Strategic Business Models for Operating system - An Analytical Study

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Abstract

Business model establishes linkage between strategy planning and implementation. Business models in software industry are unique in many ways. One is uniqueness of value chain of software industry. Secondly, software product users are manufacturers of software for open source based software. The changes in the product are identified & modified by customers themselves under open source software environment. Operating system software belongs to system software category. System software is created and made available to customers in various forms. Operating systems are designed for Desktops/Laptops and Servers. The major players in this industry are Microsoft, Linux and Mac. Under Desktop category, Microsoft (MS) and Mac are the major players. Each of these major players have unique business model. This study attempts to understand and analyze the existing business model and a conceptual business model is proposed using activity based approach for operating system products.

Key words: Business Model, operating system, Activity based approach, system software.

Business Model

Business model establishes linkage between strategy planning and implementation. It transforms strategies into action. The taxonomies of Business models are enormous, yet the definite framework of a business model fails to exist. Traditionally, business model was a tool to identify the revenue generating activity. However, business model consisted of many dimensions that positively influenced organizations. Burkhart et.al (2011) made a seminal contribution to business model literature. The study identified gaps in the business model literature, viz, lack of knowledge of interdependencies between the components of business model, lack of structured and comparable visualization of business models, less empirical studies on appropriate tools and criteria to evaluate business models. Raman Casadesus-Masanell and Joan Ricart (2011) state that alignment of business models with organizations' goals, objectives and strategies are essential for organizations. Richardson (2008) opines that Business models establish linkage between strategy formulation and strategy implementation.

The concept of Business model existed as an intuition based exercise. However, business model gained

prominence with the advent of internet in 1990's. The business model is one of the most researched concepts post internet era. Below figure indicates the number of publications related to business model in publication of non-academic journals (PnAJ) and publication in academic journals (PAJ) compiled by Zott et.al (2010).
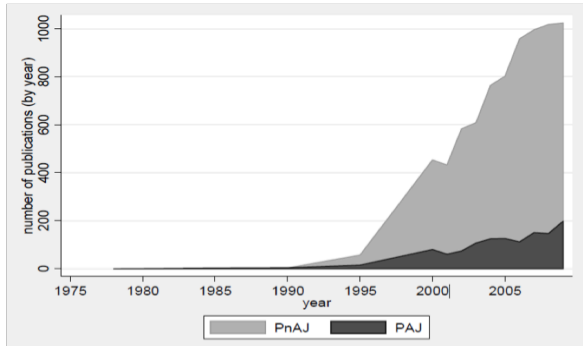

Fig: Articles related to Business Model in Business/ Management journals

Adopted from: Working paper- The Business Model: Theoretical Roots, Recent Developments, and Future Research, Christoph Zott, Raphael Amit, Lorenzo Massa, IESE Business School, June 2010

The above Figure indicates that the research on Business Model has exploded beyond 1995 though it was conceptualized earlier. The attention to business model is attributed to many reasons by management thinkers. A few of the notable attributes are, digital economy, advent of internet, rapid growth in emerging markets, convergence of value chain etc.

According to Drucker, a good business model answers questions such as, who is the customer and what does the customer value? How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?. The Business model design and product-market strategy are compliments not substitutes. (Zott & Amit, 2008). Magretta (2002) opines that business modeling is the managerial equivalent of the scientific method you start with a hypothesis which you then test in action and receive

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when necessary. A Business model is widely distinct from strategy. It has a strategic importance due to its impact on business performance. Business model can, however lead to competitive advantage (Afuah and Tucci, 2001). Hence, business model components and its design gain strategic importance. Business model can be specific for organizations or an industry. Though there is no standard definition of a business model. A few of the components that are core to business model can be identified as:

- A set of activities in the firm
  - Value chain
  - Value creation process
- Revenue generating process

The concept of business model can be examined from activity based view. An organization consists of a set of activities. The ability of a firm to integrate all activities efficiently and effectively might lead to competitive advantage. The ultimate objective of integrating activities in organization is to serve the customers better by making high quality products/services available. Activity based view considers perspectives of all stakeholders in the organization. The first set of components consists of activities that are required in making product/service and second part consists of making services/products available to customers.

The activity based business model varies across industry due to the nature of value chain involved in the industry. A few studies are available which evaluates industry specific business models. Rajala (2003) identifies four elements of business model in software industry, namely product strategy, distribution model, revenue logic and services and implementation. Rajala and westerlund (2005) identifies four types of software business models based on two dimensions, namely level of involvement of customer relationship and level of standardization. Schief & Buxmann (2012) made a seminal contribution in identifying business models existing in software industry. The study identified five clusters of business model elements. Viz, Strategy, Revenue, Upstream, Downstream and Usage. Software industry is one of the emerging industries. This is due to the fact that information technology is creating value in the organization and Software is one of the backbones

of information technology infrastructure. Software industry has mainly two categories of a product namely, system and application software. Each classification represents a sub-category of software industry.

Business models in software industry are unique in many ways. One is uniqueness of value chain of software industry. Secondly, software product users are manufacturers of software for open source based software. The changes in the product are identified & modified by customers themselves under open source software environment.

Operating systems are designed for Desktops/Laptops and Servers. The major players in this industry are Microsoft, Linux and Mac OS. Mac OS is referred as Mac in the present study. Under Desktop category, Microsoft (MS) and Mac are the major players. In server category, it is mostly MS and Linux. Mac's presence in this category is very less.

Microsoft (MS) is a proprietary operating system. Users buy licenses to use MS operating system. License provides authorization to use operating system. Apple Mac is also license based operating system, but is a hardware integrated operating system. Mac is compatible with only Apple computers. Linux is open source code based operating system. Communities of users develop and test source code. A set of distributors download OS code and sell the code as a package to users under various versions. A few of the dominant distributors of open source OS are Redhat, Fedora, Suse, Ubuntu etc,.

Operating system software belongs to system software category. System software is created and made available to customers in various forms. The entire process is examined from activity based view which covers the activity of creating system software and making system software available to customers. The analysis uses four pillars of business model proposed by Alexander Osterwalder (2004). The four pillars are:

- PRODUCT: What business the company is in, the products and the value propositions offered to the market?
- CUSTOMER INTERFACE: Who the company's target customers are, how it delivers them products and

services, and how it builds a strong relationship with them?

- INFRASTRUCTURE MANAGEMENT: How the company efficiently performs infrastructural or logistical issues, with whom, and as what kind of network enterprise?
- FINANCIAL ASPECTS: What is the revenue model, the cost structure and the business model's sustainability?

The next section elaborates the existing business models of system software. The business models have been analyzed from value creation and revenue generation perspectives. The first part deals with value creation and the revenue generation is analyzed from licensing and patents perspective in the second part.

Business Models from Value creation perspective

The value creation in the software context is related to writing of source code. The section below elaborates the value creation process of writing source code.

Existing Business Models for OS products

The system software is developed by software developers. The software is developed on technology platforms. Software developers write program/source code using programming languages. Generally, software is sold through licenses. The license indicates validity of product purchase and authorizes the product usage. Operating system (OS) products are generally sold using licenses. The licenses are used to protect intellectual property rights that define the conditions of usage of software purchased. A detailed discussion on licensing is covered in Section 6 of this chapter.

Source code is a set of programs that constitute a software product. Access to the source code is main differentiator in the business models adopted by major players in operating system software market. There are two broad categories based on access provided to source code. They are Open Source Code and Closed Source Code.

Open Source Code

In this category source code is open for access to

users. This holds good for both corporate as well as home users. The users can download the source code, make necessary changes or customize according to their requirements and install on hardware. However, a few of the software are governed by General Public License (GPL) for the usage of open source code in the commercial products. The open source code concept was proposed and started by Mr. Richard Stallman who started GNU project. The aim of this project was to develop free and quality software.

Closed Source Code

Closed source code does not provide access to the source code to the users. Users have to buy software as a package and install on hardware. The users buy the software through licenses. The licenses and products vary depending on the corporate or home users. However, some of the software are developed using open source code, but they are required to acknowledge the usage of open source code in their product.

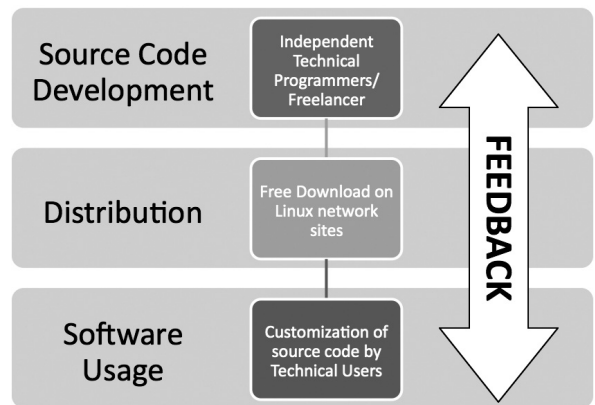## Business Model for Open Source code

The source code is written by a group of programmers. These set of programmers develop the source code generally, out of their passion. Open source code is considered to be more secured and highly reliable, since the code is written and tested by a number of programmers. The code is tested under various platforms and applications. If any errors/bugs are found, it is resolved by programmers. The issues identified will be discussed on the network and solution to the error/bugs is identified. The programmers are connected with each other through online network platforms such as discussion forums, blogs and other membership based websites. The modified code is made available to customers as soon as the errors/bugs are fixed. Therefore, the code is considered to be more authentic and secured. The source code is made available on the internet and is open for download for all users. If there are any problems with the code, it is brought to the notice of the programmers through online network. Generally, the users of open source code OS have technical background and have basic knowledge of programming and hardware. Broadly, three categories of business models in open source code can be identified as mentioned below.

- Direct download;
- Purchasing Packaged open source code operating system; and
- Sponsored open source code operating system.

Direct download

In this mode, users directly download the source code from internet. The source code is made available on the internet. The users can get customer support from third party vendors at a cost. Linux OS is an example in this type of business model.
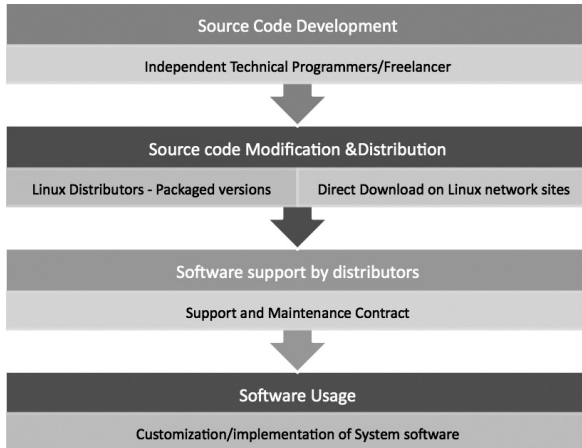

Business Model - 1 (open Source code)
Source: Author

Purchasing packaged open source code operating system

In this category, different versions of the source code are bundled together and are made available to the users by vendors. The users have to pay for the bundled product. Generally, the bundled product includes CD(compilation of source code), users guide, installation guide etc,. The users also do have a option of purchasing support services from the same vendor. In this model, though the source code is available free of cost, the package has to be purchased at a cost. Redhat, Suse etc, adopt this category of business model.

Business Model - 2 (Packaged open Source code)
Source: Author

Sponsored open source code operating system

A few of the hardware manufacturers' sponsored open source code operating system by supporting open source application products. These organizations have resources to develop open source code operating system and other applications which will be compatible to their hardware. The hardware manufacturers will be treated as ambassadors of open source code operating system. For instance, IBM established the Linux Technology Center (LTC) as the primary vehicle to participate in the Linux community. IBM and the LTC have established four goals for participation in the Linux community (IBM Systems and Technology Group, 2010):

• make Linux better;

• expand Linux's reach for new workloads;

• enable IBM products to operate with Linux; and

• increase collaboration with customers to innovate in ways IBM cannot do by itself.

Hardware manufacturers like IBM and HP develop hardware which is based on Linux operating system. In addition, the application software of these organizations are compatible with Linux operating system. The hardware is loaded with open source operating system and is sold either directly or through distribution channels.

Closed Source Code

In this category, we have broadly two classifications:

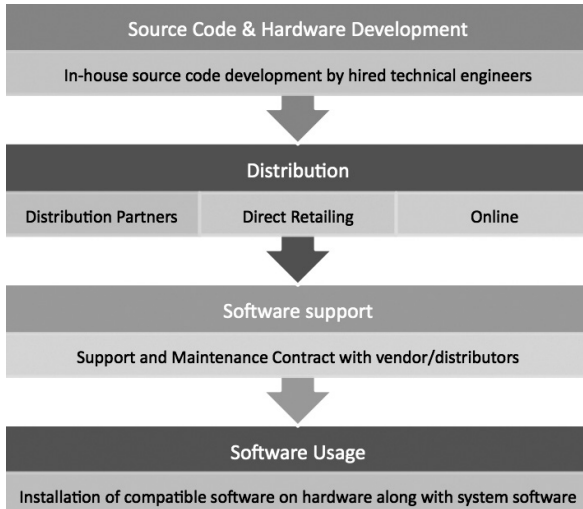1) OS sold to customers as a separate package and

2) OS integrated with hardware.
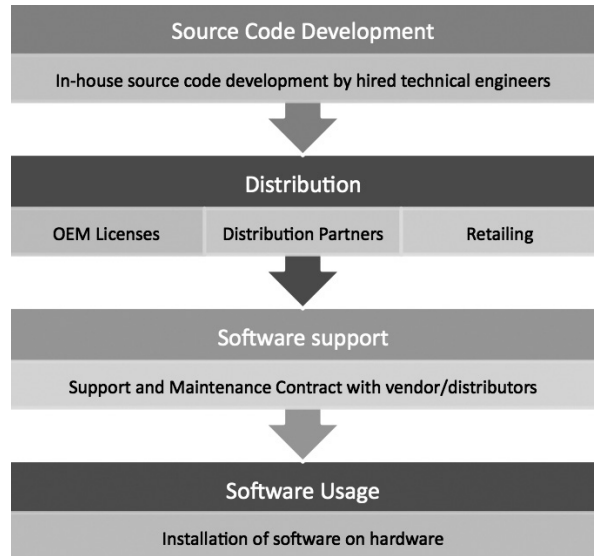
Business Model 2.1
Business Model - 3 (Packaged Proprietary OS License)
Source: Author

OS integrated with hardware

In this category, the users need not buy OS separately. The OS is embedded with the hardware. This hardware is, generally, compatible with only a few numbers of applications. Mac OS X follows this model. The OS supports only hardware of Apple. The OS is not much different for corporate and home customer segment. Since, the OS is integrated with the hardware; it is designed in such a way that it is compatible with most complex hardware specifications. This category will have end-to-end product.

Analysis of Business Models

The business models are expected to enhance the performance of organization. The business model's performance is linked with the performance of organization. There are many tools and framework available to evaluate business models. In the present study business model of Microsoft, Apple and Linux are analyzed based on the pillars and building blocks identified by Alexander Osterwalder (2004) shown below:

Source Code & Hardware Development
In-house source code development by hired technical engineers

Distribution		
Distribution Partners	Direct Retailing	Online

Software support
Support and Maintenance Contract with vendor/distributors

Software Usage
Installation of compatible software on hardware along with system software

Business Model 2.2
Business Model - 4
(Packaged H/W integrated OS License)
Source: Author

Pillar	Building Block of Business Model	Description
Product	Value Proposition	A Value Proposition is an overall view of a company's bundle of products and services that are of value to thecustomer.
Customer Interface	Target Customer	The Target Customer is a segment of customers a company wants to offer value to.
	Distribution Channel	A Distribution Channel is a means of getting in touch with the customer.
	Relationship	The Relationship describes the kind of link a company establishes between itself and the customer.
Infrastructure Management	Value Configuration	The Value Configuration describes the arrangement of activities and resources that are necessary to create value for the customer.
	Capability	A capability is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer.
	Partnership	A Partnership is a voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer.
Financial Aspects	Cost Structure	The Cost Structure is the representation in money of all the means employed in the business model.
	Revenue Model	The Revenue Model describes the way a company makes money through a variety of revenue flows.

Table# Business Model building blocks
Source: The Business Model Ontology,A Proposition In a Design Science Approach,
doctoral dissertation of Alexander Osterwalder, 2004.

Pillar	Building Block of Business Model	Microsoft	Mac	Linux
Product	Value Proposition	Stand alone Operating system with bundle of application software that meets minimum end user requirements	Hardware Integrated operating system	Hardware integrated and stand alone operating system
Customer Interface	Target Customer	Home/Enterprise Segment	Home/Enterprise Segment	Home/Enterprise Segment
	Distribution Channel	OEM/ Distributors and Resellers/online	Online/direct/retailing	Network of users/partners/corporate sponsors
	Relationship	Through partners and direct through online channel	Direct and Through partners	Direct and Through partners
Infrastructure Management	Value Configuration	Technical Engineers at Microsoft develop operating system, Microsoft has fairly good network with computer peripheral manufacturers which will design and produce Microsoft operating system compatible system	Technical Engineers at Apple develop Mac OS X operating system bundled with hardware and software which are compatible on multiple platforms	The developers are users, the operating system is developed and errors are fixed in a network of developers.
	Partnership	Partnership exists with processor manufacturers, computer hardware manufacturers to create value for customers	Partnership does exist with limited application software developers	Linux is developed with partnership between users and corporate sponsored developers
Financial Aspects	Cost Structure	cost of software development	cost of software development and hardware development	No cost
	Revenue Model	Licensing and user support	Hardware based operating system licenses and user support	User support

Table#: Building Blocks of Business Model of Microsoft, Mac OS X and Linux
Source: Compiled by Author based on annual reports of Microsoft & Mac OS X and www.Linux.com

Building blocks of business model of Microsoft Windows, Apple Mac and Linux

The building blocks of business model proposed by Alexander Osterwalder have been used to enumerate the business ontology of operating system software market. The building blocks are:

Value Proposition: A Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer.

Microsoft Windows provide operating system as a bundle of applications. Operating system has to be loaded on hardware which has compatibility with Microsoft Windows. A few selected applications will be bundled with operating system. The applications such as media player, internet web browser, word processing applications etc. are bundled with desktop operating system and features such as server management and automation, virtualization, networking etc. are bundled with Microsoft Windows server operating system. Mac OS X provides hardware as well as bundle of applications to users. The users buy bundle of applications along with hardware. Users need not buy operating system license and hardware separately. The hardware will have pre-loaded application software similar to Microsoft Windows. Linux operating system requires technical skill set. Linux operating system is available in three forms, viz,, free download, packaged distributors and sponsored operating system. Free download, Linux kernel the low level software can be downloaded free of cost and install on hardware. There are many vendors who provide Linux based application software which have to be installed and configured by users. The second form of Linux operating system is through packaged distributors who provide Linux operating system and required applications to manage Linux operating system. The distributors provide technical support, installation support and training to the users. The third form of Linux operating system is available through sponsored organization such as IBM and HP. Sponsored organization bundle Linux operating system and supporting application software with their hardware. Sponsored organization will have resources that provide customer support, training and installation services. The users will be able to access the best of the hardware and software in this mode.

Target Customer: The Target Customer is a segment of customers a company wants to offer value to.

Microsoft Windows has been targeting both enterprise segments as well as home segment. Microsoft has two business divisions that focus on both segments. One, Windows and Windows live division focuses on desktop PC's, secondly, server and tools division focuses on enterprise servers. Apple Mac OS X has operating system for both home segment as well as enterprise segment. Mac operating system was predominantly used in home segment, but recent versions of Mac operating system provides many options for enterprise customers. Generally, the designers, developers and architects have been using Mac operating system. iMac® or Mac Pro® provide the features that are needed by enterprise customers. MacBook Pro® and MacBook Air® are portable system that will help home as well enterprise customers. Linux operating system is predominantly focuses on enterprise segment due to the technical nature of Linux operating system. In the recent days, the packaged distributors of Linux are focusing on home segment as well. A few of the hardware manufacturers are shipping laptops with pre-loaded Linux operating system.

Distribution Channel: A Distribution Channel is a means of getting in touch with the customer.

Microsoft Windows has three distribution channels. One, original equipment manufacturer(OEM), secondly through distributors and retailers and thirdly online. "The largest component of the OEM business is the Windows operating systems pre-installed on PCs. OEMs also sell hardware pre-installed with other Microsoft products, including server and embedded operating systems and applications such as our Microsoft Office suite. In addition to these products, we also market through OEMs software services such as our Windows Live Essentials suite."(Microsoft Annual report,2012). The other two channels viz. distributors & retailers and online sell Microsoft application software. The proportion of operating system license sale is less through these channels. Predominantly, operating system licenses are sold through OEM. Mac operating

system makes product available through Online or direct retailing or third party resellers. Uniqueness of Apple distribution is direct retailing. "The Company's retail stores are typically located at high-traffic locations in quality shopping malls and urban shopping districts. By operating its own stores and locating them in desirable high-traffic locations the Company is better positioned to ensure a high quality customer buying experience and attract new customers. The stores are designed to simplify and enhance the presentation and marketing of the Company's products and related solutions. To that end, retail store configurations have evolved into various sizes to accommodate market-specific demands. The Company believes providing direct contact with its customers is an effective way to demonstrate the advantages of its products over those of its competitors. The stores employ experienced and knowledgeable personnel who provide product advice, service and training. The stores offer a wide selection of third-party hardware, software, and other accessories and peripherals that complement the Company's products"(Apple Annual report, 2012).

Linux makes operating system available through online or package distributors such as Redhat, Suse etc and through sponsored organization such as IBM and HP.

Relationship: The Relationship describes the kind of link a company establishes between itself and the customer.

Microsoft reaches customers typically through its partners. It does not establish direct formal relationship with customers. However, through online channel it establishes direct relationship with customers. Apple's strategy is to directly establish relationship with customers. The direct retailing strategy of Apple provides direct access to customers. Linux operating system is developed by users. Therefore, there is direct relationship with customers. Sponsored Linux operating system establishes relationship through package distributors. All the major players establish relationship with customers either directly or through their partners.

Value Configuration: The Value Configuration describes the arrangement of activities and resources

that are necessary to create value for the customer.

The discussion of value configuration is based on source code development. Value is created for the customer in each activity of organization. The discussion focuses on the core activity of organization. The core activity of software is source code development.

Microsoft Windows operating system is developed by the technical engineers hired by Microsoft. The innovation of product features is highly dependent on the caliber and creativity of technical engineers. The similar situation exists with Apple Mac operating system. Mac operating system is also developed by hired technical engineers. Linux operating system's value configuration is unique as compared to Windows or Mac operating system. The users are only the developers of source code. The value creation process is initiated and contributed by users. Network of users contribute to the value creation. The errors, bugs and required modifications are identified and rectified by users only. Engineers at Microsoft and Apple edit and fix the bugs based on the user feedback.

The source code is modified and customized by the value adding distributors. The distributors such as Redhat or Suse will have resources to modify the source code and customize applications based on the customer requirements. This will be additional value configuring activity in the value chain of operating system product.

Capability: A capability is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer.

The component of capability is not included in the discussion due to the nature of operating system. The capability component of operating system is pertinent to source code development process. The source code development process is discussed in value configuration component. Therefore, the capability component is not included in the present discussion.

Partnership: A Partnership is a voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer.

Partnership is a significant factor in system software

market. The partnership will enable hardware and software organizations to arrive at a common standard and develop the product for customers. Microsoft has partnership with hardware and software application development organizations. For instance, Microsoft partners with software vendors through distribution policies for independent software vendors (ISV). "The Microsoft ISV Royalty Licensing Program is a worldwide software licensing program that offers ISVs a convenient way to license Microsoft products and integrate them into a software business application.

This is a relevant option for:

- Organizations that exclusively develop software or software solutions instead of being part of a computer system or being a hardware manufacturer;
- Organizations that obtain at least 30 percent of their overall revenue from the sales of licenses of that solution." (Microsoft annual report, 2012).

Microsoft has partnered with hardware manufacturers. For instance, Microsoft and Intel. Intel develops processors that have compatibility with Microsoft operating system. They will develop hardware and software which will be compatible to each other's offerings. Similar to Microsoft, Apple also works with a few software vendors. The software vendors will develop applications that will run on Mac operating system. Apple and Intel work together to design and develop processors that support Mac operating system. Linux operating system is designed and developed through partnership between users. The partnership also exists with sponsored organizations. Linux operating system is product of partnered networks.

Cost Structure: The Cost Structure is the representation in money of all the means employed in the business model.

The cost structure in the context of operating system is based on cost involved source code development and hardware manufacturing. Microsoft operating system incurs cost in developing source code. The major cost in source code development is human resources. Apple Mac operating system has two costs, one hardware design and development and secondly the source code development. The source code of Mac operating

system is based on UNIX. However, it engages technical engineers to customize Mac operating system. Linux operating system does not involve any cost of development. The operating system is conceived and developed by users. The users will be technically sound and are motivated to contribute to the development of source code. Recognition of source code contributors is one of the significant source of motivation.

Revenue Model: The Revenue Model describes the way a company makes money through a variety of revenue flows.

In operating system software market revenue is generated through licensing and customer support. Microsoft offers many licensing options to purchase licenses based on user requirements, user base and technical requirements. Microsoft has software assurance program through which I provides customer support, user training and configuration support to customers at a cost. Apple generates revenue through sales of Mac desktops and portable devices pre-loaded with Mac operating system. The user maintenance contract will provide necessary support, training and deployment facilities to customers.

Linux operating system does not generate revenue per se. but sponsored and packaged Linux operating systems generate revenue through licensing and customer support. The detailed discussion on licensing is covered in section 6.0.

Proposed Conceptual Business Model for System Software:

Business model of system software market has been analyzed from internal and external environment. The internal environment was evaluated based on value creation process, taxonomy on business model evaluation. The external environment was evaluated based on distribution channels, revenue generation, licensing, legal perspectives and international trade. The analysis on these parameters indicates that business model of system software market comprises of value creation and distribution components which significantly affect players of market. The value creation belongs to internal environment and distribution corresponds to external environment.

Internal environment

The core value creation is through writing code. The code is generated through either users or technical engineers recruited by organizations. The details of the core value creation is discussed in the model below:

External environment

The external environment influences users to a great extent. The external environment deals with licensing and distribution of software. These two factors affect the usage of software. There is lack of clarity on software licensing and patenting in the international trade context. The software is truly a global product. The international community must address this issue and establish clarity on software patenting and licensing. This is directly linked with distribution and features of system software. The clarity on these issues can be established by creating techno-art policies. The policy must identify the standard features for software. These standard features are confined to the inter-operability functionality. If there are standardized features, then the software developing organization can develop software based on the standardized features. This will also solve the issues related to antitrust legal hurdles and anti-competitive strategies.

The clarity of policy has to be established by WTO in its ITA and same should also be reflected in TRIPS agreement.

The conceptual model proposed through this study is given below:

Proposed business model is shown below to depict the components of system software business model.
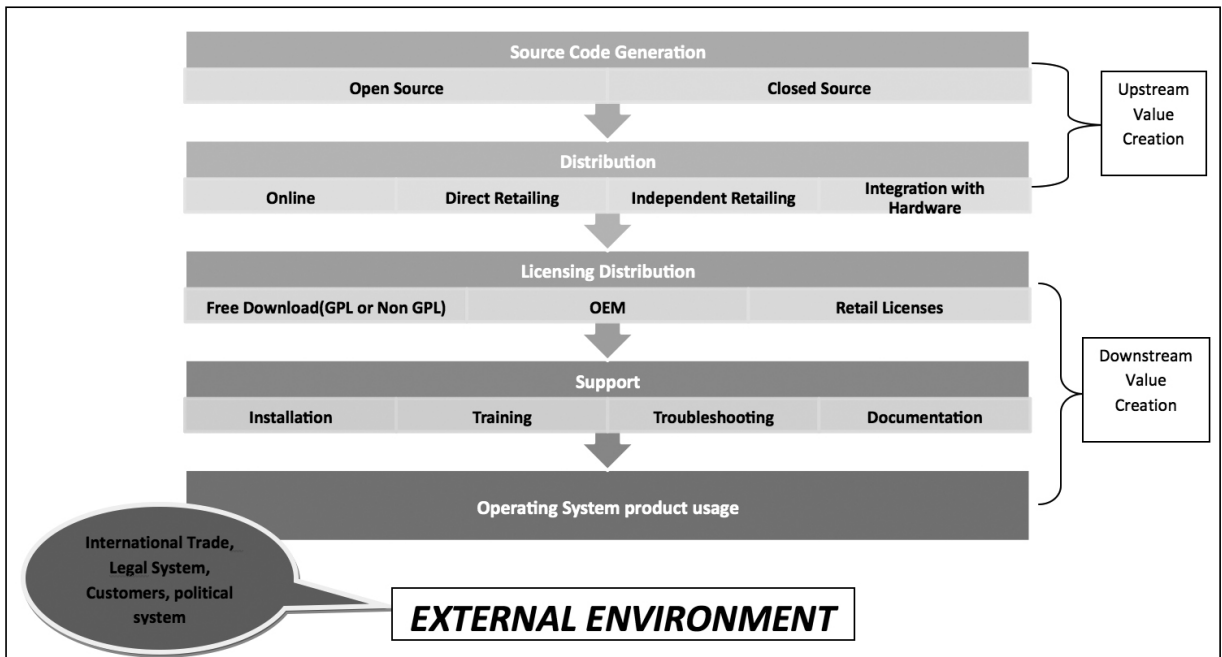
Fig# Proposed conceptual business model
Source: Author

The above figure is proposed conceptual business model. The model has two value chains, one upstream value chain and secondly downstream value chain. The upstream value chain consists of value creation through writing of source code and downstream value chain pertains to the distribution of software. The components of proposed conceptual business model are explained below:

Source code generation

Source code generation is the basic activity in system software. Source code consists of instructions to computer to perform a specific task. The source code can be open source or closed source. Open source provides access to source code where as closed source does not provide access to source code.

Distribution

System software is made available to customers through various channels. It adopts traditional distribution channel strategies of direct retailing or independent retailing. For instance, Apple has direct retailing as well as independent retailing. Open source system software can be distributed through online or through independent retailing such as Redhat, Suse etc. The system software is also integrated with hardware and sold to customers.

Licensing Distribution

Licensing distribution provides the legal framework of usage and distribution of system software. The license can be distributed as a free download yet governed by GPL or non GPL. GPL and non-GPL have been discussed in section 6.3. OEM licenses are computers with pre-loaded operating system. Retail licenses cover paper licenses or licenses which are sold independent of hardware as a commercial of the shelf software. Licensing distribution will have direct relationship with revenue generation.

Support

Support includes installation, training, troubleshooting and documentation. System software is a technical product which demands for technical support to install and use the software. Hence, this is a important component in system support. This is one more source of revenue to organization.

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