



P-3367



**ASSESSING THE ROYALTY RATE FOR CUSTOM  
DEVELOPED CAMERA w.r.t SOLITON  
TECHNOLOGIES, Ltd., BANGALORE**

**A SUMMER PROJECT REPORT (MBA703)**

*Submitted by*

**M.P.SHANMUGAPRIYA**

**(Register No: 0920400048)**

**Under the Guidance of**

**(A.SENTHIL KUMAR)**

*in partial fulfillment for the award of the degree*

*of*

**MASTER OF BUSINESS ADMINISTRATION**

*in*

**Department of Management Studies**

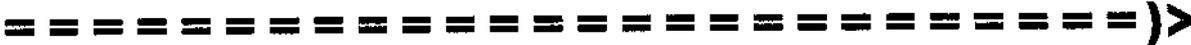
**KUMARAGURU COLLEGE OF TECHNOLOGY**

**(An Autonomous Institution Affiliated to Anna University of Technology, Coimbatore)**

**COIMBATORE – 641 049**

**October, 2010**

# **CERTIFICATE**



**KUMARAGURU COLLEGE OF TECHNOLOGY  
COIMBATORE -641 049**

Department of Management Studies

**A SUMMER PROJECT WORK (MBA703)  
OCTOBER 2010**

This is to certify that the project entitled

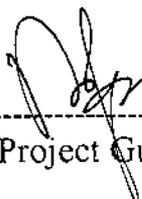
**ASSESSING THE ROYALTY RATE FOR CUSTOM  
DEVELOPED CAMERA W.R.T SOLITON  
TECHNOLOGIES, Ltd., BANGALORE**

is the bonafide record of project work done by

**M.P.SHANMUGAPRIYA**

**Register No: 0920400048**

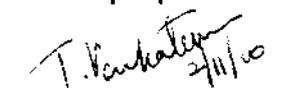
of Master of Business Administration during the year 2010 – 2011

  
Project Guide **A. SENTHIL KUMAR** MBA, PGDCA, M.Phil, **Ph.D.**  
Lecturer in Management Studies,  
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Head of the Department

Submitted for the Summer Project Viva-Voce examination held on 02/11/2010

  
Internal Examiner

  
External Examiner



August 12, 2010

To

The Head of the Department,  
KCT Business School,  
Chinnavedampatti,  
Coimbatore – 641 006.  
Tamil Nadu

Dear Sir,

We are happy to inform you that we are accepting Ms. Shanmuga Priya M.P. (Roll No. 09MBA48) who is pursuing her first year M.B.A in Department of Management Studies at KCT Business School to do her first year project at our organization from July 19, 2010 to August 24, 2010.

The title of the Project is “Assessing the Royalty for Custom Developed Camera”.

Sincerely,

Dr. Ganesh Devaraj

Managing Director & CEO

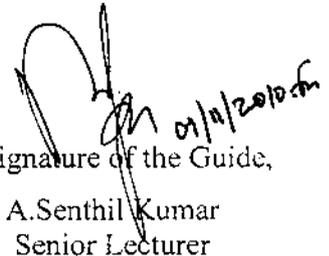
**DECLARATION**

I affirm that the project work titled Assessing the Royalty Rate for Custom Developed Camera w.r.t Soliton, Technologies Ltd., Bangalore being submitted in partial fulfillment for the award of degree of Master of Business Administration is the original work carried out by me. It has not formed the part of any other project work submitted for award of any degree or diploma, either in this or any other University.



M.P. Shanmugapriya  
(Reg. No .0920400048)

I certify that the declaration made above by the candidate is true



Signature of the Guide,  
A.Senthil Kumar  
Senior Lecturer

A. SENTHIL KUMAR MBA, PGDCA, M.Phil. **Ph.D.**  
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Coimbatore - 641 004.

## ACKNOWLEDGEMENT

I express my sincere gratitude to our beloved chairman **Arutchelvar Dr. N.Mahalingam and Management** for the prime guiding spirit of Kumaraguru College of Technology.

I wish to express deep sense of obligation to **Mr. A.Senthil Kumar, Sr. Lecturer**, KCT Business School, for his intensive guidance throughout my project.

I am greatly indebted to thank **Mr.C.Ganeshmoorthy, Project Co-ordinator / Class Advisor** and all other faculty members of KCT Business School for their kind support.

I thank **Dr. Ganesh Devaraj, CEO, Soliton Technologies Ltd, Bangalore** for providing me golden opportunity to carry out my project work in his esteemed concern. I would also like to thank **Ms. Ezhil Selvi Sr. Quality Manager & Ms. P. Rajlakshimi, Sr. Officer - Purchases Soliton Technologies Ltd, Bangalore** for helping me in getting the required data & information for the project

My special thanks to my beloved parents, my brother, my friends and all my lovable ones who served as a backbone for me in helping me to complete this project work with a great success.

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## **ABSTRACT**

A videoconference is a set of interactive telecommunication technologies which allow two or more locations to interact via two-way video and audio transmissions simultaneously. One of the Video Conference systems that made history and dramatically impacted the future of commercial video conferencing is CU-SeeMe, which ran on the Apple Macintosh and became available to the public in 1992. Even though it lacked audio, it was by far the best video system developed to date. From then it has gone through different modifications and the advancement in technology has increased the competition and the need of customers is growing phenomenally high. This change in the needs and wants of the customer has led to many innovative and sophisticated video conference systems. This study focuses on calculating the royalty rate for a custom developed video conference camera. Although many methods are available for calculating the royalty rates, in this study a cost based approach is used. All the costs incurred by the company while developing the camera have been taken into account and the costs are projected for a one year period because the contract for this specific version of product may be repudiated within an year and the present value of the royalty is calculated. The cost modelling involves many variables like unrecovered expenses, design rectification cost, design customisation cost, continual improvement cost, firmware loading cost & service support cost. The videoconferencing market in India offers great potential for growth too. There is a growth explosion expected (30% for the next two years) in the medium-term, beyond which growth rates will stabilize at 22%. Growth is witnessed not only in the large enterprise segment; but even small and medium businesses are adopting videoconferencing solutions, recognizing the vast benefits they offer.

# INTRODUCTION

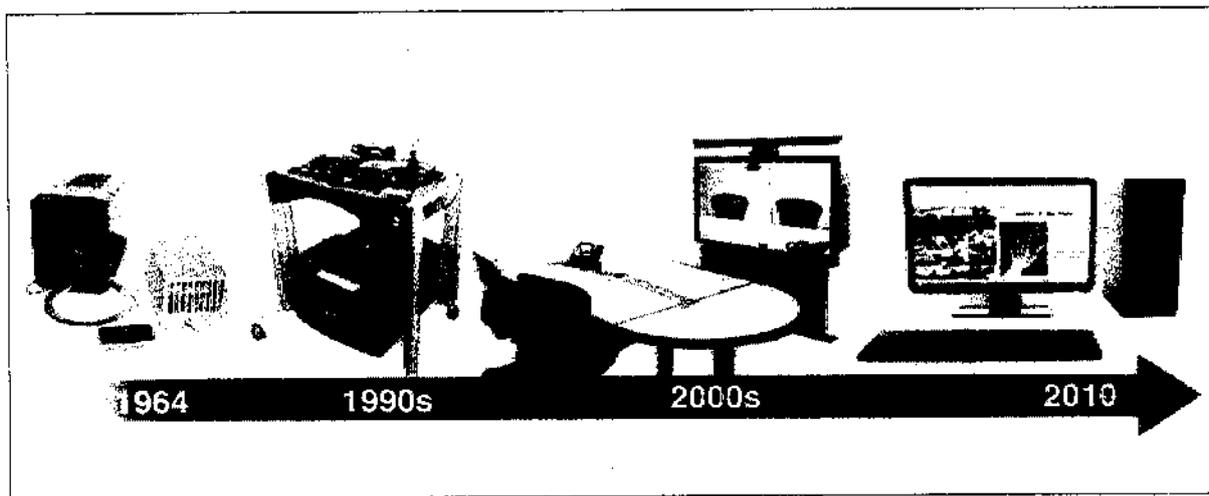
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## Chapter 1

### 1.1 Background of the Study

A **videoconference** (also known as a *videoteleconference*) is a set of interactive telecommunication technologies which allow two or more locations to interact via two-way video and audio transmissions simultaneously. It has also been called 'visual collaboration' and is a type of groupware. Videoconferencing differs from videophone calls in that it's designed to serve a conference rather than individuals which an intermediate form of videotelephony.

#### 1.1 a History of Video Conference



Source: <http://ezinearticles.com/?The-History-of-Videoconferencing&id=707634>

With the invention of television came the ability to conduct simple analog conferencing. It was a very simple system that consisted of two closed circuit television systems connected by cable. In fact, NASA used two radiofrequency UHF or VHF links, in both directions. Even today, television stations frequently use this type of video conferencing to report live from distant locations.

When video conferencing was first introduced, with a grand introduction at the 1964 World's Fair held in New York, it had a futuristic quality that no one could possibly dream would take the place of the standard telephone. Though AT&T introduced the Picturephone many years later in 1970, it was still impractical and expensive when first offered to consumers (\$160/month for each fixed end-point).

It wasn't until Ericsson demonstrated the very first trans-Atlantic LME video telephone call that companies saw the real potential for success and profitability and began to refine their own video conferencing technologies. Advancements such as Network Video Protocol (NVP), in 1976, and the Packet Video Protocol (PVP), in 1981, both helped the maturation of video conferencing, but both stayed in the laboratory or for private corporate usage.

Even before that, Nippon Telegraph and Telephone established video conferencing between Tokyo and Osaka in 1976. In 1982, IBM Japan took Video Conferencing one-step further and established a 48,000 bps to link up with IBM's internal video conferencing links in the U.S. for weekly business meetings.

### **1.1 b Video Conferencing in the Commercial Market (1980's)**

When VC hit the commercial market, it was extremely expensive, too expensive to make widespread adoption possible. Compression Labs introduced their Video Conference product in 1982 for \$250,000 that had lines that cost \$1,000 per hour. The system required vast resources that were capable of tripping 15 amp circuit breakers. It was the only working video conferencing system available until PictureTel introduced their Video Conference offering in 1986 and in just four years time the price had dropped dramatically at \$80,000 with a \$100 per hour line fee.

In between these two landmark systems that helped further the development of video conferencing systems, software and technology, there were other Video Conferencing systems that were designed for in-house use by several corporations and also the U.S. military. In the early to mid-1980s, Datapoint was utilizing the Datapoint MINX system on their Texas campus, which was sold to the military.

Video conferencing has had its share of flops because it wasn't been embraced by consumers or by business. In the late 1980s, Mitsubishi began selling a still-picture phone. One can only imagine the cost of product design and development of this picture-phone; nevertheless, Mitsubishi dropped the line just two years after introducing it.

The 1990s saw the advancement and development of video conferencing systems due to many factors, including technical advances in Internet Protocol (IP) and also more efficient video compression technologies were developed that would permit desktop or PC-based videoconferencing. In 1991, IBM introduced the first PC-based video conferencing system.

named PicTel. Although it was a black and white system that was very inexpensive, costing only \$30 per line, per hour, the system itself cost \$20,000. Not much later in 1991, DARTnet made video conferencing successful by connecting a transcontinental IP network consisting of more than 12 research sites in the U.S. and the U.K. using T1 trunks. DARTnet, now known as the CAIRN system, still exists today and connects dozens of institutions. It wasn't long after that VC started infiltrating the masses through free services and software, such as NetMeeting, MSN Messenger, and Yahoo Messenger, to name a few. While the video quality was poor at best, the price was right and slowly it started to be adopted by the consumer market. It was now only a matter of time before video conferencing made its way to corporate desktops around the world.

### **1.1 c CU-SeeMe Revolution**

One of the Video Conference systems that made history and dramatically impacted the future of commercial video conferencing is CU-SeeMe, which ran on the Apple Macintosh and became available to the public in 1992. Even though it lacked audio, it was by far the best video system developed to date. CU-SeeMe rapidly progressed and by 1993 it had multipoint capability and in 1994 added audio to its list of features. Early on, the limitations of CU-SeeMe for Mac in a mostly PC world were recognized and its developers quickly began working on a Windows-compatible version. In 1994, Windows-based CU-SeeMe was launched and in 1995, CU-SeeMe v0.66b1 with audio. While CU-SeeMe was popular, its combination of [UDP] broadcasting and peer-to-peer connection methodology limited applications to school rooms and training facilities with all users on the same network (with no intervening firewalls or network address translators).

In parallel with CU-SeeMe, AT&T targeted consumers in 1992 with its \$1,500 videophone. It was moderately successful. There was at least two other firms in 1992, a combined audio and video broadcast took place utilizing the MB one system and in July of the same year INRIA introduced their Video Conference system. This is the first year that real traction was taking place in the video conferencing market and this momentum prompted the quiet development and ratification of compatibility standards by the International Telecommunications Union (ITU).

### **1.1 d International Telecommunications Union Standards Set the Pace for Video Conferencing**

A combination of specifications and standards paved the way for video conferencing as an application to be taken seriously in the business world. The ITU established the Standard H.263, which reduced bandwidth transmission for low bit-rate communications. Other standards were already in development, such as H.323 for packet-based multimedia applications, both H.263 and H.323 among other standards were revised and updated in 1998. The Moving Picture Experts Group developed MPEG-4 as an ISO standard for multimedia content and while not directly related to video conferencing as a desktop application, all standards previously mentioned worked together to further advance the concept of interoperability with regard to data content and its transmission.

Still, there were setbacks and some companies failed in their attempts at success in the video conferencing market. Vocal Chat Novell IPX Networks introduced their first video conferencing system but it never found a market niche and it failed commercially. Microsoft entered the video conferencing market in August 1996, with NetMeeting, which was a descendent of PictureTel's Liveshare Plus, but it didn't have video capabilities initially. In December 1996, Microsoft introduced NetMeeting v2.0b2 with video. While NetMeeting had, and still has its disadvantages, it definitely set the stage and raised the bar for new entrants into the video conferencing market at the same time.

### **1.1 e Caltech-CERN Project Connects Research Centers around the World**

The Caltech-CERN project, also known as the Virtual Room Videoconferencing System (VRVS), was officially launched in July 1997. Caltech-CERN researchers initially developed VRVS to provide researchers and scientists with a means to videoconference and collaborate on the Large Hadron Collider Project and in the U.S. and European High Energy and Nuclear Physics communities. It was extremely successful. So much so, that seed money was raised for Phase Two, CalREN-2, which would expand and improve on the VRVS system. The expansion would make VRVS available to geneticists, doctors and other scientists around the globe.

Cornell University's development team released CU-SeeMe 1.0 in 1998. Version 1.0 not only supported both the Mac and the PC, but it featured colour video - this was a huge leap for desktop video conferencing in terms of feature functionality and broadened the market for CU-SeeMe considerably.

In the meantime, groups were busy developing standards that could only help further video conferencing as a business communication technology. Session Initiation Protocol (SIP) was officially announced by MMUSIC in 1999. SIP proved to have some user-related advantages not found in H.323 that helped to make it to gain a fair share of supporters, including Microsoft eventually. There was plenty of activity from standards committees and vendors alike in 1999. NetMeeting v 3.0b came out with Version 3.0 of the ITU standard H.323 followed by the first version of the Media Gateway Control Protocol (MGCP). Later in the year, ISO standard MPEG-4 version two was released and PSInet became the first company to rollout automated multipoint services based on the H.323 standard.

While relatively young, SIP continued to develop and evolve as it entered version 1.30 in November of 2000. Following that, the fourth version of H.323 was released. In conjunction with developments in the video conferencing space, wireless mobile phone manufacturers started competing vigorously for their fair share of the consumer market. Realizing that video conferencing could indeed be the future, and a goldmine for makers of digital mobile phones, Samsung released their MPEG-4 streaming 3G video mobile phone, the very first on the shelves and a particularly huge success in Japan.

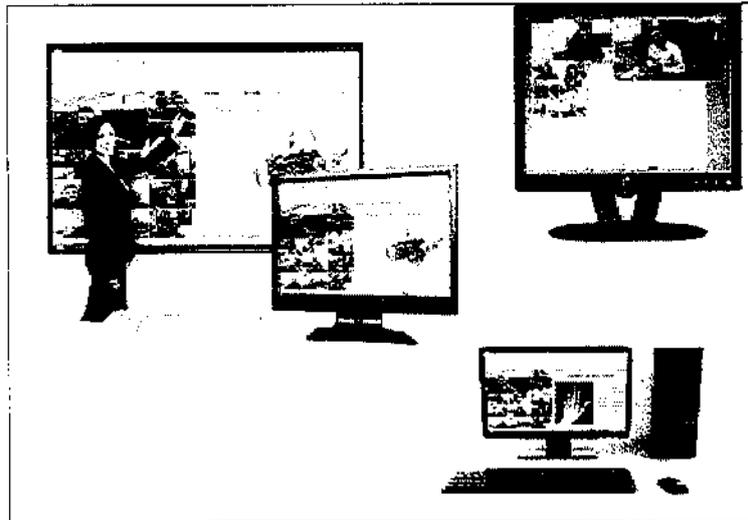
Microsoft made a bold move by announcing in 2001 that its Windows XP Messenger would support SIP. It was also the year that video conferencing was getting attention from vertical industries that saw its potential. The first transatlantic "telesurgery", with video conferencing centre stage, took place allowing a surgeon in the U.S. to control a robot overseas to perform gall bladder surgery. To date it was the most compelling, non-business use of video conferencing and indeed brought VC to the attention of medical practitioners and the general public throughout the world.

Not long after the "War on Terror" commenced, TV reporters used a portable satellite and a videophone to broadcast live from Afghanistan in October 2001. It was the first time that video conferencing technology was used to talk in real-time with someone in the war zone via video. For the first time, war was being broadcast in real-time to people around the world rather than by taped broadcast.

By the end of 2002, the Joint Video Team finished research that led to the ITU-T H.264 protocol. This protocol standardized video compression technology for both MPEG-4 and ITU-T for a wide range of application areas. It was much more versatile than preceding

protocols. The new technology would be ready for its introduction to the video industry in March 2004.

### 1.1 f Video Conferencing Evolution



Source: <http://www.nefsis.com/Best-Video-Conferencing-Software/video-conferencing-history.html>

By 2003, high-speed Internet access became widely available at a very reasonable cost. At the same time, the costs of video capture and display technology also decreased. The general public was able to afford web cameras, the cost of PCs at the time was minimal and Broadband Internet access was available in nearly every region of the country. All of these factors, including the availability of free software from leading IM service providers, combine to make video conferencing even more accessible for the consumer market.

Higher education started to embrace the benefits of video conferencing in 2003. Schools around the world began to integrate video conferencing into their distance learning programs to enhance classes with more interactive classroom-like environments. As the quality of streaming video increased, with disruptive streaming delays decreased, video conferencing became much more popular to schools. Administrators and teachers alike realized the immense benefits of real-time interaction between professors and students. VBrick began providing various MPEG-4 video systems to universities in the U.S. and desktop video is now rapidly gaining favour and popularity as an effective means to communicate and interact in real-time for business organizations throughout the country.

In 2004, video conferencing companies continued refining their applications and fine-tune it for more reliable performance and usability. In March 2004, a Linux-based free video conferencing platform that is H.323 compliant and NetMeeting-compatible was released. In April of the same year, Applied Global Technologies developed a web camera that when used in conjunction with video, tracks the voice of the speaker in order to focus on whomever is speaking at the time.

Later in 2004, WiredRed Software became the first company to enable 10 or more participants to conduct video conference sessions simultaneously. In March 2005, WiredRed made another first by offering web, VoIP and video conferencing over secure connections that can utilize third-party, or on-premise PKI systems.

### **1.1 g Video Conferencing Hardware Systems vs. Video Conferencing Software & Online Services Present Day**

With the advancement of software technologies, PC processor speeds and broadband Internet connectivity, it is now possible to rely entirely on standard PC servers and desktops to accomplish boardroom-quality video conferencing. However, hardware-based systems are still available today. Dedicated video conferencing systems generally have all required components in a single piece of equipment. Usually this is a console with a high quality video camera that is controlled remotely. These cameras, also known as PTZ cameras, can be controlled from a distance to pan left, tilt up and down, and zoom. The console itself contains all electrical interfaces, the control computer and the software or hardware-based itself. Omni directional microphones, a TV monitor with speakers and/or video projector are connected to the console.



Source: <http://www.nefsis.com/Best-Video-Conferencing-Software/video-conferencing-history.html>

There are several types of dedicated video conferencing devices that range in price and quality:

- Individual devices are usually portable and meant for single users. It has fixed cameras, microphones and loudspeakers integrated into the console.
- Desktop systems are usually manufactured by integrating add-on boards to standard PCs. A variety of cameras and microphones can be used with the board, which contains the necessary codec and transmission interfaces. Most of the desktop systems support the H.323 standard.
- Large group systems are expensive, non-portable devices used in one-way type seminars in large rooms and auditoriums.
- Small group systems can be non-portable or portable. This type of system is smaller and a less expensive device used in small meeting applications.

### 1.1 h Problems with Video Conferencing

The issues with video conferencing is two

1. **Eye Contact:** It is known that eye contact plays a large role in conversational turn-taking, perceived attention and intent, and other aspects of group communication.<sup>[8]</sup> While traditional telephone conversations give no eye contact cues, videoconferencing systems are arguably worse in that they provide an incorrect

impression that the remote interlocutor is avoiding eye contact. Telepresence systems have cameras located in the screens that reduce the amount of parallax observed by the users. This issue is also being addressed through research that generates a synthetic image with eye contact using stereo reconstruction. Bell Communications Research owns a patent for eye-to-eye video conferencing using rear projection screens with a camera behind it. This technique eliminates the need for special cameras or image processing.<sup>[10]</sup>

**2. Appearance Consciousness:** A second problem with videoconferencing is being on camera, with the video stream possibly even being recorded. The burden of presenting an acceptable on-screen appearance is not present in audio-only communication. Early studies by Alphonse Chapanis found that the addition of video actually impaired communication, possibly because of the consciousness of being on camera.

The issue of eye-contact may be solved with advancing technology, and presumably the issue of appearance consciousness will fade as people become accustomed to videoconferencing.

## 1.2 Review of Literature

**Michael D. McCoy and Sandra L. Boscia**<sup>1</sup>, says, every intellectual property is unique and each has got its own way of determining the value for them. There are more than 10 methods available for valuing an intellectual property. There 3 most common approaches used- market approach, cost approach, income approach. The market approach is based on economic principles. These principles are competition in the marketplace and the point of equilibrium of an investment as determined by supply and demand. Two ways to determine value based on the cost approach is by quantifying reproduction and replacement costs. This approach is based on the economic principle of anticipation. Under this approach the investor tries to determine the amount of income that will be derived from the property in the future. Then this determined amount of income is converted to a present worth. Each and every method has got its own advantages and disadvantages.

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<sup>1</sup>Valuation of Intellectual Property or Enigma of Exclusivity". *The Licensing Journal*, Jan' 1999

**J. E. Kemmerer & J. Lu,**<sup>2</sup> describes that royalty rates are defined as a percentage of sales or a payment per unit. The profitability of the products or services that incorporate the patented technology plays a dominant role in royalty determination. A survey published by Degan and Horton (1997), half of the respondents use financial measures for determining royalty amounts, , while nearly a quarter used the 25% rule as a starting point. The financial measures are discounted cash flow or profit sharing analysis. It explains the relationship between profitability and royalty rates across industries. The analysis of the data shows that reported royalty rates across industries do not converge with the rates generated by 25% rule at an industry level, although the reported rates tend to fall between 25% of the gross profit margins and 25% of operating profit margins.

**R.F. Reilly**<sup>3</sup>, in his paper explains about the procedures related to the identification and valuation of commercial IP. There are three generally accepted IP valuation approaches—the cost approach, the market approach, and the income approach. Each of these valuation approaches has the same objective: to arrive at a credible value indication for the IP. Within each of the valuation approaches, there are several generally accepted methods and procedures that may be appropriate for any particular IP valuation. The selection of the appropriate valuation methods and procedures is based on: (1) the characteristics of the subject IP; (2) the quantity and quality of available data; (3) the purpose and objective of the analysis; and (4) the experience and judgment of the valuation analyst. The author explains about how the IP is valued during the expansionary and recessionary economy environment.

**William Choi and Roy Weinstein**<sup>4</sup>, says that since 1970, Georgia-Pacific has served as the conventional template for calculating reasonable royalty rates in such situations. Misapplication of the Georgia-Pacific template can produce a royalty rate unsupported by economic theory. It was found that licensing experts run down the list and identify some factors that support "high" royalty rates, while others identify those factors that

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<sup>2</sup> **Profitability and Royalty Rates Across Industries: Some Preliminary Evidence**", *Annual Conference of the International Academy of Business and Economics*, 2008.

<sup>3</sup> **Valuation of an IP during a Distressed Economy, Part II**" *The Licensing Journal*, October 2009.

<sup>4</sup> **An Analytical Solution to Reasonable Royalty Rate Calculations**", *The Journal of Law and Technology*, 2001.

support "low" royalty rates, whichever seems to benefit them most. The Nash Bargaining Solution is used in this approach. It is solved by identifying the disagreement payoff for the patent holder/licensor, the disagreement payoff for the infringer/licensee, and the total potential profit from licensing. Here,  $d_1$  is defined as the disagreement payoff for the patent holder, whereas  $d_2$  as the disagreement payoff for the infringer/licensee. Thus a reasonable royalty rate is one "that a licensee would be willing to pay the inventor while still making a reasonable profit from use of the patented invention."



### 1.3 Statement of problem

Investments in R&D is considered to be the revenue growth engines for the future equally important is the recovery of R& D investment at the earliest. The question that arises is how to price the technology. Technology could be priced through royalty payments also. Often royalty payments are inaccurately priced that leads to many a times under recovery of R&D cost. Hence pricing the royalty for optimum recovery of R& D cost and allied cost is taken as the problem for study.

### 1.4 Organisation Profile

Soliton Technologies was started in 1998 by Dr. Ganesh Devaraj. Soliton started business as the first Alliance Member of National Instruments in India, and Ganesh introduced Virtual Instrumentation, a concept pioneered by Texas based National Instruments, to manufacturing industries in the region. In parallel he also developed customers in the US for its offshore Virtual Instrumentation Software (LabVIEW) development services. The revenue grew at an average annual compounded rate of 60% during the first seven years. During this period, Soliton also established itself as one of the world's most innovative Virtual Instrumentation System developers by winning the most prestigious global award in this field a record three times (2000, 2001, and 2004). Soliton started a products division in 2005, and became the first company in India to manufacture Machine Vision Cameras and Smart Cameras. Soliton has established itself as the leading machine vision company in India. In all, Soliton has received over 25 technology awards for its innovative work and has built up an outstanding reputation for Quality, Integrity, and Customer Satisfaction.

### **1.4.1 Values**

Soliton has a core purpose - to build a world-class global company with a reputation for **Integrity** and **Excellence**. These are our core values.

### **1.4.2 Integrity**

As a company we are making commitments every day - to our customers, our people, our partners, our suppliers, and our investors. Integrity is being true in our communication to each and every one and then meeting these commitments. The trust that this creates for Soliton is, and will continue to be, the foundation of our success.

### **1.4.3 Excellence**

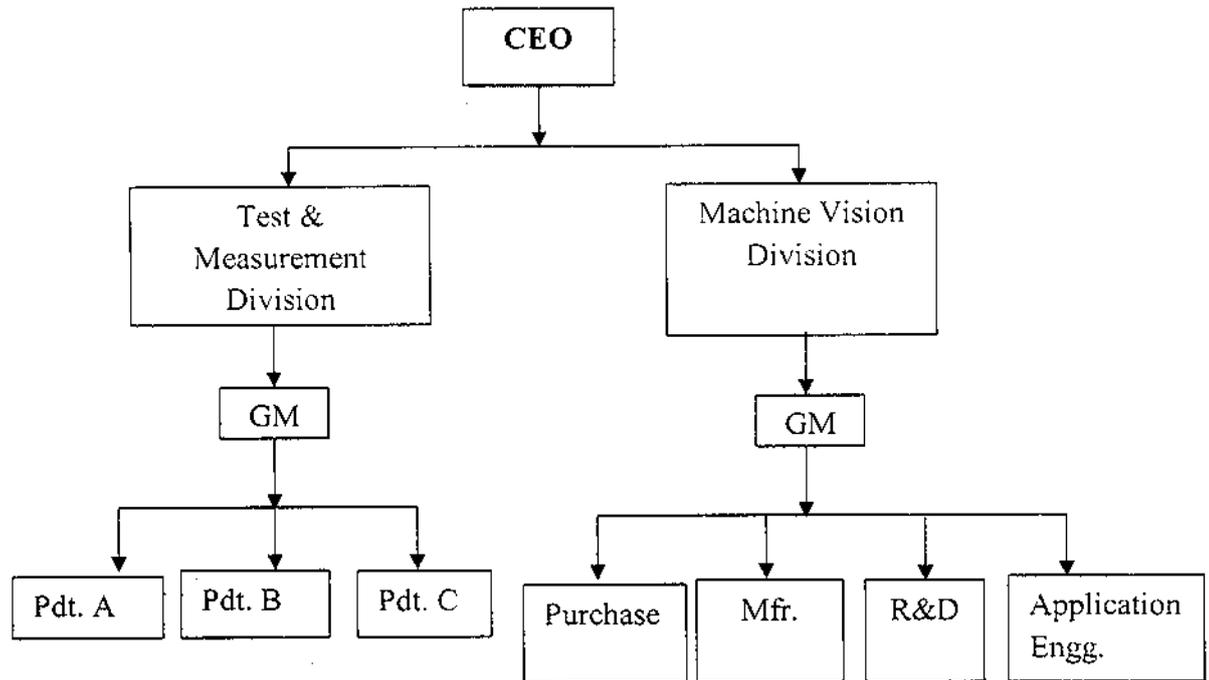
Excellence inspires! An environment of excellence inspires us to do our very best every time. The resulting recognition inspires us to do even better the next time. This positive cycle is what we actively work to create and enhance in Soliton. Our aim is to inspire each of us at Soliton to produce work that ultimately delights us and every one of our customers.

In order to enhance our culture, we are always looking to bring in people who will lead the company towards higher standards of integrity and excellence. People who share these values feel inspired to work in Soliton and they in turn attract customers who place a high value on integrity and excellence. In fact the entire eco-system of customers, partners, suppliers, and investors that we gravitate towards is one that shares these values. It is our endeavour to set an outstanding example that will inspire those who interact with us and we are always looking for opportunities to work with people who will inspire us further.

### **1.4.4 Board of Directors**

- Dr. Ganesh Devaraj – MD & CEO
- Mr. Ashok Aram
- Mrs. Mekala Devaraj
- Mr. Rajesh Devaraj
- Mrs. Sugantha Devaraj

## Organisational Chart



### 1.4.5 Product Profile

#### 1.4.5.1 Camera Division

##### 1.4.5.1.a Products- Smart Neo

Soliton Neo is a standalone DSP-based smart camera. Smart cameras are compact systems that do not require a PC for operation. Powered by the high-speed algorithms of the **Soliton Vision Library (SVL)** and the easy GUI of **Soliton Vision Artist (SVA)**, this low-cost industrial smart camera is designed to enable you to really achieve 'zero defects' by the automation of online visual inspection, quality inspection of production and assembly lines, and machine vision based poka-yoke.

##### 1.4.5.1.b Applications

Smart Neo Cameras are used in

- Manufacturing
- HealthCare

### **1.4.5.1.b.i Manufacturing**

#### **Automotive Industry**

- Non-contact gauging / dimensioning
- Spark plug inspection
- Instrument cluster calibration and inspection
- Parts tracking in production lines with 1-D and 2-D barcodes

#### **Electronics**

- Assembled PCB inspection (presence-absence, orientation, dry solder, short circuits....,
- Bare PCB inspection (holes, traces, solder paste, screen print)
- IC and connector inspection (bent pins, lead length, etc.)

#### **Pharmaceutical**

- Capsule package inspection for broken or incorrect capsules
- Liquid level inspection
- Vial / bottle inspection for contamination or glass pieces
- Package label verification

#### **General Manufacturing and Assembly**

- Automated visual inspection of machined parts
- Mechanical assembly inspection for presence-absence, orientation, engagement...
- Inspection of parts for physical damage, scratches, etc.
- Size / shape based sorting (metal, rubber, plastic parts)
- Parts counting on assembly lines
- Parts alignment during automated assembly
- Automatic control of welding process
- Surface defect inspection

### **1.4.5.1.b ii Health Care**

Retinal imaging cameras are designed based on the requirements. Retinal cameras can be used to detect eye diseases like:

- Diabetic Retinopathy

- Glaucoma
- Macular Degeneration

Early detection can go a long way towards effective treatment of these eye disorders.

This is where retinal imaging cameras prove to be very useful.

#### **1.4.5.2. Test & Measurement Division**

- Software Development
- Products
- Turnkey Solutions

##### **1.4.5.2.i Products**

###### **1.4.5.2.i. a Valve Test System**

Soliton Universal Valve Test System is highly configurable Hydraulic / Pneumatic Valve Testing and Report Generation software. It addresses the needs of companies looking for flexible software that can be configured to test different types of valves easily.

Benefits of Valve Test System include

- A high degree of customisation and flexibility in designing test systems
- Test various testing set-ups before finalizing on the most appropriate one for your testing needs
- View the test system as a hydraulic / pneumatic circuit with graphical parametric displays as opposed to a collection of cryptic controls and indicators
- Reduction in the lead time to build a test rig, thus reducing overall cost
- Customized Report Generation

This software can be used to.

- Configure your valve test rig
- Create Test Sequences and Validate with test rig
- Start Production Testing of Valves

PC (Personal Computer) or PXI versions of this system are provided to suit the cycle time requirements of the test system. PXI is a real time operating platform from NI:

- PC version can be used where the cycle time is not critical. PC engine runs at 100ms cycle time and reduces overall hardware cost

- PXI version runs at 1ms cycle suitable for testing time critical parameters of the Unit under test.

#### **1.4.5.2.i b Instrument Driver Creator**

The Instrument Driver Creator is an interesting application that aids you in creating a complete project-style driver within minutes. This tool cuts by about 90%, the time spent in creating a VISA-based LabVIEW instrument driver while enforcing compliance with NI development standards and automating repeated tasks such as icon layout, connector pane layout, initialisation, closure, hierarchical organization, error handling etc

#### **1.4.5.2.i.c Gauge View**

The Gauge VIEW is state-of-the-art machine vision software that has been specifically designed to read gauges or needle based meters. The unique technology in Gauge VIEW can be easily used to read and calibrate any type of gauge. The software is highly flexible and robust and has been designed to effectively handle the variations in

- Dial Shape
- Dial Colour
- Dial Rang
- Dial Graduations (Linear and Non-Linear)

#### **1.4.5.3 Customers of Soliton Technologies**

General Motors	Daimler Chrysler	GE
Apple	Boeing	IBM
Ford	Bajaj	Hitachi
Nortel	Pricol	Honeywell

## **1.5 Objective of the Study**

### **1.5 a Primary Objective**

To arrive at the royalty rate to be charged for per unit for the transfer of technology by the organization to its client

### **1.5 b Secondary Objectives**

- i. To profile the cost structure involved in the R&D value chain with respect to videoconferencing cameras.
- ii. To assess the Present Value of the cash inflows obtained through technology transfer.

### **1.7 Limitations of Study**

The major limitation is

- The study is limited only to this technology; it does not take into account the royalty to be charged in case of any major revision in the product which may lead to launch of a new version of the product.

# **RESEARCH METHODOLOGY**

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## Chapter 2

### 2.1 Research Methodology

#### 2.1 a Type of Study

An Analytical study is to be conducted for calculating the royalty to be charged by the organisation to its client for technology transfer.

#### 2.1b Method of Data Collection

Both Primary and Secondary data are to be used for the study. Primary data is collected through personal discussions with the respective persons in the organization. Secondary data is obtained through the Internal Reports and Documentations.

#### 2.1 c Period of Study

The study is conducted for the gestation period from November 2009 to June 2010 during which R&D work was carried out.

#### 2.1 d Variables Required

The following variables are required for the study

- Cost Model
- Unrecovered Expenses
- Design Rectification Cost
- Design Customization Cost
- Continual Improvement Cost
- Firmware Loading Cost
- Service Support Cost

#### 2.1 e Tools for Analysis

The statistical tools used for analysis is

#### 2.1 e i Cost Modeling

**Cost models** are mathematical algorithms or parametric equations used to estimate the costs of a product or project. The results of the models are typically necessary to obtain approval to proceed, and are factored into business plans, budgets, and other financial planning and tracking mechanisms. They may be standardized (available in published texts or purchased

commercially) or proprietary, depending on the type of business, product, or project in question. Simple models may use standard spreadsheet products.

Models typically function through the input of parameters that describe the attributes of the product or project in question, and possibly physical resource requirements. The model then provides as output various resources requirements in cost and time.

### **2.1 e ii Net Present Value (NPV)**

NPV is defined as the sum of the present values (PVs) of the individual cash flows. NPV is a central tool in discounted cash flow (DCF) analysis, and is a standard method for using the time value of money to appraise long-term projects.

## 2.2 Macro- Micro Analyses

### 2.2. a Introduction

The video conferencing industry is robust and painted a bright outlook for the future. The overall enterprise telepresence and video conferencing market is projected to grow 15% annually over the next five years to reach \$4.3B in 2014. The factors contributing to this phenomenal growth are:

1. **Economic Pressures** – increasing need to be more efficient, cut costs, and communicate with customers, partners and suppliers around the world.
2. **Globalization** – not only are enterprises today managing trade across borders and outsourcing certain business functions, they also have dispersed management teams and skill sets, which lead to increased challenges for corporate culture and communication. With business flowing in all directions, enterprises have become globally integrated, stateless multinationals.
3. **Business Continuity** – concern for threats such as global contagion, energy crises, and terrorism are on the rise, and business needs to be sure it can maintain operations.
4. **Better Equipment** – technological advances in the industry have led to a better user experience with CD quality audio and HD quality video, as well as increased collaboration with dual streams, integration, and bridges and gatekeepers. Meanwhile prices have remained relatively flat and users benefit from a better price per performance.
5. **Unified Communications** – integration between large unified communications players and video has driven awareness of conferencing and collaboration.
6. **Climate Change** – social pressures and corporate responsibility policies are driving the need to reduce travel to lower carbon emissions. As government mandates and rewards for travel reduction grow, organizations will increasingly turn to video conferencing.

Video conferencing is no longer seen as just a cheap alternative to travel. It also helps companies address issues such as the dispersion of global teams, the need to decide and implement in "internet time," and the need to respond to intense competitive pressure. In addition, as cost, environmental and security concerns heighten, video conferencing is also being seen as a more 'responsible' option from a variety of perspectives.

- With the global business slowdown, prudent companies are acting to reduce their costs.
- Environmental concerns will increase the pressure on companies to adopt 'green' policies, including optimisation of business travel which, it's argued, contributes to global warming.
- Security concerns mean that organizations must respond to a 'duty of care' to their employees and this increasingly means curtailing travel to certain destinations at certain times.

Not surprisingly, many organizations are promoting video conferencing as an alternative to air travel. Some companies already require employees to confirm on travel requisition forms that video conferencing is not an alternative option to making a particular trip.

Executives have long been aware that the use of conferencing and collaboration technology could be a viable and cost-effective alternative to sending their employees out on the road. But knowing and doing are different things. Research shows that this has now changed. A combination of fears of travel, heightened competitive threats and the sheer power and pervasiveness of the technology has created a major shift in attitude toward conferencing and collaboration. That has resulted in a strong up-tick in usage of all the collaborative applications--voice conferencing, Web conferencing, and video conferencing. Wainhouse Research polled over 700 US business travellers in July and August 2002, and found that for the first time, technology-enabled meetings were being used more than in-person ones. Before 9/11 in-person meetings accounted for 54.2% of meetings; post 9/11 in-person meetings decreased 16-3% to account for 45.4% of meetings. And this trend has continued. With technical hurdles to video conferencing mostly overcome, psychological and organizational barriers to adoption and use are now falling fast as well.

Video conferencing has made tremendous leaps since the advent of web-based technologies allowing users more convenience and less cost. Companies are discovering how these technologies can aid their mobile sales force and improve effective decision-making in their overseas or regional markets, while individuals are connecting more easily with family and friends. This technology is changing the way we communicate with each other and in five years, as the current trends demonstrate, it will be just as commonplace as cell phones and Internet access.

The future of video conferencing looks bright because more consumers and companies are attracted to less costly communication methods that lead to increased decision-making through virtual physical interaction. According to Wessel Pieterse, a convergence specialist at Cisco Systems, face-to-face communication via video conferencing is a powerful tool. "One study has shown that around 55% of your impact on someone comes through in your body language, while 38% of the impact is on how the message is said. Only 7% of the impact is related to what is actually said." Video conferencing also reduces travel and its associated costs, and it helps bring project teams together to offer feedback and consensus.

## 2.2.b Forecast and Assumptions

Table 1 shows worldwide videoconferencing revenue and endpoints, and Figure 1 shows videoconferencing revenue, for 2009–2014.

Worldwide Enterprise Videoconferencing Revenue and Endpoints, 2009–2014

	2009	2010	2011	2012	2013	2014
Videoconferencing revenue (\$M)	1,892	2,742	3,877	5,308	6,947	8,755
Growth (%)	16.7	45.0	41.4	36.9	30.9	26.0
Endpoints (000)	218	300	405	533	686	845
Growth (%)	5.4	37.4	35.0	31.5	28.9	23.2

Table 1

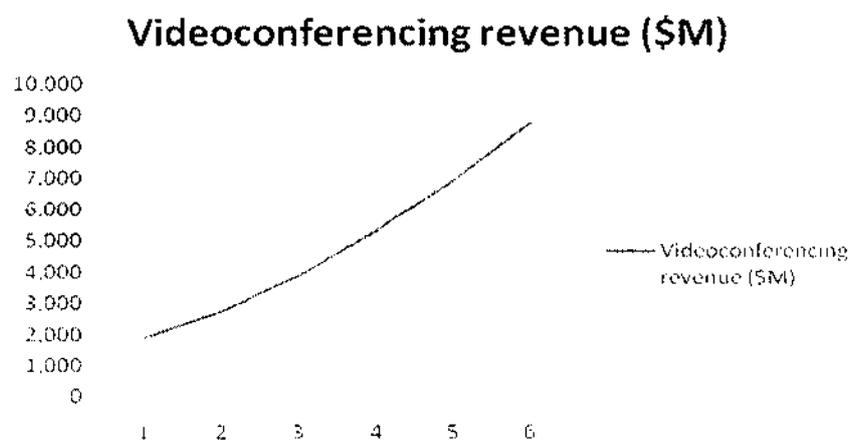


Figure 1

Note: See Table 1 for key forecast assumptions.

Source: International Data Corporation, 2010

### **2.2.c Scenario in the Asia-Pacific Market**

With the economy expected to pick up in the Asia Pacific, the video conferencing market is likely to benefit as more companies invest in video conferencing solutions.

According to a new study by Frost & Sullivan, spending for video conferencing solutions is expected to continue its pickup from late last year, with revenues reaching US\$367.5 million by the end of the year.

In a new industry analysis titled 'Asia-Pacific Video Conferencing Endpoints Market', the consultancy firms said the region, including Japan, will grow 9.5 per cent year-on-year by the end of the year with shipments growing by 14.1 per cent to 108,434 units.

The Asia-Pacific market is expected to grow at a compound annual growth rate (CAGR) of 13.6 per cent till 2016 reaching nearly US\$820 million. Unit shipments, meanwhile, are predicted to grow at a CAGR of 16.3 per cent from 2009 to 2016.

### **2.2.d Corporate spending**

Corporate spending for the video conferencing market was obviously affected by the global credit crunch. Frost & Sullivan particularly noted that for the banking and financial sector, the sector most badly hit by the crunch, investments in video conferencing solutions declined.

"The corporate sector saw the sharpest decline in video conferencing investments last year, most notably the banking and finance sector," said Nath, Frost & Sullivan Industry Manager. Corporate cutbacks, however, were offset by a rise in government sector adoption.

Growth of the video conferencing endpoints market dropped sharply to post a modest 5.4 per cent on the back of just over US\$335 million revenues in 2009.

"Spending in the first three quarters of 2009 showed a decline in almost all Asia-Pacific countries, but by end-2009, enough deals were closed to bring the market back from the red," said Nath.

### **2.2.e HD adoption**

All is not that bad in the market, however. Despite the global slowdown, Frost & Sullivan noted that sales and marketing activities in the video conferencing sector remained active last year with high definition (HD) systems bringing in more business

"As a result, almost all of the units sold in 2009 in the mid- to high-range market were high definition solutions," said Nath.

The market for HD is expected to grow up to 2016 even for countries such as China and India where standard definition currently dominates.

The challenge for HD adoption in the region, though, is bandwidth. One solution is for companies to consider when they plan their Internet protocol (IP) networks infrastructure is that video applications can run on IP.

"Pure IP systems are already widely deployed in urban cities of the region. As bandwidth costs continue to decline and become more available beyond these urban areas, we expect pure IP systems to see huge uptake in the mid to long-term," said Nath,

The major players in video conferencing industry globally are

- Tandberg (market capitalisation US \$ 2.6 Bn) acquired by Cisco in 2010
- Polycom (market capitalisation US \$ 2.2 Bn)
- Radvision (market capitalisation US \$ 180.3 mn)
- Avistar (market capitalisation US \$ 27.06 mn)
- Sony
- ZTE
- Huawei
- Lifesize
- Kecom
- Aethra

## **2.2.f Indian Scenario**

In India, the Video Conferencing market might be at a nascent stage but potential to tap the market is high with the companies taking the conferencing options as a safe bet to ensure cost cutting. Global vendors are increasing their activity in India to tap into this potential. The global market for video conferencing endpoints and infrastructure was worth more than \$1.6 billion in 2008, and India contributes approximately two percent to that total, i.e. approximately \$35.8 million.

According to Frost and Sullivan, the growth is driven by budget cuts inside enterprises, which have cut travel and must now rely on video conferencing for virtual meetings.

“This upbeat outlook for video conferencing solutions is buoyed by the need for real-time collaboration as productivity tools, and the increasing availability of next-generation video conferencing devices and compression technologies,” says Pranabesh Nath, industry analyst at Frost & Sullivan.

“Despite reduced spending in a recessionary climate, most companies realize that investing in video conferencing solutions provides long-term savings compared to direct travel, by enabling cost-effective long-distance communications,” he added. “It also increases employee productivity and collaboration due to the ability to conduct more meetings than is possible with physical travel.”

Adoption in the more mature economies such as Australia, Japan and South Korea have been dominated by the corporate sector, particularly the banking, financial services and insurance (BFSI) industry. High-definition video conferencing solutions were the clear favourite for new deployments in these markets.

Whilst in the developing countries like India and China, the government sector was the biggest spender on video conferencing, leaning towards the more affordable and lower bandwidth-compatible standard definition systems; although Nath says that high-definition solutions are gaining popularity in these markets as well

### **2.2.g Future Growth in India**

The growth of the overall Asia Pacific videoconferencing endpoints markets are expected to be led by the corporate sector, where converged voice, data, and video solutions are likely to have their strongest appeal, primarily as productivity tools for knowledge workers. The videoconferencing market in India offers great potential for growth too. There is a growth explosion expected (30% for the next two years) in the medium-term, beyond which growth rates will stabilize at 22%. Growth is witnessed not only in the large enterprise segment; but even small and medium businesses are adopting videoconferencing solutions, recognizing the vast benefits they offer. Notable developments in recent months include prominent mergers and continued progress in migration from Integrated Services Digital Network (ISDN) to Internet Protocol (IP) Network. In the coming years, factors like cost of ownership,

maintenance of infrastructure and general perception that people had about conferencing as a luxury and a hassle is slowly dying. "With the introduction of the concept of high definition, videoconferencing is likely to gain momentum and we really see this growing at rapid pace." Minhaj Zia, Business Development Manager, Unified Communication, India and SAARC, Cisco. Also with the wide scale adoption of ICT technologies and high definition solutions, we are heading toward a bright future.

### **2.2.h Technology Shift**

Technologically a massive migration is happening from circuit-switched ISDN transmission to packet switched IP networks. IP promises easier management, lower costs, higher bandwidth calls enabling higher quality audio and video, and integration to corporate IT mainstream. This technological shift has also lead to easier deployment of videoconferencing solutions. Other than that improvement in video systems in terms of price, performance and feature richness, new recommendations from ITU to make IP connectivity between different network providers standardized, standard data collaboration tools such as H.239 have all taken videoconferencing to new heights.

### **2.2.i The Challenges**

Despite its inherent technological and cost advantages, videoconferencing over converged network faces certain challenges that impede its growth. In India, the biggest challenges were regulatory restrictions imposed by the Indian government and interoperability issues that result from lack of standardization. Moreover, there is lack of education and low awareness on the business benefits of conferencing solutions. Factors like cost of ownership, maintenance of infrastructure, and the general perception about videoconferencing as an item of luxury could possibly impact growth of this market. "At present, most of the enterprises connect via ISDN. However, Internet based connections are increasing in popularity and many public rooms have come up in India, which allow these conferencing over IP network. Having said this, bandwidth issues at the backend need to be addressed to ensure that full benefits of videoconferencing can be availed," says Shivashankar.

Fortunately, broadband is fast becoming all pervasive in India and looking ahead IP-based networks will play a critical role in advancing the broadband penetration in the country. Bandwidth availability and the price of bandwidth will also be driving adoption of videoconferencing. India is a growing economy and there is immense competition among the

companies. Pressure to be more productive at lower costs, short time to market and being able to reach people are pertinent for the companies to gain competitive edge, and these requirements are driving adoption of videoconferencing in the country.

## **2.2.j Reality Bites**

After a decade of languishing in the dark corners of the communication market, telepresence emerged as the most promising conferencing trend in 2006. After the launch of HP's Halo, Cisco launched its Telepresence Meeting System solution along with Polycom's real presence solutions RPX series. These solutions added a new meaning to two-way interactive visual communication and exceeded the boundaries of traditional videoconferencing system. Interest of fortune 500 companies in high performance immersive visual communications that are highly reliable and easy to use has given a much required take off to the telepresence segment, despite the high initial costs and operating costs of such systems.

In some cases, these products use a room-within-a-room environment along with life-size images, and high-definition resolution with spatial and discrete audio to create a live, face-to-face meeting around a single 'virtual' table. These systems use the standard IP technology deployed in corporations today, and run on an integrated voice/video/data network. Such systems support high-quality, real-time voice and video communications with branch offices using broadband connections. They also offer capabilities for ensuring quality of service (QoS), security, reliability, and high availability for high-bandwidth applications such as video, particularly high definition video, which can require 1Mbps to 5Mbps, depending upon the resolution.

Telepresence is a videoconferencing experience that creates the illusion that the remote participants are in the same room. There are four key elements that are kept in mind for generating this experience; these include high quality audio video, simplicity, high reliability and environmental excellence.

"Polycom truly believes that India is a ripe market for a space that is worth around \$3 bn worldwide as per various research agencies. Potential applications would span across areas like boardroom meetings, corporate conferences, high-end surgeries, operation theaters, education and distance learning etc," says Yugal Sharma of Polycom.

Telepresence solutions are designed to deliver an all-immersive experience and typically require 4-24 Mbps of high performance and high QoS IP bandwidth. That usually means a dedicated network is required.

As more and more organizations join effective visual collaboration networks, the utility, value, and ROI of being connected to these networks grow, creating the same potential for exponential growth that characterized telephony and the Internet.

Over the next decade, virtually every Global 5000 Company will adopt a technology allowing them to interact with people, no matter how far away, as if they were in the same room. The technology is called telepresence, and a variety of Fortune 1000 organizations already started using it, reporting both satisfaction and a strong ROI.

### **2.2.k Future Scope**

"Videoconferencing is moving beyond corporate to the government sector, judiciary, distance learning, entertainment and telemedicine," says Shivashankar. There is an increased use of videoconferencing systems for interviewing candidates, interaction with relatives settled abroad, reviews and meetings, product launches, press conferences and auditioning actors. Videoconferencing promises applications also in healthcare, education, and government segments, as prices for hardware and bandwidth reduces and awareness about the technology spreads in the market.

Gone are the days of extended travel, waiting in long airport security lines, travel delays, inflated travel budgets and lost productivity. As organizations become more diverse in business applications, acquisitions and mergers become more common and multi-national work forces become the standard, decision makers are looking for ways to make communicating among their knowledge workers easy.

Collaborative technologies will enable business partners to easily switch back and forth from web, video and audio conferencing to see and hear each other and to share documents and information in real time. Today's enterprises are also looking forward to leading edge technology, flexible conferences, flexible deployment, common management suites, highly scalable solutions, secure VoIP conferencing, embedded multipoint options and videoconferencing solutions.

Today, networks are becoming increasingly scalable and enterprises are realizing the benefits of having all the applications on the network. The real impact of videoconferencing technology can only be realized when the user's experience is close to natural face-to-face meeting, and telepresence in this respect has already started revolutionizing room based videoconferencing services.

India will be one of the biggest markets worldwide for videoconferencing solutions. The enterprise user is getting financially stronger and as now they care competing globally, they need to be more productive and lower the costs of videoconferencing solutions.

# **DATA ANALYSIS & INTERPRETATION**

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## Chapter 3

### Analysis and Interpretation

#### Valuation of Intellectual Property Rights

For calculation of Royalty, the intellectual property should be valued first. Different methods are available for valuation of IPR. The most prevailing methods are

- i) Cost Approach
- ii) Market Approach
- iii) Income Approach

Each method has got its own advantages and limitations. In this case cost approach method is used to value the IPR.

#### 3.1 Ascertainment of Cost

Since it involves cost modelling, different costs are to be determined for the valuation of IPR. It can be classified into two types, the unrecovered cost and the prospective cost.

##### 3.1.a Historical Cost

##### 3.1. a.i Unrecovered Expenses

S.No	Particulars	Cost in ₹	% of the Total Cost
1.	BOM	35,57,201.78	37.73
2.	Man Hour Cost	38,96,750.00	41.33
3.	Administrative Overheads	19,29,755.35	20.47
4.	Other Expenses	43,714.00	0.46
5.	<b>Total R&amp;D</b>	<b>94,27,421.13</b>	<b>100.00</b>
6.	Initial Payment Received (\$1,00,000)	45,70,000.00*	
7.	<b>Total Unrecovered expenses</b>	<b>48,57,421.13</b>	<b>51.52</b>

\*1USD = 45.70 INR

Table No. 3.1.a.i

#### Interpretation

The R&D expenses involved in this project includes Materials cost, Labour Cost, Administrative Overhead and additional expenses like consultation charges provided by

the organisation to the customer which is ₹ 24,0000.00, Testing charges ₹ 13,200.00 and food charges ₹ 6,514.00. The total R&D expenses is ₹ 94,27,421.13. The initial payment received by the company is \$1,00,000.00 which in domestic currency has got a value of ₹ 45,70,000.00.

### Inference

From this it was found that the unrecovered expenses is ₹ 48,57,421.13(i.e) 51.52% of the cost has to be recovered. The administrative Overheads is calculated on a pro-rata basis for 10 employees (who were involved in this project) based upon average employees. The average employee per month is 26. Further during the foreign exchange conversion, the company has suffered a loss of ₹ 6,011.22 due to the fluctuations in the exchange rate. Similar kind of losses can be avoided in the future if the company adopts currency hedging strategies.

### 3.1. a. ii Redesigning of the boards

S. No	Activities involved	Cost of each unit in ₹	No. of units	Total Cost in ₹	% of Total Cost
1.	NRE	--	--	30,000.00	38.47
2.	Design Cost	--	--	25,000.00	32.06
3.	Testing	Vibration	2	7,200.00	10.16
		Temperature	2	7,200.00	10.16
		EMI		6,500.00	9.17
4.	<b>Total Cost</b>			<b>75,900.00</b>	<b>100.00</b>

Table No. 3.1.a ii

### Interpretation

The initial modification involves redesigning of 2 PCB's by incorporating a lens limiter to it, so that the lens control mechanism is enabled and the standards are in compliance with FCC Certification. The redesigning of boards involves different types of cost like NRE cost, Designing cost and testing cost which is ₹ 75,900.00. There are 3 different types of testing to be carried out like Vibration testing, Temperature testing and EMI testing where the first 2 types require a minimum of 8 hours of testing and for EMI

testing it is 1 hour. In case of Vibration and Temperature the testing of one unit per hour is ₹450.00 and for 8 hours the cost is ₹3,600.00. For EMI testing, it is not the hourly charges but it is the minimum commitment for one hour and maximum upto 6 hours which is ₹6,500.00.

### **Inference**

An assumption is made that the number of boards used for redesigning is, two because considerable amount of work has been carried out in the beginning stage. The cost incurred for the ground work is already accounted in the total R&D expenses and here only the testing, NRE and designing the layout for PCB is involved. The total expenses for the redesigning of these boards is ₹ 75,900 and it is brought under historical cost because the technology transfer happens only after redesigning them.

### **3.1.b Future Modifications**

Once the product is launched it may need to undergo some minor/major revisions and now the scope of study is limited with minor revisions. The minor revisions can occur because of

- Issues with design
- Components getting Obsolete, or
- Requisition for design changes from the Customer

### 3.1.b.i Design Rectification Cost

S. N	Type of Cost	Activities involved	Cost of each unit in ₹	No. of units	Total Cost in ₹	% of Total Cost	
I	Research	Purchase of Components	11,945.00	10	1,19,450.00	35.75	
		Testing	Vibration	3,600.00	10	36,000.00	10.78
			Temperature	3,600.00	10	36,000.00	10.78
			EMI	6,500.00	-	6,500.00	1.95
II	Redesign	Service Cost for the Vendor	-	-	25,000.00	7.48	
III	Prototype	Fabrication	2,204.00	10	22,040.00	6.59	
		Assembling	5,376.00	10	53,760.00	16.09	
		Freights & Customs Duty	5,354.39	-	5,354.39	1.60	
IV	NRE	Service cost for the vendor	-	-	30,000.00	8.98	
V	<b>Total Cost</b>				<b>3,34,104.39</b>	<b>100.00</b>	

Table No. 3.1.b.i

#### Interpretation

Designing issues might occur when there is a malfunction in the unit, or any problem with the firmware of the configuration. The components cost has a major proportion compared to other type of cost with a 35.75% in the overall cost. The next major share is from assembling with 16.09% followed by vibration and temperature testing. The service cost for the vendor in case of laying the circuit path for PCB and NRE cost is 7.48% and 8.98%. The EMI testing and freights charge has got a minimum share of 1.95 and 1.60%

#### Inference

For the purchase of components only 6 major components have been taken into account as they contribute 80% of the total cost of materials. Redesigning and NRE job is a onetime cost immatter of how many units of products are going to be produced. In case of any issues with the design the entire process of R&D has to be done which involves considerable amount of time and cost. If this process requires additional persons to sort out the issue, man hours cost has to be accounted for.

## 3.1.b. ii Cost incurred due to obsolescence of components

S. No	Type of Cost	Activities involved	Cost of each unit in ₹	No. of unit	Total Cost in ₹	% of Total Cost	
<b>Direct Substitute</b>							
I	Search for Vendor	Information Processing Cost	-	-	5210.21	1.54	
<b>Indirect Substitute</b>							
II	Research	Purchase of Components	11,945.00	10	1,19,450.00	35.20	
		Testing	Vibration	3,600.00	10	36,000.00	10.61
			Temperature	3,600.00	10	36,000.00	10.61
			EMI	6,500.00		6,500.00	1.92
III	Redesign	Service Cost for the Vendor	-	-	25,000.00	7.37	
IV	Prototype	Fabrication	2,204.00	10	22,040.00	6.50	
		Assembling	5,376.00	10	53,760.00	15.84	
		Freights & Customs Duty	5354.39		5354.39	1.58	
V	NRE	Service cost for the vendor	-	-	30,000.00	8.84	
<b>Total Cost</b>					<b>3,39,314.60</b>	<b>100</b>	

Table No. 3.1.b.ii

**Interpretation**

Components get obsolete in two contexts. First one is the product is upgraded (indirect substitute) and the second one is the vendor stops manufacturing (direct substitute). In case of the direct substitute the cost involved is only for the search cost for a new vendor with the same specifications and it does not involve any testing cost. The indirect substitute involves purchase of components, testing for the functionality and specifications with the previously used component/components.

### Inference

The information processing cost involves the purchase of Books and periodicals, membership fees, internet and telephone bills. 10% of the overall cost is taken as information processing cost because it just involves the search for an alternative vendor. This search has to be done at a faster pace because it might affect the production process and finally delivering of the product might get delayed. Any up gradation in the component specification may either enhance the functionality of the product or the component may not go with the other components.

#### 3.1.b iii Customization Cost to meet the customer needs/ market needs

S. No	Type of Cost	Activities involved	Cost of each unit in ₹	No. of unit	Total Cost in ₹	% of the Total Cost	
I	Research	Purchase of Components	11,945.00	10	1,19,450.00	35.75	
		Testing	Vibration	3,600.00	10	36,000.00	10.78
			Temperature	3,600.00	10	36,000.00	10.78
			EMI	6,500.00		6,500.00	1.95
II	Redesign	Service Cost for the Vendor	-	-	25,000.00	7.48	
III	Prototype	Fabrication	2,204.00	10	22,040.00	6.59	
		Assembling	5,376.00	10	53,760.00	16.09	
		Freights & Customs Duty	5,354.39		5,354.39	1.60	
IV	NRE	Service cost for the vendor	-	-	30,000.00	8.98	
<b>Total Cost</b>					<b>3,34,104.39</b>	<b>100.00</b>	

Table No. 3.1.b.iii

### Interpretation

This cost occurs due to the requisition from the customer for changes in the design based upon the product features available in the market. The research activity involves components cost, vibration, temperature and EMI testing for 10 units is ₹ 1,97,950.00 which is 59.26% of the total cost for this activity. The prototype activity involves fabrication, assembling and freights & custom duty cost which is 24.28% of the total cost. The service cost for redesigning and NRE is 16.46% of the total cost.

## Inference

Unlike the other type of issues, the changes in design requested by customers can be a sensitive one. The changes in the design required by the customer might be a major revision or a minor revision. The focus of the study is only with the minor revisions in the existing product because any major revisions give way for the launch of the advanced or new version of the product.

### 3.1.c Continual Improvement Cost

S. No	Type of Cost	Activities involved	Cost of each unit in ₹	No. of units	Total Cost in ₹	% of Total Cost	
I	Research	Purchase of Components	11945.00	10	1,19,450.00	60.34	
		Testing	Vibration	3,600.00	10	36,000.00	18.19
			Temperature	3,600.00	10	36,000.00	18.19
			EMI	6,500.00		6,500.00	3.28
<b>Total Cost</b>					<b>1,97,950.00</b>	<b>100.00</b>	

Table No. 3.1.c

#### Interpretation

In case of continuous improvement the components involves a higher percentage of cost (i.e) 60.34% of the overall cost. The remaining 39.66% of cost is for vibration, temperature and EMI testing.

#### Inference

The product has undergone only alpha testing and not beta testing. The reliability of product is questionable hence R&D work has to be carried out for continuous improvement until the product is stabilised. Continuous improvement will involve some replacement in components, testing the functionality with the same prototype.

### 3.1.d Firmware Loading Cost

S. No	Activities involved	Cost of each unit in ₹	No. of units	Total Cost in ₹	% of Total Cost
1.	Firmware Loading (Salary)	10,000.00	12	1,20,000.00	50.00
2.	Opportunity Loss	10,000.00	12	1,20,000.00	50.00
<b>Total Cost</b>				<b>2,40,000.00</b>	<b>100.00</b>

Table No. 3.1.d

### Interpretation

With respect to manufacturing, the cost incurred will be the salary to be paid for the person who will be deployed for firmware loading and the opportunity loss of the expertise.

### Inference

Although the technology is transferred, a special person has to be deputed in the production department of the customer organisation for loading the firmware. The product key of the firmware will not be given directly to the customer because the chance of reworking or copying the algorithm is high.

### 3.1.e Service Support Cost

S. No	Activities involved	Cost of each unit in ₹	No. of units	Total Cost in ₹	% of Total Cost
1.	Warranty Cost	1115.50	10	11,155.00	0.37
2.	2% of Yield	29889.95	100	29,88,995.00	99.63
<b>Total Cost</b>				<b>30,00,150.00</b>	<b>100.00</b>

Table No. 3.1.e

### Interpretation

In all the above prospective cost, service support job is necessary and for this purpose 2 R&D engineer are appointed. The support cost involves debugging, search of new components, vendors and for this purpose warranty cost and 2% of yield cost is taken. The warranty cost is 0.37% of the total cost whereas 2% of yield is 99.63% of the total cost.

### Inference

The warranty cost is calculated by taking 5% of BoM. The total BoM cost is ₹ 22,309.95 and 5% of that is considered as warranty cost for one unit. During the process it is assumed that 2% of the total units might go as wastage and 5,000 units are to be produced which means that 100 units might go as wastage for producing 5,000 units.

### 3.2 Estimation of Future cost

The following tables depict the future cost to be incurred which is calculated from the historical cost.

#### 3.2.a Design Rectification Cost

S.No	Type of Cost	Activities involved	Historical Cost in ₹	Expected Cost in ₹	
I	Research	Purchase of Components	1,19,450.00	1,31,395.00	
		Testing	Vibration	36,000.00	39,600.00
			Temperature	36,000.00	39,600.00
			EMI	6,500.00	7,150.00
II	Redesign	Service Cost for the Vendor	25,000.00	27,500.00	
III	Prototype	Fabrication	22,040.00	24,244.00	
		Assembling	53,760.00	59,136.00	
		Freights & Customs Duty	5,354.39	5,889.83	
IV	NRE	Service cost for the vendor	30,000.00	33,000.00	
V	<b>Total Cost</b>		<b>3,34,104.39</b>	<b>3,67,514.83</b>	

Table No. 3.2.a

## 3.2.b Cost incurred due to obsolescence of components

S.No	Type of Cost	Activities involved	Historical Cost in ₹	Expected Cost in ₹	
<b>Direct Substitute</b>					
I	Search for Vendor	Information Processing Cost	5,210.21	5,731.24	
<b>Indirect Substitute</b>					
II	Research	Purchase of Components	1,19,450.00	1,31,395.00	
		Testing	Vibration	36,000.00	39,600.00
			Temperature	36,000.00	39,600.00
			EMI	6,500.00	7,150.00
III	Redesign	Service Cost for the Vendor	25,000.00	27,500.00	
IV	Prototype	Fabrication	22,040.00	24,244.00	
		Assembling	53,760.00	59,136.00	
		Freights & Customs Duty	5,354.39	5,889.83	
V	NRE	Service cost for the vendor	30,000.00	33,000.00	
	<b>Total Cost</b>		<b>3,39,314.60</b>	<b>3,73,246.07</b>	

Table No. 3.2.b

### 3.2.c Customisation cost to suit customer needs/market changes

S.No	Type of Cost	Activities involved	Historical Cost in ₹	Expected Cost in ₹	
I	Research	Purchase of Components	1,19,450.00	1,31,395.00	
		Testing	Vibration	36,000.00	39,600.00
			Temperature	36,000.00	39,600.00
			EMI	6,500.00	7,150.00
II	Redesign	Service Cost for the Vendor	25,000.00	27,500.00	
III	Prototype	Fabrication	22,040.00	24244.00	
		Assembling	53,760.00	59136.00	
		Freights & Customs Duty	5,354.39	5889.83	
IV	NRE	Service cost for the vendor	30,000.00	33,000.00	
<b>Total Cost</b>			<b>3,34,104.39</b>	<b>3,67,514.83</b>	

Table No. 3.2.c

### 3.2.d Continual Improvement Cost

S.No	Type of Cost	Activities involved	Historical Cost in ₹	Expected Cost in ₹	
I	Research	Purchase of Components	1,19,450.00	1,31,395.00	
		Testing	Vibration	36,000.00	39,600.00
			Temperature	36,000.00	39,600.00
			EMI	6,500.00	7,150.00
<b>Total Cost</b>			<b>1,97,950.00</b>	<b>2,17,745.00</b>	

Table No. 3.2.d

### 3.2.e Service Support Cost

S.No	Activities involved	Historical Cost ₹	Expected Cost in ₹
1.	Warranty Cost	11,155.00	12,270.50
2.	2% of Yield	29,88,995.00	32,87,895.00
<b>Total Cost</b>		<b>30,00,150.00</b>	<b>33,00,165.50</b>

Table No. 3.2.e

### Interpretation

The future/prospective cost is arrived at, using the inflation cost. The inflation (WPI index) for the month July 2010 is 9.97%. The escalation in cost is rounded off to 10%. In all the above tables from Table No 4.2.a – 4.2.d, the expected cost is 10% increase in historical cost.

### Inference

The chances for the contract of the company with their customer may get repudiated after a year is high because of a very shorter technology life cycle; therefore it is necessary that all these costs have to be recovered within a period of one year in the form of royalty.

### 3.3 Identifying Total Cost

S.No	Particulars	Amount in ₹
1.	Unrecovered Expenses	48,57,421.15
2.	Redesigning of the PCB's	75,900.00
3.	Design Rectification Cost	3,67,514.83
4.	Cost incurred due to Obsolescence of the Component	3,73,246.07
5.	Due to market changes	3,67,514.83
6.	Continuous Improvement Cost	2,17,745.00
7.	Service Support Cost	33,00,165.50
8.	Firmware Loading Cost	2,40,000.00
9.	<b>Gross Amount</b>	<b>97,99,507.38</b>
10.	Profit (25% of Gross Amount)	24,49,876.85
11.	<b>Net Amount</b>	<b>1,22,49,384.23</b>

Table 3.3

### Interpretation

After the identification of the individual cost incurred for each type of activities involved, the costs are summed up to arrive at the total cost. The gross amount is ₹ 98,01,597.38 and the company requires 25% of profit from the amount spent for R&D.

### Inference

The production for one year is 5,000.00. The net amount is ₹1,22,49,384.23 (Gross amount + 25% profit) which has to be recovered within a period of one year.

### 3.4 Calculation of Royalty per unit

S.No	Particulars	Amount in ₹
1.	Net Amount	1,22,49,384.23
2.	Royalty per unit for 5,000 units	2,449.88

Table 3.4

### Interpretation

The total cost including the unrecovered R&D expenses and other future cost is ₹ 1,22,49,384.23. The number of units to be produced for a year is 5,000 and the royalty is spread across these 5,000 units. Royalty rate per unit is ₹ 2,449.88

### Inference

The minimum commitment from the customer to the company for a year is 5,000 cameras and it is assumed that all the 5,000 cameras are to be produced within this time span and the royalty is calculated by spreading the net amount for these 5,000 units.

### 3.5 Calculation of Present Value

Future Value of Total Cost = ₹ 1,22,49,384.23

Total No. of Units = 5,000.00

Future Value of Royalty per unit = ₹  $1,22,49,384.23 / 5,000$   
= ₹ 2,449.88

Cost of Capital = 15%

Present value of Royalty per unit = ₹  $2,449.88 / (1 + 0.15)^1$   
= ₹ 2,130.33

S.No	Particulars	Amount in ₹
1.	Royalty per unit	2,449.88
2.	Present Value of royalty	2,130.33

Table 3.5

### Interpretation

The future value of royalty rate per unit is ₹ 2,449.88. The cost of capital is 15% and the future value is discounted to present value. The present value of royalty rate per unit is ₹2,130.88.

### Inference

The production of the 5,000 units of video conferencing camera with the particular specification is for one year because of the rapid change in the technology/ shorter technology life cycle. The contract for this particular project is repudiated after a year, hence the net amount of ₹ 1,22,49,384.23 has to be recovered within the time period.

# CONCLUSION

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## Chapter 4

### 4.1 Findings

- The unrecovered expenses is ₹ 48,57,421.13 (i.e) 51.52% of the cost has to be recovered.
- During the foreign exchange conversion, the company has suffered a loss of ₹ 6,011.22 due to the fluctuations in the exchange rate.
- The total expenses for the redesigning of these boards is ₹ 75,900 and it is brought under historical cost because the technology transfer happens only after redesigning them.
- The changes in design requested by customers can be a sensitive one which might lead to loss of customer also if their specifications are not met.
- The reliability of product is questionable. Hence R&D work has to be carried out for continuous improvement until the product is stabilised. Continuous improvement will involve some replacement in components, testing the functionality with the same prototype.
- For the purchase of components only 6 major components have been taken into account as they contribute 80% of the total cost of materials.
- In case of any issues with the design the entire process of R&D has to be done which involves considerable amount of time and cost.
- The information processing cost involves the purchase of Books and periodicals, membership fees, internet and telephone bills. 10% of the overall cost is taken as information processing cost because it just involves the search for an alternative vendor.
- A special person has to be deputed in the production department of the customer organisation for loading the firmware. The product key of the firmware will not be given directly to the customer because the chance of reworking or copying the algorithm is high.
- The total BoM cost is ₹ 22,309.95 and 5% of that is considered as warranty cost for one unit. During the process it is assumed that 2% of the total units might go as wastage and 5,000 units are to be produced which means that 100 units might go as wastage for producing 5,000 units.

- The chances for the contract of the company with their customer may get repudiated after a year is high because of a very shorter technology life cycle; therefore it is necessary that all these costs have to be recovered within a period of one year in the form of royalty.
- The production for one year is 5,000. The net amount is ₹1,22,49,384.23 (Gross amount + 25% profit) which has to be recovered within a period of one year.
- The contract for this particular project is repudiated after a year, hence the net amount of ₹ 1,22,49,384.23 has to be recovered within the time period.

## 4.2 Suggestions

- The foreign exchange rate is on the greater fluctuating side in the recent days as rupee is appreciating which is affecting the exporters. In order to prevent exchange rate losses the company can adopt currency hedging techniques.
- The company has gone only for alpha testing and not beta testing because of time constraint. It is recommended that they go for beta testing in the future because of the changing customer needs and shorter technological life cycle of the video conferencing systems.

## 4.3 Conclusion

For any unique product to hit the market, lot of efforts is put by the organisation jointly with the R&D team. There is a larger outflow of capital in addition to it there is a heavy input from the R&D team both physically and mentally. The reach of the innovative product to the public is alone not sufficient, to the same extent it should generate revenue. There are companies who are not interested in launching their products directly into the market, but they transfer the technology or provide permission for a third party to use their product's formula for a stipulated amount of time. The reward for this is obtained in the form of royalty. This study is focussed in identifying the right royalty rate for transfer of technology for custom developed camera using cost based approach method. The net present value is positive; hence the project is economically viable. The company can proceed forward to transfer their technology to the third party at the recommended cost.

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