the company's ability to utilize existing customers while adding new subscribers. Finally, the rating also has influence on the ability of the company to face competition from potential new entrants.

B. **Product Usability: Interactivity Between Product and Customer.** This parameter reflects a company's ability to envision requirements while providing user-friendly interactive features to its customers. The parameter also evaluates incremental ARPU generated from existing customers. Higher rating influences the company's bargaining power against customers. Additionally, differentiated services also result in higher bargaining power against suppliers.

C. **Secured Solution: Enabling Security within the Company and its Services**. The objective of secured services is not only to protect the legitimate users while accessing the network but also to keep the malicious users away from any potential disruption of the services. Content is one of the most important elements for IPTV services. Availability of secured infrastructure for delivery encourages access to premium contents and attracts incremental subscribers.

D. **Market Regulation: Business Operation within a Regulated Market.** This factor includes clarity of regulatory environment in the target country. An uncertain regulatory environment will have high impact on planning development of newer services. Additionally, increase in regulation of content will also result in increased cost to suppliers.

E. **Customer Satisfaction: Immediacy of Satisfaction.** This parameter reflects the operational efficacy of the company while handling problems reported by customers. A higher satisfaction index results in increased market share influencing the company's ability to attain higher bargaining power against suppliers. Additionally, the parameter also has influence on power against competing vendors.

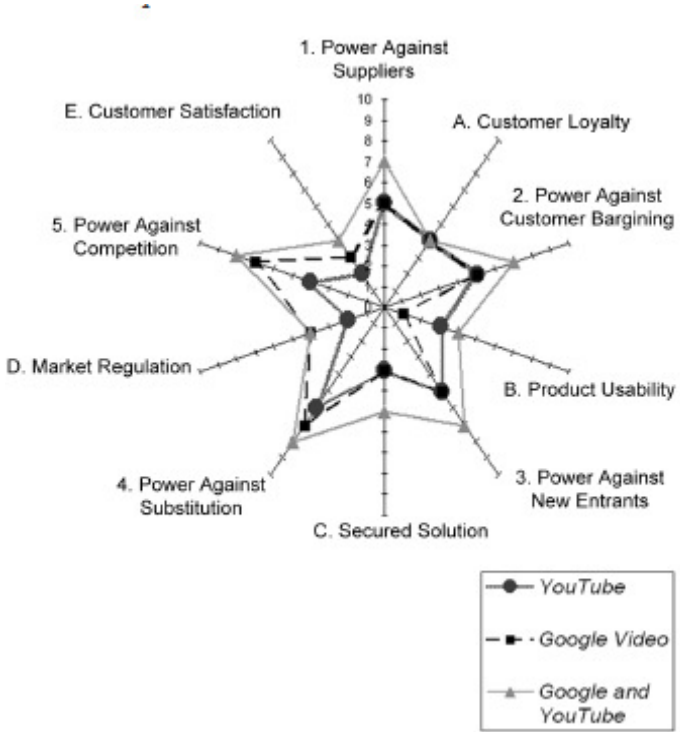

Figure 11. Google vs. YouTube star model (Landow, 2008)

In order to assess the relative bargaining power of a player in a relationship, the following parameters should be considered. Here, the unit of analysis is a player.

- Nature of roles taken by player: a key role gives greater ability to control the value network
- Number of roles: a larger number of roles gives greater control over the value network
- Number of customers: a larger number gives greater power
- Number of suppliers: a larger number gives greater power
- Number of substitutes: a larger number gives greater competition and weaker bargaining power

Appendix A: Cost allocation

Two approaches can be followed for allocating costs to the different services, dependent on the considered starting point of the network modelling process. The first approach, **top-down method**, an attempt is done to reduce the unaccounted-for common cost. One way to do this is to refine accounting records, keeping more information on how the common cost is generated. The cost of existing equipment is allocated to the elements needed to deliver the service, through the use of cost drivers. Depending on the different cost bases, different costs per service can be revealed. The second approach, the **bottom-up method**, each stand-alone cost is computed from a model of the most efficient facility that specializes in the production of that one product, using current technology.

A bottom-up method is, due to its characteristics particularly recommendable for regulatory studies, because it is independent of the operator's information, and it is also of interested for operators to study and decide upon networks deployment.

Once all the processes have been described and costs have been categorized and assigned, different types of costs per service can be calculated through different methodologies. The first method is the **Stand Alone Cost** (**SAC**). It considers the cost per service as if there was only one service offered. All shared/joint costs and common costs are added to the direct costs of the considered service and are allocated to that service. The SAC is the highest cost level the service can reach. This method is only used in a top-down approach to determine an upper bound for the cost of a service. The **Fully Allocated Cost** (**FAC**) method allocates all costs to all services. Direct costs are directly attributed to each cost consuming service, shared/joint costs and common costs through cost drivers. This method can be used for top-down as well as bottom-up approach. The hardest part when using this cost base is to find the right driver for all costs. The **Incremental Cost** (**IC**) method only measures the change in total costs when a substantial and discrete increment or decrement on output is generated. This increment can be a newly offered service, but also an increase in output of one service. A well known methodology to measure increment costs is through **Long Run Incremental Costing** (**LRIC**). Long run implies that when a large increment occurs, capacity can be expanded. Economies of scale will be playing an important role in the allocation of shared/joint cost, resulting in a smaller part of the attributed costs than in FAC. The LRIC method is mainly used with the bottom-up approach.

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