LOYALTY SWITCHING FROM TRADITIONAL TO e-LEARNING IN INDIAN HIGHER EDUCATION

– A Markov Chain Analysis –

(A case study of Sri Venkateswara University, Andhra Pradesh, India)

By

Dr. MAMILLA RAJASEKHAR
Associate, Professor, Dept. of Commerce
Sri Venkateswara University, Tirupati-517 502
Andra Pradesh, India

MRS. CUDDAPAH ANITHA
Teaching Assistant, Dept. of MCA
Sri Venkateswara University, Tirupati-517 502
Andra Pradesh, India

ABSTRACT

It is high time for Indian universities to transform themselves from sellers to marketers, though they are non-profit organizations, in marketing their degrees to its customers (students). In this direction e-learning could be one of the tools that helps achieve this objective. The authors in this survey-based article studied the consumers' (professors, scholars, and students of their university) loyalty switching from traditional to e-learning through Markov Chain Analysis, an operations research technique, based on which they suggested certain strategies to be adopted in order to provide quality higher education, as is intended by WTO's Cancun 2003 Meet, and to face the imminent, healthy, and cut-throat competition from foreign as well as private universities in both regular and distance education product categories from January, 2005 onwards.

Keywords: Markov Chain, switching loyalty, e-learning life cycle, e-learning tools.

1. INTRODUCTION

With a drive to improve total factor productivity and economic growth in its member countries, educational services have been brought under the purview of GATS in 1995 by WTO, followed by its reasonable negotiations in Doha (2001), Seattle (2002), and Cancun (2003) meets, based on which India as a founder member of WTO has passed a bill in its parliament to allow foreign universities into India from 1st January, 2005 onwards to do trade in higher educational services (Deodhar, Satish, 2003). It is high time for India to reform its higher education from half-baked socialism to half-baked capitalism and realize the need to run universities on business lines though they are non-profit organizations. India being the fifth largest education system in the world with large potential market for regular and distance educational services, e-learning could help Indian universities to protect themselves from foreign universities in the years to come.

Challenges of traditional learning: An opportunity for e-learning:

The need and characteristics of e-learning from e-learning tools such as tools such as such as Computer-aided video instruction (CAVI), hypermedia, multimedia, CD-ROMs, LANs, Internet connections, e-mail, bulletin boards, Gopher, WWW, and collaborative software environments. can be understood well by distinguishing between the present and future learning as shown below:

Characteristics of Conventional learning	Characteristics of e-learning
1. Instructor-led learning (Synchronous learning)	Instructor-less learning (Asynchronous learning)
2. Skills oriented	Knowledge-oriented
3. Product-centric	Customer-centric
4. Short-time learning	Life-long learning
5. Static content	Dynamic and customized content

6. Mandated   Self-directed

7. Passive participation of customers   Active participation of customers

8. One-to-one communication flow   Many-to-many communication flow

9. Teacher's role is a commander   Teacher is a coach, facilitator, resource broker

10. Place and time dependent   Place and time dependent

11 Learning is separated from earning   Learning while working

Loyalty switching from traditional to e-learning:

Loyalty switching from traditional to e-learning explains how the consumer (student) of Indian higher education is switching his loyalty from traditional to e-learning with his given personal, psychological, cultural and social characteristics to come to a decision whether to adopt/switch to e-learning or not from the traditional learning consisting of textbooks, classroom lecture, and written examinations.

A case study of Sri Venkateswara University:

Sri Venkateswara University Campus, located in Tirupati of Andhra Pradesh, located in the foothills of Lord Balaji of Tirumala was established in 1954. At present (2005) it is running M.A., M.Com., MBA, MCA, M.Sc., B.Tech., M.Tech., M.Phil., and Ph.D., courses with 58 departments (37 arts, 16 science, and 6 engineering); running 71 post-graduate courses (40 arts, 24 science, and 10 engineering); with a student strength of 5,320 (2600 arts, 2100 science, 300 engineering, and 320 M.Phil., and Ph.D); with a total computer strength of 320 (130 to professors, 15 to Directorate of Distance Education , 20 to administration, 5 to library, and 150 to students); with internet connection to 140 computers (30 to students and 110 to professors); with a library of 3 lakh books and 360 periodicals, and collection of 400 micro films on various subjects. Besides this set up, Directorate of Distance Education (DDE) has a yearly enrolment of approximately 2800 students (2,000 arts, and 800 sciences) into 10 post-graduate courses from 1972 onwards. Though the DDE has an internet connection to 10 computers, no students of it are availing the facility as they come once in a year for ten days for attending contact programs.

Sample selection:

Following stratified random sampling technique, samples of 10%, 10%, and 2% are taken from professors, scholars, and students' segments respectively with equal representation from Arts, Science, and Engineering faculties of Sri Venkateswara University Campus, Tirupati of Andhra Pradesh. Male and female samples are selected almost in equal proportions as shown in Table 1.

	Arts			Science			Engineering		
	Professors	**Scholars	Students	Profess	Scholars	Students	Profess	Scholars	Students
1. Total	173	180	2600	140	120	2100	57	20	300
2. Sample	17	18	52	14	12	42	6	2	6
3. % age	10%	10%	2%	10%	10%	2%	10%	10%	2%
4. Male: Female	9:8	9:9	26:26	7:7	6:6	21:21	3:3	1:1	3:3
* Followed stratified random sampling technique in sample selection..									
** Scholars=Research scholars doing M.Phil., and Ph.D.,									

Table 1: *Sample selection**

Data collection:

Two questionnaires which were browsed from a website, after some modifications to them, are executed with the sample selected, and the data elicited from the sample is analyzed through Markov Chain Analysis to make out some findings and give suggestions based on them.

Questionnaire 1: It was intended for measuring the percentage of information the professors, scholars and students of different faculties drew from internet and to track the growth of technology use in the class room lecture, research, and term-end examinations (Norris, ?).

Questionnaire 2: It was intended to assess the attitude of the samples towards the internet by asking them to respond to a set of 13 statements on a 3-point Likert's scale, while taking into consideration their age, service, designation, and gender(Christensen, 1997).

Objectives of the study:

The following are set to be the objectives of the current research study:

1. To study the current loyalty of the professors, research scholars, and students for conventional learning tools such as textbooks, journals, and magazines, as well as e-learning tools.

2. To study the rate at which the sample switch loyalty from traditional to e-learning.

3. To study the amount of information the sample obtain from traditional as well as e-learning tools in their teaching, research, and study.

4. To measure time that it will take to reach equilibrium state of the loyalty to e-learning after which the loyalty will remain unchanged in order to facilitate the university to plan what steps could be taken to reach this stage as early as possible.

5. To recommend strategies to be adopted to improve the adoption rate of e-learning among the sample.

Markov Chain Analysis:

The author has used Markov Chain Analysis (Swaroop, Kanti, etal., 2004)) to analyze its synchronized data in the manner as is shown in the annexure Tables 2, 3 and 4. "Markov Chain is a stochastic process used to analyze the movement of a variable in an effort to forecast its future movement, in which the occurrence of a specific event depends on the occurrence of the event immediately prior to the current event." This is one of the management techniques. This analysis has been used mainly as a marketing tool for predicting the behavior of customers from the standpoint of the loyalty to one brand and their switching patterns to other brands. There is no other technique or tool for studying the rate of loyalty switching in the Management Science or Operations Research. However, it is also being used in other fields such as accounting, behavioral sciences, education, human resource management, etc.

Markov Chain Process:

Step 1: A state-transition matrix:

This matrix summarizes the transition probabilities in a given Markov Process. Its rows identify the current states of the system (loyalty towards traditional and e-learning) being studied and the columns identify the alternative states to which the system can move.

Let E_i = state i of a stochastic process; (i=1, 2…., m) and p_{ij} = transition probability of moving from state E_i to state E_j in one step. Then one stage state = transition matrix P can be described as given below:

$$P = \begin{array}{c} \\ E1 \\ E2 \\ \\ Em \end{array} \begin{array}{ccc} E1 & E2 & Em \\ \left[\begin{array}{ccc} p11 & p12 & p1m \\ p21 & p22 & \cdots & P2m \\ - & - & - \\ p31 & p32 & \cdots P3m \end{array} \right] \end{array}$$

Each row of the transition matrix represents a one-step transition probability (P) distribution over all states. This means: Pi1+pi2……+pim=1 for all i and 0 pipij

Step 2: n-step transition matrix:

This matrix summarizes the behavior of a system over a period of time. The probability that the system moves from E_i to E_j at time n (i.e., after n steps) in an n-step transition probability is denoted by:

$$P_j^{(n+1)} = \sum_{i=1}^{m} p_i^{(n)} p_{ij} \qquad \boxed{n = 0,1,2……}$$

where p_{ij} is the transition probability of moving from E_i to E_j.

For j=1,,2,…m, this gives a system of m equations that can be written in matrix form as:

$$\begin{pmatrix} P1^{(n+1)} \\ P2^{(n+1)} \\ Pm^{(n+1)} \end{pmatrix} = \begin{pmatrix} p11 & p12...........p1m \\ p21 & p22.........p2m \\ pm1 & pm2.........pmm \end{pmatrix} \begin{pmatrix} p1^{(n)} \\ p2^{(n)} \\ pm^{(n)} \end{pmatrix}$$

i.e., p(n+1)=pp(n) , where p(n+1), p(n) are probability vectors at time n+1 and n respectively, and p is one-state transition matrix.

Step 3: Equilibrium matrix:

As shown below, this matrix summarizes the constant (independent) probabilities at time n when there would be no change in the matrix probabilities due to change in transition probabilities.

p(n+1)=p(n)=p, independent of n.

Findings from Markov Chain Analysis:

In order to be consistent with the number of steps as are discussed in Markov Chain Process , the findings are derived from across three of its steps. They are explained as follows:

1. Current rates of loyalty to e-learning:

The purpose of this step of Markov Chain is to find the attitude/preference of the sample towards traditional learning and e-learning in this university and the same is quantified through survey by using the Questionnaires 1 and 2 as well as the instrument called state transition matrix respectively in zero period (survey period i.e., 2004). Table 2 shows the findings of the study in this regard.

1. Sample from Science and Engineering branches on the whole is more indifferent (>50%) rather than unfavorable to e-learning (column 2-b for all S and E rows), as against 25% of indifference with Arts branches (column 2-b for all A rows). It may be due to the fact that sample from Science and Engineering is perceived to be more

Survey Item (1)		During2004 (2)			State transition matrix * (3)								
		F	I	N	F to F	F to I	F to N	I to F	I to I	I to N	N to F	N to I	N to N
I. % age of people with specific attitudes towards e-learning : Professors	Arts-A	6	70	24	0.9	0.05	0.05	0.05	0.9	0.05	0.05	0.01	0.84
	Scien-S	15	65	20	0.95	0.05	0	0.15	0.75	0.1	0.1	0.3	0.6
	Engg-E	12	72	16	0.95	0.05	0	0.3	0.6	0.1	0	0.2	0.8
Scholars	Arts-A	18	22	60	0.68	0.22	0.01	0.09	0.81	0.1	0	0.08	0.92
	Scien-S	30	50	20	0.68	0.18	0.14	0.08	0.82	0.1	0.1	0.15	0.75
	Engg-E	28	54	18	0.68	0.27	0.05	0.02	0.62	0.18	0.1	0.1	0.8
Students	Arts-A	3	22	75	0.8	0.2	0	0.1	0.77	0.13	0.05	0.15	0.8
	Scien-S	6	42	52	0.8	0.1	0.1	0.16	0.75	0.09	0.01	0.4	0.5
	Engg-E	5	58	37	0.8	0.2	0	0.2	0.2	0.6	0.2	0.3	0.5
		T	J	E	T to T	T to J	T to E	J to T	J to J	J to E	E to T	E to J	E to E
II. % age of information they receive from different sources :Professors	Arts-A	80	15	5	0.9	0.1	0	0.1	0.8	0.1	0.1	0.1	0.8
	Scien-S	75	15	10	0.82	0.08	0.1	0.07	0.78	0.15	0.05	0.07	0.88
	Engg-E	80	10	10	0.5	0.04	0.06	0.1	0.82	0.08	0.08	0.12	0.8
Scholars	Arts-A	20	70	10	0.8	0.15	0.05	0.05	0.85	0.1	0.1	0.1	80
	Scien-S	15	70	15	0.8	0.1	0.1	0.1	0.1	0.8	0.24	0.52	0.24
	Engg-E	10	70	20	0.77	0.08	0.15	0.1	0.75	0.15	0.05	0.1	0.85
Students	Arts-A	96	4	0	0.95	0.05	0	0.2	0.8	0	0	0	0
	Scien-S	93	5	2	0.75	0.15	0	0.2	0.75	0.05	0.15	0.05	0.8
	Engg-E	90	7	3	0.8	0.1	0.1	0.1	0.8	0.1	0	0.1	0.9

Table 2: *Current rates of loyalty and its transition rates*

In survey item I: F=Favorable, I=Indifferent, N=Not favorable.
In survey item II: T=Text books, J=Journals, magazines and news papers,   E=E-learning.
Arts=All MA subjects, including M.Com. and MBA.,   Science=All M.Sc. subjects,
 Engg=All B.Tech and M.Tech subjects. This explanation is same for all the tables to come)
*State transition matrix: Let Ei=state of stochastic process; (i=1,2,…,m)and pij=transition probability of moving from
state Ei to state Ej in one step. Then, each row of the transition matrix represents a one-step transition probability
distribution over all states. This means pi1+pi2+…+pim = 1 for all I and 0 < pij < 1.

open, receptive and cognitive to the new technology in general.

2. The e-learning among the entire sample is in the introductory stage of the product life cycle (e-learning life cycle), which explains that most of the sample is not aware of e-tools and methods. This is due to budget constraints in acquiring e-learning infrastructure, and lack of positive attitude among teachers and employees towards e-learning.

3. In Arts, the professors of Management, Commerce, and Economics are relatively more familiar with e-learning tools and account for 50% of pro-e-learning professors in arts. It is also due to the fact that these faculties are more market-oriented and are subjected to frequent environmental changes that have to be taught in order to be up-to-date. They also use internet to search the websites of dot com companies like Monsterindia.com, Jobstreat.com, Noukri.com etc.,   for the purpose of placements of their students, especially of MBA and MFM students.

4. Analysis of survey item-II shows that most of teachers spend 1-2 hours a week on net, while scholars of engineering and science spend 2-4 hours a week implying that scholars are better exposed to e-learning than faculty. It is due to the fact that many of these teachers are of second generation (appointed during 1970s) who are less interested in e-learning, and as they opined, it is difficult for them to adapt themselves to new technology while the third generation (appointed from 1989 onwards) teachers are relatively better in e-learning.

5. Learning through textbooks is at 90-95% 75-80% and 10-20% (T of column 2 in survey item II) with students, professors, and scholars respectively, while surprisingly, scholars are more positive (18-30%) to doing research through e-tools (T of column 2 in survey item II) when compared to professors and students (3-15%).

6. Students of Engineering, Science, and Arts get only 3%, 2%, and 0% of the required information, while professors get 5%, 10%, and 10%, and scholars get 10%, 15% and 20% respectively from net (E of column 2) showing clearly that the scholars, irrespective of faculty they belong to, are better e-learned.

7. Female professors are less facilitated and alert to e-learning; they feel difficult to visit private internet pubs for surfing as they are pre-occupied with the education of their children, while women's hostel students as well are not permitted to go out even for net surfing after 6-30 pm.

2. Switching rates of loyalty to e-learning:

The basic objective of this stage is to find out the rate at which each of the samples is switching its loyalty from traditional to e-learning and vice versa. This could be of interest to Sri Venkateswara university in specific and University Grants Commission in general to make a hint upon why the sample switches, what are the weaknesses of the present traditional learning system compared to e-learning, and what steps should be taken to improve their preference for e-learning. In this direction, the rates at which the sample switches are calculated right from zero period till the beginning of next 5th year and are shown in column 4 of the Table 3.

Survey Item (1)		At the beginning of * * (4)												
		2nd year			3rd year			4th year			5th year			
		F	I	N	F	I	N	F	I	N	F	I	N	
I. % age of people with specific attitudes towards e-learning : Professors	Arts-A	10.1	65.7	24.2	13.6	62.1	24.4	16.5	58.9	24.5	19.1	59.2	21.2	
	Scien-S	26	55.5	18.5	34.9	48.5	16.7	42.1	43.1	14.9	47.9	38.9	13.2	
	Engg-E	33	47	20	45.5	33.9	20.7	53.3.	26.7	19.9	58.9	22.7	18.6	
Scholars	Arts-A	14.2	26.6	59.2	12.1	29.4	59.5	10.8	31.1	58	10.2	32.3	57.6	
	Scien-S	26.4	49.4	24.2	24.3	48.9	26.8	23.1	48.5	28.4	22.4	22.4	48.7	
	Engg-E	31.6	42.8	25.5	32.6	37.7	29.7	32.7	35.1	32.2	32.2	33.8	33.8	
Students	Arts-A	9.9	29.2	62.9	14	33.9	54.1	17.3	37	47.7	19.9	39.1	42.9	
	Scien-S	16.7	52.9	30.4	24.9	53.5	21.6	30.6	51.3	18.1	34.5	48.7	16.7	
	Engg-E	23	47	30	33.8	41.8	24.4	40.3	39.1	20.6	44.2	37.7	18.1	
		T	J	E	T	J	E	T	J	E	T	J	E	
II. % age of information they receive from different sources :Professors	Arts-A	74	20.5	5.5	69.2	26.4	4.4	65	32	3	60	39	1	
	Scien-S	63.1	18.4	18.5	53.9	20.7	25.4	46.9	22.2	30.9	41.6	23.2	35.2	
	Engg-E	73.8	12.6	13.6	68.8	15	16.2	64.7	17	18.3	61.4	18.6	20	
Scholars	Arts-A	20.5	63.5	16	21.2	58.6	20.2	21.9	55	23.1	22.4	52.4	23.2	
	Scien-S	20.5	59	20.5	24.3	51.3	24.3	27	45.9	27	28.9	42.1	28.9	
	Engg-E	17.7	55.3	27	19.1	45.6	35.3	21	39.3	39.7	22.1	35.1	42.8	
Students	Arts-A	92	8	0	89	11	0	86.9	13.2	0	85	14.9	0	
	Scien-S	71	17.8	11.5	58.5	24.6	16.9	51.3	28	20.6	47.2	29.8	23	
	Engg-E	72.7	14.9	12.4	59.6	20.4	19.9	49.7	24.3	25.9	42.2	27	30.7	

Table 3: *Loyalty switching for the next five years (2005-2010)*

**n-step matrix: If we know the initial state probabilities (n=0), we can compute them at any time successively as :

$$p(n) = P\,p(n-1) = P^n\,p(0)$$

1. It is clear from column 4 of the Table 3, irrespective of the designation the sample switch from their non-favorability to more of indifference and to less of favorability as they are not aware of e-learning tools. It is high time for the university to quickly react to the need for e-learning.

2. Though some have got higher positive attitude towards e-earning at period zero (column 2 of Table 1) there is a declining trend in it due to higher rate of transition towards indifference (column 3 of Table 2) especially among students and scholars as there is no proper evidence of substantial service in terms of people (professors, laboratory assistants, and students are not trained to e-learning), process (the flow of e-learning activities are not neither standardized nor customized, and the involvement of e-learning customers is at its very early stage), and physical evidence (hardware, software, WAN, and internet are not fully acquired).

3. Due to non-availability of e-tools at their disposal, Arts students and scholars are continuing their loyalty to traditional learning tools like text books, journals, and magazines instead of switching their loyalty towards to e-learning tools.

4. Most of the sample switches its loyalty at a moderately high rate rather from unfavorable attitude to indifference (column 4) to favorability than from favorability to indifference to non-favorability. It is expressed by the sample belonging to Science, Engineering, and Arts in that order. It is perhaps due to higher levels of negative attitude that the sample has got towards e-learning.

5. The favorability of the professors and students did increase in the five successive years after zero period while it decreased with research scholars. It is due to the fact that the that the former was more of indifferent moving towards less of favorability, a situation which is just contrary in the case of professors and students (column 4 for all rows of A, S, and E in survey item I).

6. Indifference of arts sample to e-learning increased along with consistent increase in favorability during the 2005-2010 with scholars and students when it decreased with professors along with increase in favorability (column 4 for all rows of A in survey item I)

7. Non-favorability has been at its downtrend although 2005-2010 with the whole sample irrespective of faculty and designation (column 4 for all A, S, and E in survey item 1)

8. Preference for textbooks had slowly reduced with all categories of the sample (row T of column 4 for A, S, and E in survey item II)), while in the case of journals and e-learning it had increased with an decelerating and accelerating rates respectively (row J, and E of column 4 for all A, S, and E in survey item II).

3. Equilibrium state of loyalty to e-learning:

The basic objective of calculating column 5 of Table 4 is to measure the number of years it will take to reach equilibrium state of loyalty after which there will not be any change from the then loyalty status to either traditional or e-learning. This shows stability of the sample in their attitude towards e-learning, showing explicitly that nothing can improve or deteriorate upon it.

1. The dependence on e-learning would be in the ascending order with Arts, Engineering, and Science at this state, showing that the sample from Science is more e-pro, while Arts is less 'e-pro' or sometimes 'e-against'. It is also found to our surprise that Arts students, with an exception of MBAs and MFMs who appear for online exams of National Stock Exchange and search for websites of job dot coms, may not use internet at all even at this state (column 5 of Survey item II of students).

2. It is noteworthy to find that the loyalty towards e-learning could not exceed 56% with any category of the sample showing the overriding importance of traditional methods and tools of teaching and learning.

3. In no category of Arts the equilibrium state is not reached in >20 years , while it is relatively longer with Science and Engineering (20-31years) due to the fact that their transition rates (column 5) are more towards indifference and less towards non-favorability. To note, that the Arts students have come to equilibrium within a short span of 7 years to say 'no' to e-learning.

4. Contrary to the zero-period situation, the indifference and non-favorability have been transformed into favorability during this period. This is due to the attitudinal changes in the sample and the organizational efforts to diffuse the concept of e-learning across the campus.

5. It is noteworthy to mention that there is no much change both in attitude towards e-learning and amount of e-information the professors get, with an exception of Science faculty.It is perfectly due to higher indifference/negativism towards e-learning that existed

Survey Item (1)		During 2004 (2)			Steady-state at the beginning of * * * (5)			
		F	I	N	th Ye ar	F	I	N
I. % age of people with specific attitudes towards e-learning : Professors	Arts-A	6	70	24	15	31	44	25
	Scien-S	15	65	20	27	73	21	6
	Engg-E	12	72	16	14	76	15	9
Scholars	Arts-A	18	22	60	8	10	34	56
	Scien-S	30	50	20	10	22	48	30
	Engg-E	28	54	18	9	32	32	36
Students	Arts-A	3	22	75	13	28	43	29
	Scien-S	6	42	52	10	41	43	16
	Engg-E	5	58	37	11	50	36	14
		T	J	E		T	J	E
II. % age of information they receive from different sources :Professors	Arts-A	80	15	5	24	50	33	17
	Scien-S	75	15	10	23	24	25	51
	Engg-E	80	10	10	25	48	27	25
Scholars	Arts-A	20	70	10	20	26	45	29
	Scien-S	15	70	15	19	33	34	33
	Engg-E	10	70	20	20	23	27	50
Students	Arts-A	96	4	0	7	82	18	0
	Scien-S	93	5	2	18	41	31	28
	Engg-E	90	7	3	31	17	33	50

Table 4: *Loyalty switching for the next five years (2005-2010)*

***Steady-state (Equilibrium) matrix: When n becomes very large each P_{ij} tends to fixed limits and each state probability vector p (n) approaches a constant (equilibrium) value, i.e., $p(n+1) = p(n) = p$, independent of n.4

during the zero period.

6. The total sample has moved from non-favorability to more of indifference and favorability to e-learning after two decades of transition process. This duration can be minimized if the university is wise and fast enough to implement pro-e-learning policies and programs.

Strategies to be adopted:

1. There is an imminent need for converting this conventional university into a virtual university in order to reconfigure the triangle of challenges - lower costs, greater access, and higher quality, by increased T to all

bandwidth, number of computers made available for longer hours. At present the university is planning to establish the net facility through TATA owned VSNL's Internet Service Provider DISHNET to all departments with LAN within a year or so.

2. Nilay Yajnik (2003) suggested the use of internet based computer technologies such as the Next Generation and Natural Language Interface have to be widely used in e-learning.

3. In the production of content, as Kageni Njagi, Ron Smith, & Clint Isbell. (2003) felt that universities do not have to produce all the lectures and seminars locally. They can impart the best material in the form of e-text books, CD-ROMs and other off-line material and live lectures and discussions (Shelly, Cashman, Gunter, & Gunter, 1999) through the networks from professors elsewhere through the 3-phase process of planning, design and development, and review/testing of content. However, there is evidence (Binod & Suri, 2005) that professional training via CD-ROMs flopped because instructors and coaches were out of the picture.

4. In distributing the content to customers, off-line or net can be used at many qualities and cost levels. It can be still video or low quality video based on ISDN either synchronously or asynchronously.

5. Natarajan (2002) has prescribed that the collaborations in distance education with networking companies are very much needed in order to facilitate content development, packaging and specifically in distributing the same to e-customers.

6. Home page has to be created (right now it has www.svu.ac.nic.in as its preliminary form of intranet), wherein online syllabi, discussion forums and chat sessions with improved bandwidth for higher performance for sound, video, and graphics are to be accessed.
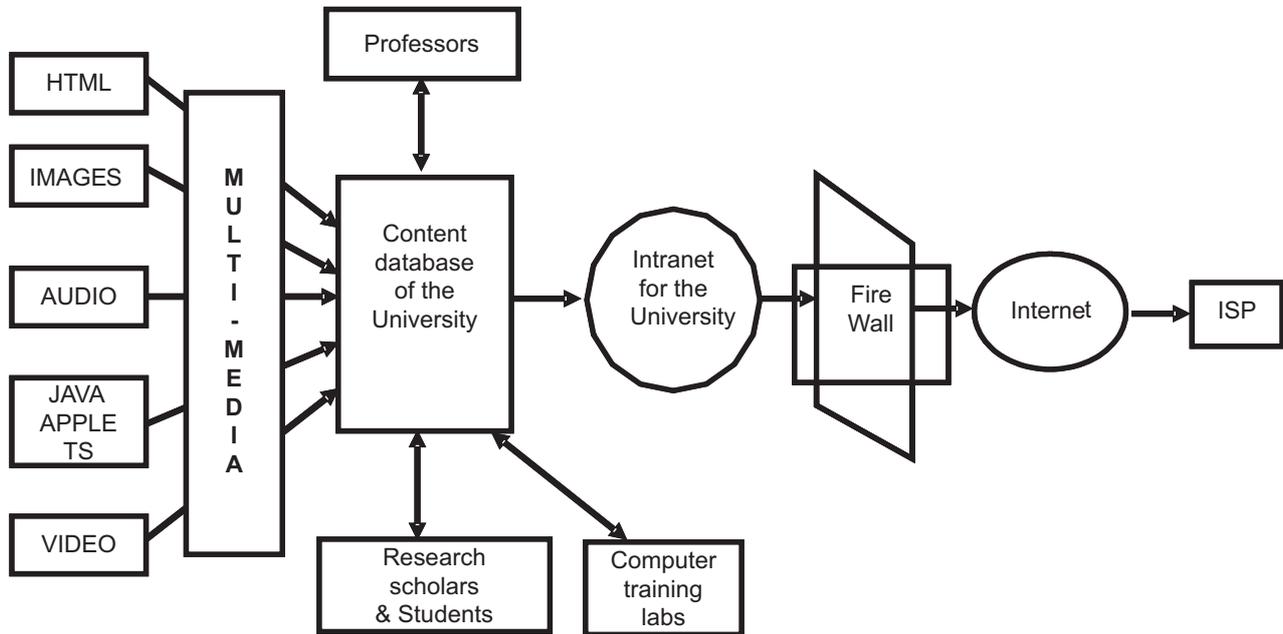
Figure 1: *Proposed system's implementation structure for Sri Venkateswara University, Tirupati*

7. The class rooms, all offices--academic and administration, science labs, and computer training centers should be connected through intranet. Figure 1 shows an integrated form of system implementation structure with multimedia content database scheme. The intranet is connected to the internet by using network operating system. Firewall is introduced between intranet and internet in order to provide security against intruders into databases.

8. Philip Kotler (2004) emphasized that there is sheer need for appointing a marketing officer in the university who, as a part of his job, has to design, price, distribute, and promote (external marketing) the e-learning to its customers (students). He has to train and motivate its employees especially professors, computer lab assistants (internal marketing) to serve the customers well. He should see that the university employees should have skill in serving (interactive marketing) their customers through e-learning. As stated by Everett M. Rogers (1962), the rate of diffusion and adoption of new technology among early adopters is far more than the late adopters and laggards

(Kotler, Philip.2004:467-70). So, the university is required to provide the basic e-learning tools such as internet connection, CDs, training in internet and also to extend incentives and rewards to the professors of innovator, and early adopter type during the introduction stage of e-learning life cycle so as to pull the early and late adopters into growth stage and maturity stages (whereby steady-state matrix comes into picture) of the e-learning life cycle and then to supply them with advanced versions of e-learning tools and desktop video conferencing in their class room teaching. E-learning would become a tradition by itself when laggard type of customers adopt e-learning only after its steady-state matrix period.

9. Offering of distance education by the university's Directorate of Distance Education (DDE) has to be made compulsory besides regular courses. It should follow path of the premier institutes of India, such as IIMs, IITs that have already offered post-graduation courses, and even Ph.D., through its virtual university in the form of distance education, for which there is a great need for appointing an exclusive marketing manager to look after to sustain

and satisfy the student customers.

References:

Binod, S. & Suri, G. (2005). Getting it right with e-learning. Indian Management, January 2005, pp. 60-66.

Christensen, R. (1997). Teachers' view of technology and teaching   www.tcet.unt.edu/research/index.htm.

Deodhar, Satish. (2003). Managing trade in educational services: Issues for India's response in WTO negotiations. www.iimahd.ernet.in/~satish/wtoedu.pdf

Kotler, Philip. (2004). Marketing management Analysis, planning, implementation, and control.   New Delhi: Prentice Hall of India. Ibid, p.464-470.

Njagi, Kageni. Smith, Ron. & Isbell, Clint. (2003).

Assessing students' attitudes toward web-based learning resources.

Natarajan, R. (2002). The promise and prospects of e-learning in India.

www.naweb.unb.ca/proceedings/2003/paiternjagiisbell.html

Nilay Yajnik (2003). E-Learning Technologies for Rural India.

www.naweb.unb.ca/proceedings/2003/posternjagilsbell.html.

Norris (?). Teachers & Technology: A snap-shot survey. www.tcet.unt.edu/research/index.htm.

Swaroop, Kanti. Gupta,P.K. & Mohan, Man. (2004). Operations Research. New Delhi: Sultan Chand & Sons

Publications.

Abbreviations used:

1. WTO

World Trade Organization.

2. GATS

General Agreement on Trade in Services.

3. ERASMUS

European Action Scheme for the Mobility of University Students.

4. UMAP

University Mobility in Asia and the Pacific.

5. IAM

International Academic Mobility.

6. UMIOR

University Mobility in Indian Ocean Region.

7. CAVI

Computer Aided Video Instruction.

8. ICFAI

Institute of Chartered Financial Analysts of India.

9. ISP

Internet Service Provider.

10. ISDN

Integrated Services Digital Network.

11. NAAC

National Assessment and Accreditation Council.