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Low-cost Multimedia Technology and Education- An Indian Perspective

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1. Introduction

The last decade of the 20th Century, has been described as the *Decade of Multimedia*. It has been often predicted that though the economic affordability of necessary development and dissimination technologies, there would be a world-wide shortage of contents. The forecasters predicted that once the novelties of utilaterian multimedia contents in the form of encyclopedia and interactive training materials -- still the mainstays of CD-ROM based interactive (in contrast to midi music and video clips) multimedia contents -- wear off, the focus would naturally drift to more aesthetically desireable Art and Cultural Heritage topics.

Production of attractive multimedia contents on Art and Cultural Heritage Topics demands large and organised human effort. It had often been argued in the past, that once the underlying technology is mastered, the geographical focaii of Multimedia Global Content development would shift Eastward. The predictioons indicated that due to rich cultural heritage, lower salary, and with world's largest and thriving film industry, South Asian Countries, and specifically India, would become the natural producers of multimedia contents in a large and organised scale comparable to its present Printing or Film Industries.

To the utter discomfort of such futurologists, it does not seem to have happened as yet! However, it is not simply a case of few futurologists losing face, the economic benefits ushered in by a sizable multimedia industry in a developing countries, like India, would have highly been desirable from generated employment and earnings both in the formal and informal sectors.

2. Present Perspective

In case of India, it is not that nothing at all had been achieved. The number of multimedia CD-ROM's generated indegeneously now stands close to 50. In variety, the contents cover classical and contemporary paintings, religious discourses, yoga, classical dance, and technical training. The quality varies widely - starting from high quality materials developed by IGNCA using high-end production equipments, to the acceptable threshold level products by different Public and Private Sector Organisations. Apart from the education and training sector, the target market had been the *culture and leisure* segment, sometimes unkindly labelled as the "multimedia enriched substitute for *coffe-table* pictorial books". Some of the products have been specifically targetted for similar objectives for the richer export market.

Despite the encouraging start, the total business volume as well as the generated employment are meagre. No "killer product" idea has so far emerged. Neither it has been possible to attract International Corporations to turn to India (or any other SEARC country for that matter) as the production base. Some early spontaneous experiments of joint production of contents had already withered away.

3. Reasons for Tardy Growth of Indian Multimedia Content Industry

Various reasons have been cited for the weak and feeble performance of the Indian multimedia content industry. These include lack of expected export order, lack of domestic market, lack of feel and sensitivities towards the special needs of the (export) market, lack of indegenous content corpus and, finally, lack of skilled/experienced manpower.

Before going into the details of such arguments, we group these reasons into two factors (for inadequate growth in multimedia contents industry); namely: (i) Loss of momentum in the growth of Global Market for the interactive multimedia contents, and (ii) Absence of mass market for indegeneous multimedia products; resulting into the inevitable slack in gathering of critical take-off momentum.

4. The Global Market Trend

The current and the past year has seen a lot of shake-out, mergers, and closures in the multimedia content creation industry[1]. Poor growth in demand has been cited as the main reason for such a state. The situation is so grim that not only content creators, but service companies for replicating CD-ROM's have also closed in hoards. The poor growth rate has been variously attributed to, inter alia, insufficiency of interesting contents, premature hypes leading to resultant frustration with the user-interactivity/self-exploration, un-reliability of CDROM's, and finally, the competition from other well-established conventional alternatives like the piped entertainment from satellite and cable broadcasting networks, or the interactive navigational experience of the Internet web-browsing. It appears that users are not really ready to live with the poor technical quality of audio, still-images, and full-motion videos, various guises of technical in-conveniences super-imposed on the un-avoidable extra costs for the PC as the delivery equipment to experience these so-desirable user interactivity/self-exploration.

Being Global in nature, one may expect that technological innovations would be forthcoming as effective remedies to alleviate the user dissatisfaction in the near future. For example, cost of DVD-in-PC devices are expected to reduce substantially in next two to three years, which would allow near-bradcast quality full motion video in a semi-interactive mode. The first such interactive movie had been released in the first week of August 1998 in the USA. Cable and satellite TV receivers are expected to be integrated with more reliable and low cost add-on cards. Internet connectivity, of course, would become much more pervasive by becoming more user-friendly and cost effective

Strategy Analytics, a planning support company in US, is forecasting that assuming that the technological innovations would stabilse, the multimedia software (content) market is to nearly double between 1998 and 2005, reaching nearly $15 billion. In absolute terms, the market remains sizable but its growth rate is stinted in comparison with the past performance. For example, between 1992 and 1993, worldwide CD-ROM (multimedia) unit sales of institutional and consumer titles jumped nearly 200 percent, to 35.2 million units, according to InfoTech, a Woodstock, Vt.,U.S.-based consulting firm.As late as 1994, growth in sales accelerated to 334 percent and 152 million units over 1993. Sales in 1995 tapered off a bit but were still a hardy 166 percent over 1994. [2]

From the perspective of India, the absolute market volume of $15 billion should have been optimistic but for the following reasons:-

- A considerable portion of this market is expected to be in Asia, due its poor web support.[2]. It is not difficult to imagine that it would include DVD versions of Holywood hits and *Kung-Fu* movies for which India is not likely to become a content producer.
- The volume includes games, a highly culture dependent commodity and for which there is not enough experience, adequate marketing expertise, and financial muscles in India for such risky products.
- As the experience of surviving multimedia content producer indicates, a substantial portion of the revenue would come from the commissioned titles rather than shelf titles [1]. The commissioned

titles would include technical training manuals and publicity material. Securing orders for such commissioned titles requires marketing skills and demonstrable previous expertise - both being difficult for an Indian Company. This point is further discussed along with the content type "technical training material" in a subsequent section.

5. The Non-existing Local Market

Lack of domestic demand is due primarily to lack of the availability of the delivery platforms (i.e. PC), and secondarily, due to absence of killer application along with the general absence of interesting contents.

Let us probe the affordability issue little bit more closely. After all a multimedia computer today is costlier than a scooter ; the usefulness of the latter is obvious while that of the former is not. Having said this we must note that despite the cost , a 50cm color television (though much less than a good multimedia enabled PC) is a taken-for-granted necessity in middle class homes. The viewership survey indicates the popularity of music, film and discovery channels. This indicates that there are enough people in the country who are ready to invest money and time for education and entertainment through electronic media. So it is not perhaps the affordability barrier alone; it is the "value for money" which could be the real stumbling block.

The high life-cycle (read, rapid obsolescence) ownership cost coupled with limited audio and video quality are simply no match for the promised interactivity. Multimedia computers as a commodity unfortunately, is still a curiosity item with a stiff price elasticity. However, people with multimedia computers at home generally opt for some token presence of interactive multimedia contents - of the games and encyclopaedia kind. "Made in India" multimedia titles in an indian homes is still a rarity.

The requirements for training material for defence and civilian equipments (primarily in the aviation sector), however, are on the rise.

Unfortunately, like any other venture, for the multimedia content creation, the supply and the demand sides are mutually dependent and for the Indian multimedia content creation industry, are presently in a near deadlock "chicken-egg" situation.

6. Is Educational Software the Gateway?

Some analysts have suggested that for educational software production, multimedia is the natural choice, and this can be an area where Indian initative could easily make a dent in the Global Market. Though on the surface this appears to be quite a possibility, there are several issues that demand a closer scrutiny. The first issue relates to the scope of the word education; While the second relates to close symbiosis of the multimedia learning paradigm with the subject content. Without going into a detailed analysis of learning modes and requirements, the following general analysis may be considered.

Within the framework of University Education, a multimedia CBT is just another reference material. Becuase the preliminaries of a subject are expected to be introduced within the class room, the role of multimedia is at best expository adjunct rather than an essential vehicle to the already established CBT encouraging self-exploration through the hypertext and other interactive format. The requirement for the supplimentary materials is yet un-structured and the market is unsure and immature. The requirement for this class of content arises only after the material is available. It is a natural consequence that such material would be developed within or in close proximity to the Universities themeselves. It is not unlikely that a few, widely appreciated material of this type would be originating from Indian Universities but this would not naturally lead to a economically vibrant multimedia industry.

On the other hand, in the so called K12 level (from kindergarten to standard 12), requirement for multimedia educational material is non-trivial. Here the perceived benefit is that the students can

supplement their intra-mural learning with materials which bring them experience with real life situations by which they would be able to better understand the text book and class room education. By the nature of these requirements, besides for Physical Science, the contents should be very much culture dependent (even for Earth Science and Life Science reference materials in school level appear to be dependent on local conditions and environment). As schools of developing countries can hardly afford multimedia platforms in requisite numbers, the market exists only in the developed countries. Being cultuarlly dependent, it is difficult for a non-resident developer (say, from India) to develop school level educational multimedia content for North America. In any case, a school children there, would expect the course material to be at least as interesting as game software - perhaps, a tall order!!

Multimedia as a tool for enhancement of practical training related to machines and systems, however, has no viable competetion. Development of this kind of content requires intimate knowledge about the machine or system. For many cases, the information content is of proprietory or confidential nature. All these lead to the requirement that the developer and the client should be in close technical contact.Though the aesthetic quality requirement is not so great, the subject-skill requirement is considerable. Yet this is one area where there remains some untapped prospect for the indian industry.

Threr is still another sector - Informal and post literacy education which we would discuss specifically in the Indian context in a subsequent section.

7. Indian Agenda

Only a handful of Indian Organisation has world-class capability for multimedia content creation. The motivation to upgrade the skill or widen the skill base is not so strong due to lack of market, be it domestic or export. So one could passively wait till the demand side improves. Such "wait for the market to warm up" has been a stock strategy of the larger corporations in the case of emerging sectors and some have played it quite coolly for profit at a later date. However, such passive "wait and see" policy cannot work at the National Level where a more pro-active initiative is necessary. Due to passivity, quite a few opportunities have overtaken the country. If and when the demand side improves globaly, India may not be able to stake its due claim due to sheer un-preparedness.

Being pro-active requires active persuit of the exsiting opportunities in the training and higher education sectors, and upgradation of the associated skills both in level and extent, so as to make India an attractive destination as a content development centre.

While the agile Indian Software Industry is expected to gear up for global tie-ups for catering to the focussed technical training contents sector (some already have) , they are not be expected to make long term investments for the required human resource development. Like in the case of Year2000 software problem or ERP, the private sector training establishments will like to charge a very steep fees for multimedia skill development courses. Due to high fees, lack of able faculties, and non-availability of post-training employment, such courses are not yet very popular, are offered in only a few centres,and are often under-subscribed.

In the above prevailing circumstances, the Department of Electronics (DOE) has initiated a novel scheme to promote low cost multimedia content creation in the country. The scheme, described below, envisages to make available adequate skilled technicians who are expected to operate as entepreneurs for developing low cost multimedia contents predominantly for the Indian market. As most studio quality audio and video equipment are gradually adopting digial recording and editing technologies, the skills applicable for the low cost multimedia content creation may be more easily upgraded to those required for high end. multimedia.

8. Department orf Electronics (DoE) Initiated Programme for Low-Cost Multimedia Content Creation

As a part of India's National Information Infrastructure (NII) Action Plan of "Multimedia Promotion Programme" [Annexure-I], DoE had initiated a 3-year Project [6] (covering (i) focused and standardised training programme with stress towards sufficiency in on-hand supervised creation experience, (ii) entrepreneurship development and nurturing, and (iii) steady supply of re-usable multimedia components /Templates/ Clip-arts of Indian motiffs and heritage, etc.) with 3 first-tier and many second-tier participating institutions, to bring about a country-wide new vocation of low-cost multimedia content creation with following characteristics:

- The necessary development infrastructure will be of low-cost (essentially based on common multimedia PC with a total up-front investment towards necessary equipments of around 2-3 Lakhs per developmental seat).
- In contrast to the presently-prevalant product-oriented mode of multimedia content creation, the forthcoming vocation will pre-dominantly function in the "service-oriented" or commissioned fashion, catering to the respective local needs.
- The multimedia content creators will be expected to be functioning as entrepreneurs singly or running his own Small and Medeium Enterprise (SME).

Some of the possible content creation assignments for these trained creator/entrepreneurs could be:

(a) Creation of Multimedia Albums covering Family functions/Events.

(b) Creation of Multimedia Albums covering Local Community functions/Events.

(c) Multimedia Presentation or Brochure for small or mediaum Companies/Organisations.

(d) Multimedia Illustration of Popular Books/Literature.

(e) Tutorial education through multimedia-based Multiple Choice questions (MCQ).

(f) Computer Based Training/educations.

(g) Electronic Documentation of Product / Service manuals or local Handicrafts.

(h) Virtual Reality walk-throughs of Local Monuments/Museums/Place of Tourism Interests.

Main motivation of the above programme is employment generation of the lasting kind. Hence, any of the trained entrant may look for and/or specialise any/all of the above basket-full of possible applications in and around their physical location. It is expected that part of the trained computer software manpower will adopt this new vocation and act as a messiah to convince public at large to adopt this new media of mass communication; and at the end of the Project duration of three years, there will be SMEs of trained multimedia content cretors in almost all the shopping centres of all the cities and towns in the country. Fierce commercial competetion is expected to ensure craetivity, up-to-dateness in knowledge and skills of these content creators; and, hence, they then may be expected to supply quality manpower to meet the various needs of the multimedia content creation industries.

9. Why the existing initiative alone is not adequate

The initiatives undertaken by the DOE, primarily focusses on alleviation of the shortage of skilled manpower, a major supply side constraints. The scheme however assumes that market forces of avilability would generate the demand as it has been so in many a cases (say, for example, in the case of VCR). On a closer look such optimism in this particular case of multimedia content creation may not be

fully justified for the following reasons:

- In intermediate time-frame, the platform for multimedia viewing is likely to stay as cumbersome, costly,and, therefore, of limited availabilty and popularity.
- The additional benefits of interactivity may not be an attractive incentive for the higher cost for the mass market like social event archive.

In short, the Global constraints would be applicable in the local situation as well, possibly to a more dwarfing extent and the required market growth may not really materialise.

Thus, in a way, the DOE's initiative described above takes care of only some of the supply side constraints and, therefore, is not likely to break the "poordemand -poor supply-poor skill" vicious circle. The initiative must be augmented by measures for wider availabilty of interactive multimedia platforms and utilisation of interactive multimedia as a vehicle for post literacy and general informal education. A scheme on the above theme, called *Integrating Development with Multimedia* is, therefore, being suggested in the subsequent sections which may meet the other major objectives (besides Employment Generation] of the above project under the "Multimedia Promotion Programme" [Annexure-I] of the NII Action Plan.

10. Integrating Development with Multimedia

10.1 Overview

Long term development of a country like India is strongly linked with the literacy and education level of the population. Apart from the Formal Education Sector, there is need for Post Literacy and Social Education in various topics in Health , Culture, Agriculture, Agro-economics, Fishery Development, Horticulture, Ecology, use of Farm Machinaries and Pesticides, Solar Energy utilisation , Bio-gas plants and likes. The dissemination of information and education in these topics are presently done primarily through print or video (Television or Video Tape) media. The achieved impact of these dissemination process so far has been limited. It is possible to give the interactive multimedia a chance in this direction. To overcome the resistance of common people to use computers, they would be exposed to video show as an overview. The video shows may have enriched content to cover also short features like local Handicrafts, Village Fairs, Inauguration of new facilities, old temples and mosques, archeological finds, local sports events, festivals, tourist attractions, achivements of underpriviledged - handicapped people, Local personna - respected school teachers, Local dance or drama performence etc.

The video would urge the viwers to obtain more detailed information from interactive multimedia, at their leisure hours. The video shows may be organised in local schools or public libraries, wherever there is a space for twenty people, a T.V and electricity. Mobile publicity vans are available in a few states and these may be utilised for such **pilot shows**. The benefit of such pilot shows would far outweigh the cost and there would be scope for commercial or specific ministry level sponsorship.

Detailed informations regarding the mentioned topics in the pilot shows would be available in multimedia information kiosks located at district headquarters and selected sub-divisions. Such information kiosks would be integrated with District Science Centres (where exists), District Public Libraries or better Schools and use the existing infrastructure of building, etc. Each such centre would also have a video screening facility for regularly screening the pilot shows. The interactive multimedia systems would be operated by school- teacher, librarian or senior student volunteers. Each centre would periodicaly receive updated contents in CDROM or DVD's from the state head quarters. In some cases (like weekly updates on news items) re-writable high volume media (like DVD-RAM?) may also be used. At any point of time a centre would have about 10 titles in stock.

The state level headquarters would receive materials from the National Centres and adapt it for local

languages. Develop some material for own state and for other states (which would be distributed through the National Centres). The State Centres would be interconnected with the National Centres through Data Communication Infrastructure (e.g. Internet, NICNET, ISDN) so that updating process would be quick.

The State Centres, apart from receiving materials from commissioned local producers, would receive feed-ins from District Level Ameatures and professional Freelance Videographers (VHS), Photographers and Correspondents. Which would be integrated at their digital processing studio. Production templates would be used for quick production.

As a future plan, District Centres may be networked using (existing NIC or Health service) VSATs, Electricity Boards' carrier communication lines, Railway communication Network or dial-up lines, for distribution and updation of contents

10.2 Costs and direct benefits

Each centre would require a capital grant of about six lakhs (well within the unassigned grant of an MP) every five years (i.e. before LS election), and an annual recurring grant of around 1.5 lakhs to cover maintenance and part time staff.

Each such centres would be able to serve about 7,000 interactive vistors (1 hour duration) and about 19,000 non-interactive visitors per year. The annualised cost is less than Rs 40/- per interactive visitor and Rs 10 considering all visitors. The above costing does not include costs of content production and costs of setting up the state and national facilities. Innovative utilisation of existing facilities would cutdown these costs further.

We may expect that each district would contribute to about one CD-ROM full of (unedited) multimedia contents every year to the State level archive. The State Level Centres would contribute about three CD-ROM full of edited interactive multimedia contents every year to the National Archive and about twenty updates of interactive and non-interactive multimedia contents to District Centres per month.

Availabilty of interactive content of local relevance on CD-ROM would attract new talents and sensitise them on scripting, subject selection,etc.

Local people with sufficient means may, therefore, be attracted to own multimedia contents as archival of family ceremonies and memoirs, because they may be viewed at the centre. The more wealthy citizens may plan to own Multimedia Platforms if the price and the benefits become effective.

Apart from exhibiting local event and development realated low-cost contents, the district centres would also exhibit good quality encyclopaedic and national culture and heritage related contents. Feed of low cost multimedia from the remote district would provide ideas to produce better quality features realting to countries diverse culture.Thus, it would complement the national (e.g. IGNCA) and private (e.g. Suravi programme on DD) effort of archiving heritage materials.

It would, thus, be a logical extension to the DOE multimedia initiative by providing involvements of talents and avialabilty of outlets for indegeneous multimedia contents. This would give a positive boost to the indian multimedia industry by widening the local market, by providing a larger skill-pool, and, finally, large repositories of multimedia objects and ideas.

As additional benefits, networked district level centres may also be used for educational network nodes for advanced and gifted children. Email and e-fax service for NGO's, schools and other fund strapped social institutions. The facilities are likely to catalise more demands for books and other printed literature from the libraries and lead to better and more meaningful utilisation. There is also a not too remote

possibility of widening of the neo-literate printed literature.

10.3 Some Concerns

While the authors are convinced about the technical and economic feasibility of the project, a few doubts remain and should be exposed. The doubts encompass technical as well as administrative aspects.

Whether we would be able to agree on a country-wide effective standard for representing various languages for conversion across all indian languages. Any incompatibility would lead to loss of productivity and delay. We should also quickly develop tools for multi-language support as we cannot rely totally on foreign MNC's (e.g. Microsoft, Adobe, MacroMedia, etc.) to do it for us for ever.

The same anxiety of incompatibility is applicable to templates - too many varieties and comvenstions in content template may agin create bottlenecks.

Getting good content feed from remote locations will not be easy. Local teachers and subject specialists and news paper correspondents need to be sensitised and motivated towards authoring low-cost multimedia contents of adequate quality . This calls for local motivators with good intentions - always a scarce commodity.

A few years back, hardware support would have been the topmost concern. While the problem may not be acute in more industrialised states with good communication, such problems may persist in the far north and the north-east.

In our country, any mode of mass communication usually faces various degrees of overt and covert pressures from political sources. Political Cornering of this proposed channel of social education may cause untimely demise of the golden goose.

The greatest danger to the scheme is lack of motivation of the local operators, be it Government Officials, Elected Representatives, or NGO volunteers. Station keepers with poor service motivation are known to have driven-away the beneficiaries, let the infrastructure collapse and force the society to continue paying the recurring costs with no apparent benefit.

11. Concluding Comments

The low-cost multimedia development can really enhance the permeation of multimedia to the people level. Its technology is ready, and the infrastructure for training technicians and producers is being set up.

Introduction of multimedia in informal public education and integrating the scheme with Government Information dissemination and social service scheme is not only a cost effective and educationally sound procedure, it would generate internal demands and bring out new talents and, thereby, kick start the local multimedia production capability.

The need is there, the technology is there, the economics is favourable; but do we have the political will, social commitment and the administrative skill ?

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Annexure-I

Multimedia Promotion Programme of NII:

The programme envisages a series of pre-commercial application development and promotional projects of multimedia technology leading to creation of "knowledge workers" & enterpreneurship development, and productivity improvement in rural areas. These include:

A. Entepreneurship Development through re-usable multi-media content repositories, resources and training as facilitator to multi-media content production industry.

B. Rural & Social applications.

1. Multimedia for social welfare programme - family welfare, sanitation, low-cost housing, environment protection, etc.

2. Multimedia contents capsules for education, health and agriculture: Value-addition to information available on Internet.

3. Multimedia for productivity improvement in rural areas:

i) Enhancement of skills, technologies & training of Artisan.

ii) Energy uses including biogas, non-conventional energy.

iii)Agricultural products & produces improvement technologies.

iv) Low-cost technology dissemination & diffusion relevant for area-specific applications.

v) Animal productivity improvement technologies.

vi) Diary, horticulture, poultry etc. industry - entrepreneurship development programme.

Under the Multimedia Promotion Programme, such new programmes would be conceptualised with the relevant Govt. department/Ministry, and industry would be encouraged and supported to develop and implement. NII will be used as 'carrier' for national-wide dissemination for socio-economic development.