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An Assessment of the “Diploma in Computer Engineering” Course in the Technical Education System in Nepal

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Abstract

The purpose of this study was to assess the Diploma in Computer Engineering (DCE) courses offered at affiliated schools of the Council for Technical Education and Vocational Training (CTEVT) with a focus on the goals of the curriculum and employment opportunities. Document analysis, questionnaires, focus group discussions and semi-structured interviews were conducted to gather the data. This study analyzed and described current issues and future policy strategies associated with employment opportunities of graduates. The study indicates that there is potentiality for job opportunities in foreign and domestic markets, especially for DCE graduates. The study also reveals that a remarkable number of graduates are self employed. Based on the findings of the study, the government of Nepal can play a vital role through the CTEVT to improve the employability of DCE graduates by the monitoring and supervision of institutions, fulfillment of standards requirements of programs, curriculum amendment, and marketing DCE programs.

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Background

It is believed that education has a fundamental role to play in personal and social development to reduce poverty, exclusion, ignorance, oppression and war (Delors, 1998). The biggest and most important resource for the economic development of any country is its human resources. With this function, technical education and vocational training has the power to influence the industrial and economic growth of the country. Most of the developed countries give emphasis to human resource development through technical and vocational education at the secondary and higher level within their education system. But in a country like Nepal, where not only 46% of the population is illiterate, but those who are “literate” do not possess the technical skills required to run a modern day efficient economy. Poverty and the inability to earn or produce enough to support oneself or a family are major reasons behind the movement of work seekers from one place to another (Bhattarai, 2005). The study has shown that though there is a sizeable mass of unemployed and underemployed technical education and vocational training (TEVT) graduates, at the same time many sectors of the country are facing a critical shortage of trained manpower. What this indicates is a lack of labor market information to inform the decision making process both among governmental and other stakeholders (KC, 2008). Assessment of employment and labor market contributions in Nepal is difficult because self-employment is common and casual wageworkers are numerous. Even the most basic data on employment and the labor force are either lacking or unreliable (Joshi, 2007).

The struggle of Nepali industry to participate in the international market has substantially increased the importance of technical education and vocational training. It is of vital

importance for the Nepali economy to train the workforce that will keep up with the current developments, has professional skills and knows the business world well. This trained workforce will help Nepal to follow up the technology which is rapidly-renewed and constantly-developing parallel to the developments in science and technology. It will also enable the Nepali economy to compete with the developing countries in the international market.

According to the Technical Education and Vocational Training Council Act, 1989 (amended in 1993 and 2006), the Council for Technical Education and Vocational Training (CTEVT) is established as an apex body for the purpose of formulating technical education and vocational training (TEVT) policies, coordinating programs, developing, expanding and ensuring quality of TEVT in Nepal. It has the mandate of regulating and upgrading the standard of technical education and vocational training, maintaining coordination among different agencies imparting such training and determining and certifying the standard of skills. Technical Schools under CTEVT intends to improve employment potential of unemployed youths and link the education and employment system. In order to bring these assumptions to reality, it has been realized that there has to be strong linkage between technical schools/institutions and the labor market (Sharma, 1999). The CTEVT has been granting affiliations to more than 250 institutions offering various courses in Technical School Leaving Certificate (TSLC), Diploma/Certificate, and vocational trainings.

The growth of information and communication technologies has significantly influenced the socio-economic progress of several countries. Besides developed countries, developing countries are also taking advantage of emerging technologies to improve their management system, trade and commerce, education, training and extension services. There is

no doubt these technologies are rapidly removing the traditional barriers of distance that until now hindered transfer of information, skills, learning resources and expertise from one place to another. Nepal cannot afford to be an exception. Many institutions in Nepal are emerging in this field and offering short term to advanced higher level courses. Diploma in Computer Engineering (DCE) courses in CTEVT affiliated institutions started in 2001. It is obvious that there is a big demand for computer and information technology professionals and skilled human resources in Nepal. The increasing craze on the computer and information technology sector of Nepal is attracting young adults. Attractive income and boundless opportunity is the main reason that youngsters are running after computer and information technology courses. No single study measuring the volume and depth of employment possibilities has been conducted yet to explore the overall dynamics of employment. Computer courses with information technology are still in primary stages of development in Nepal. Only 37% (CBS, 2004) of the people have access to electricity. In this context, wide use of computers and their access to rural people might take several years. There are many courses related to computer and information technology offered by different institutions in Nepal. Some are affiliated with CTEVT and some are not. The courses range from basic level training to advance degree level. Many students have been studying abroad as well. A study on employment possibilities of DCE graduates from CTEVT affiliated institutions has not been made yet. Therefore, this study was an attempt to explore the information of opportunity to the graduates of diploma courses run by CTEVT affiliated institutions.

In Nepal, primary school starts from grade one to five years of education followed by three years of lower secondary, two years of secondary and two years of higher secondary.

The students graduate from secondary school (10 years), attend one of the schools of general education (higher secondary) or technical education at the technical school leaving certificate (TSLC) or diploma level. They are free to select any system but must successfully pass the entrance exam organized by the individual institutions. The basic goal of general education is to prepare students for academic higher education, as given in higher secondary school affiliated by Higher Secondary Education Council. The basic goal of technical-vocational education is to prepare students for jobs and for four-year technical colleges in higher education, as given in technical colleges or universities. Those who want to attend higher education institutions are required to be successful in the entrance exam organized by related universities. TSLC and Diploma courses are being run by CTEVT and private institutions affiliated by CTEVT. TSLC is a 15 month program and Diploma is 3 years of courses after completion of secondary school. These courses are relatively new and developed by CTEVT. Its compatibility with market demands might be of interest to all concerned students, teachers, professionals, institutions and CTEVT.

Computer education, including information and communication technology, is one of the most saleable courses in the world. Various courses related to computer and information technology have been offered in Nepal ranging from basic training to higher advanced degrees. This study identified employment status of DCE graduates, issues related with level and types of computer professionals most demanded in the market, and content of curriculum. This study analyzed and described current issues encountered by DCE graduates of Nepal and suggests future policy strategies to resolve these issues. The study also explores various types of demand of computer and information technology professionals in the

market and collects feedback and comments for making prevailing curriculum more saleable in the market.

The connections between employment and training have always been a problem for the TEVT system in Nepal. The analysis of issues affecting successful transition from training to work provides valuable input for the program planners and curriculum developers to design and implement market-driven computer and information technology programs. In addition, this research builds a foundation for identifying the most prominent problems affecting employment opportunities. It is hoped that outcomes of this study will result in the development of more meaningful DCE curriculum that addresses the employment needs of the Nepalese people.

Purpose

The aim of this study was to assess the employment opportunities of the DCE course graduate. There are three reasons for choosing this program to assess. The first reason is that information and communication technologies have become more widespread. In this fast developing world, it is highly important to train a qualified workforce in Nepal to reach a dynamic, competitive and economic structure. Second, this curriculum is one of the curricula developed and implemented by CTEVT. Therefore, the implementation of this curriculum serves as an example for other curricula. Third, because of high interest of youth, and demand in business and industry for qualified computer technicians.

In the scope of this study, the aim was to answer the following questions:

1. What are the potential areas of employment for DCE graduates?

2. To increase existing employment situation of DCE graduates, what amendments should be incorporated in prevailing DCE courses?
3. To make DCE courses more relevant to the market need, what actions should be taken?

Methods

The procedure followed to achieve the set objectives of the study was a combination of literature review, questionnaire, focused group discussion and semi-structured interviews with the computer and information technology professional, teachers and principals of computer institutions, graduates of DCE, members of Computer Association of Nepal (CAN), entrepreneurs and other similar organizations. Primary information on the issues was taken with the help of an in-depth interview with the experts and the person working on computer and information technology. Some open questions were asked to get their inputs in this research. Informal discussions were also held with the experts and concerned individuals to obtain detailed information about the topic.

Sample

All technical institutes affiliated with CTEVT offering DCE courses since 2001 and the graduates from these institutes were considered as universe for this study. Apart from these, the study covered computer experts and professionals, entrepreneurs and industrialists, and corporate organizations as well. CTEVT affiliated institutes were Lumbini Engineering College (LEC), Sunsari Technical School (STS), Pokhara Engineering College (PEC), Kathmandu Institute of Technology (KIT) and Birganja Institute of Technology (BIT). Altogether 246 students passed through these five institutes until October 2006. Questionnaires were sent only to those

graduates who had full addresses with their respective institutes. Out of 246 graduates 210 were correspondent and sent the questionnaire for the study. Among them only 70 (33.33%) graduates responded and were considered as sample for the study.

Table 1 shows the distribution of graduates and sample population by institutes based on the address availability for correspondence.

Table 1

Number of Graduates and Sample Population by Institutes

Institute	Total No. Graduates	Graduates having addresses	Replied
Lumbini Engineering College	82	71	24
Sunsari Technical School	54	48	10
Pokhara Engineering College	45	38	12
Kathmandu Institute of Technology	32	24	7
Birganja Institute of Technology	33	29	17
TOTAL	246	210	70

Besides the use of questionnaires with DCE graduates, focus group discussion (FGD) and semi-structured interviews were also carried out to collect qualitative data. For this purpose non probability incidental sampling method was adopted. FGDs were held in Pokhara, Janakpur, Dhanagadhi and Dharan. Semi-structured interviews were carried out in Kathmandu, Nepalganja and Birganja. Members of professional organizations, computer professionals, entrepreneurs, teachers and managers were key informants. Turn out for both events was 51.

Data collection

Questionnaire survey method was used for quantitative information and focus group discussion and semi-structured interviews were used for getting qualitative information.

1) Questionnaire Survey

The questionnaire was basically designed to be asked to students who graduated from institutions affiliated with CTEVT. Altogether there were eight fixed, closed and four open ended questions relating to employment, income, employer satisfaction, nature of work preferences, future plans, potential area of employment, amendments in curriculum, government effort to improve employment, etc. It was difficult to meet with the DCE graduates directly to get responses because of the nature of their employment and various places of work. Questionnaires were sent through post and to some extent direct contact, and requested them to send the response directly to CTEVT. Therefore, it was difficult to verify the questions and answers.

2) *Semi-Structured Interview (SSI)*

Open ended questions were developed to conduct semi-structured interviews to computer professionals, entrepreneurs, and industrialists in corporate organizations. The interview basically focused on competencies, current employment status and employment conditions of DCE graduates, as well as the level of need for the computer and information technology workforce, curriculum development, job opportunities and suggestions for improve employability of CTEVT diploma holders. This interview was administered with 16 respondents of computer and information technology fields such as managers, teachers, entrepreneurs, and members of professional associations.

3) *Focus Group Discussion (FGD)*

For the qualitative information a check list containing major issues to be investigated was developed and implemented through focus group discussions. The discussion focused on the DCE graduate working area, employment conditions, strengths and weaknesses. The group also discussed the curriculum, existing quality of the product, and gave suggestions to CTEVT and the government for immediate action. It was conducted in Janakpur, Dhangadhi, Dharan, Pokhara, and Nepalganja. Altogether there were 51 participants who provided their valuable opinion for the study.

Data Processing and Analysis

All the data collected through different sources was first thoroughly checked, processed and analyzed by classifying/tabulating them in different categories. Further analysis was done using descriptive methods and some analytical methods.

Limitation of the Study

Graduates from different institutes were scattered all over the country, therefore the study completely relied on their responses through correspondence. Most of them probably were outside their residence engaging in jobs and in other business so that only one third portion of the questionnaires was returned. However, attempts had been made to meet DCE graduates during the field survey and a few questionnaires were filled at that time too. Some institutions did not keep all the home addresses of their graduates which also attributed to a relatively small rate of return.

Findings

All together there were 70 graduates from five institutes to respond to the questions raised about the different issues. The respondents who passed DCE courses from 2004-2006 October were taken under study. They responded from diverse geography, culture, family background caste, etc. Out of 70 respondents, 79% were male and 21% were female.

The number of graduate participants by various institutions is shown in Table 2. Similarly, 51 key informants from different computer institutes and colleges, chambers of commerce and industry of Dhanagadhi, Nepalganja, Janakpur, and Pokhara were taken for focus group discussion and semi-structured interviews.

Table 2

Number of Graduate Participated in study by various institutions offering DCE course

Institute	No. of students	Percentage (%)
Lumbini Engineering College	24	34.3
Sunsari Technical School	10	14.3
Pokhara Engineering College	12	7.1
Kathmandu Institute of Technology	7	10
Birganja Institute of Technology	17	24.3
Total	70	100

Employment

The employment status of students graduated from CTEVT affiliated institutes is presented in Table 3. Out of 70 students surveyed, the majority of them (54.2%) were found to be employed in different places, while 37% were found to be unemployed and 8.6% were engaged in higher study. Among surveyed students 21% were female and 66% had completed their DCE courses at least 2 years ago as presented in Table 4.

Table 3 - Employment status of DCE graduates

Status	No. of student	Percentage (%)
Employed	25	35.7
Self-employed	8	11.4
Foreign employment	5	7.1
Higher study	6	8.6
Unemployed	26	37.1
Total	70	100

Table 4

Number of surveyed students by number of years completed after taking DCE course

No. of years Completed	No. of students	Female	Male
Less than 1 year	24 (34.3%)	6 (8.5%)	18 (25.7%)
1-3 year	30 (42.9%)	3 (4.3%)	27 (38.6%)
More than 3 years	16 (22.9%)	6 (8.6%)	10 (14.3%)
Total	70 (100%)	15 (21.4%)	55 (78.6%)

Note: Figures within parenthesis show the percentage

Table 4 reveals that most of the respondents completed their DCE course two years before this study. The more the graduation time lags the more the probability of engagement in employment. Those students who were unemployed were asked about their future plan. Out of 32 unemployed graduates, 30% were engaging in higher study whereas 10% still planned to seek a job. Similarly, 5.7% unemployed respondents expressed their view to continue to live as they are presently and 54.28% fell to another category and not related to this query directly as presented in Table 5.

Table 5*Unemployed graduates by their future plan*

Future plan	No. of students	Percentage (%)
Higher study	21	30
Still seeking employment	7	10
Living without doing anything	4	5.7
Not applicable	38	54.2
Total	70	100

Table 6*Distribution of employed graduates by types of job*

Types of job	No. of students	Percentage (%)
Computer operator	15	39.4
Training (Instructor/Assistant)	8	21.1
Repair and Maintenance	7	18.4
Data entry and Processing	4	10.5
Programmer	2	5.3
Others (Network administration)	2	5.3
Total	38	100

According to the participants of the FGD, most of the DCE graduates are working in different fields like a training program, medical transmission, banking, government office, graphics, data base programming, hospitals, business process out-sourcing and departmental stores. A majority of them are in private sector employment. It was found from qualitative discussion that despite low standard curriculum and poor management of institutes, the DCE graduates have high demand in the job market both in country and abroad,

particularly in Gulf countries like Malaysia, Thailand and India. Reasons provided behind it were: no high expectations of salary and less conscious to hierarchy and status. The graduates working in different fields are presented in Table 6.

Wedges

The wedges of the DCE graduates range from Rs. 5,000 – Rs. 20,000 per month. The majority of the respondents fall under the category of earnings Rs. 5,000 – Rs. 10,000, whereas only 10% earned between Rs. 15,000 –Rs. 20,000 per month as presented in Table 7.

Table 7

Number of graduate by size of income

Income (Per month)	No. of students	Percentage (%)
Rs. 5,000-10,000	25	65.8
Rs. 10,001-15,000	5	13.2
Rs. 15,001-20,000	4	10.5
No response	4	10.5
Total	38	100

Employer Satisfaction

The majority of the respondents said that their employers are satisfied with their performance, whereas only 8% were not satisfied with their performance. A small number of respondents (7.9%) could not answer whether their employers are satisfied with their performance or not. It is quite interesting that 24% of the respondents did not like to explore the fact is presented in Table 8. When further asked about the dissatisfaction of their performance, it was personal behavior and inadequate skills of the respondents.

Table 8*Employers' satisfaction by the performance of respondent*

Satisfaction of employers	No. of students	Percentage (%)
Yes	23	60.5
No	3	7.90
I don't know	3	7.90
Missing	9	23.7
Total	38	100

Preference of Employment

The majority of the respondent preferred to get in country office related job where as 17% respondent preferred to go foreign employment. Almost 29% of respondent were found to have their own enterprises. The data is presented in Table 9. It was also found from qualitative response of the respondent that training centers, bank, telecom, government offices, NGO/INGOs and industries are major areas of work.

Table 9*Employment preference by the DCE graduate*

Type of Employment	No. of students	Percentage (%)
Within country	38	54.3
Foreign	12	17.1
Self-enterprise	20	28.6
Total	70	100

Perspective on employment opportunities and Curriculum Development

Perspectives of the DCE graduates and other computer experts and professionals were solicited. Responses were collected through individual correspondence with students and focus group discussions in different places with computer experts and information technology professionals.

Perspective of DCE graduates

Following are views of DCE graduates to improve prevailing employment status:

- Update curriculum as per the need of the market and include individual project work.
- Give more emphasis on practical work and provide more exposure during training.
- Remove unnecessary parts of curriculum and include new topics software design, multimedia, active server pages (ASP), hypertext preprocessor, and virtual places (VP).
- Give authority to individual institutes to include new topics according to current needs of the market.
- Encourage all government offices to use computers for official works and bring an act related with e-documents and computer technology.
- Encourage the private sector for investments to develop hardware and software for computers.
- Give preference to graduates of DCE rather than trainees of short courses for the employment of government services by Public Service Commission (PSC).
- Encourage business and industry people to establish computer industry and information technology parks.

- Conduct regular monitoring/supervision of CTEVT affiliated institutes and improve their standards related with facility and instruction.
- Establish a labor market information system and counseling unit.

Perspective of IT professionals of different institutes

Participants of FGD and SSI expressed their views in connection with research queries related to potential places of employment, improvement in employment opportunity, current trends of employment, curriculum amendments, and government and CTEVT efforts. Following were their suggestions to improve prevailing employment status of DCE graduates:

- Update curriculum regularly as per the need of the market.
- Include electives courses in curriculum to offer courses as per the need of the market.
- Give emphasis on the practical rather than theory and provide more practical exposure during training.
- Include on the job training/Internship in curriculum.
- Create awareness among employers, especially to the government organizations, about the importance of DCE courses.
- Enforce all government offices to keep official documents and information in their computer system.
- Approach the PSC to give preference to DCE graduates rather than short course trainees for government employment.
- Encourage affiliate institutions to maintain guidelines of the courses and standards of facilities through regular monitoring and supervision.

- Include foreign language courses in curriculum as electives.
- Give emphasis to programming language.
- Incorporate all newly emerging computer and information technology in curriculum.
- Develop micro level syllabus for all subjects.
- Define depth of courses clearly and mention sub titles in details.
- Evaluation system of the examination should be improved and questions should represent all chapters based on hours allocated to each chapter.
- Include internship in curriculum instead of the more theoretical part.
- Involve computer experts, professionals and employers at the time of designing new courses and amending curriculum.
- Split existing curriculum in two parts as 2.5 years for institutional teaching and one half year for internship.

Discussion of the Findings

In Nepal there are many computer institutes and colleges who have encompassed courses from basic levels to advanced degrees. Most of the training institutes are registered in the District Administration Office or in the District Domestic and Cottage Industry Office, whereas institutes/colleges offering academic courses have taken affiliation from CTEVT.

Training institutes mostly run short term training and cyber. The majority of surveyed DCE graduates seem to be engaged in such training institutes and cyber as a trainer, manager and entrepreneur. Besides this, graduates are also engaged in foreign and domestic employment as a programmer and networking developer. Facts proved that most of the employers are satisfied with their employees. Though employees were not

asked about their satisfaction with their employment during the study, nevertheless most of them were not satisfied because of their job being temporary.

College/schools offering academic courses in the hardware and software programs of computer engineering have not been able to fascinate enough students. Those who have graduated already have not been getting jobs as per their expectation and investment in their study. The paramount reason behind it might be the political situation of Nepal which depleted its economic growth and prosperity in the past decade. Apart from this, government policy is also responsible for not creating conducive environments to develop computer and information technology as an industry. Graduates of higher study have the tendency to go abroad for further study and seeking jobs. However a small portion of surveyed graduates of DCE are looking forward to going abroad or for higher study. Their first preference is in getting job inside their country.

In spite the acceptance of DCE graduates among employers, some factors are hindering a wider opportunity in the job market. Not updating courses as per the market need, below standard training facilities, trainers, inadequate supervision and instruction of CTEVT, lack of recognition of DCE courses by PSC for recruitment in government vacancies are some remarkable facts which make employment situation of DCE graduates harsher.

The present study indicates that there is ample potential for enough job opportunities in foreign markets, especially in Asian countries like Malaysia, Thailand, India and The Gulf. However the graduates should possess a lot of practical exposures in the most recently emerging area of computer and information technology which reflect the needs of the market.

No doubt the government is one of the titanic employers of computer professionals in Nepal. Considering this fact all the respondents of this study emphasize the open door of government positions to DCE graduates through PSC which has been pertained by short term training holder since the last decade. Once PSC recognizes the DCE course for recruitment in government vacancies they will have ample opportunity for employment of DCE graduates.

The study reveals that remarkable numbers of graduates are engaged in self employment too. Those who are not getting jobs at the present are also looking at self employment or taking initiative for entrepreneurship. Self employment does not provide employment to owners only, it also gives jobs to others. Hence it has unseen positive impact in the job market. The field of computer and information technology has been expanding day by day even in remote areas of Nepal. Similarly young people are more attracted towards computers and their applications. This is an encouraging sign for a widening job market of DCE graduate in the future.

It might be a fascinating fact to all that as compared to higher degree and training holders, graduates of DCE courses have a greater demand in the domestic market of Nepal. Studies reveal that two factors favored this fact. DCE graduates did not expect high salaries so they can be adjusted for various job tasks and nature of work. At the same time they did not seem conscious to hierarchy in the working place. Other factors associated with them was their ability to perform a wide range of basic to slightly higher level tasks of computer and networking technology which is not possible to short term training holders.

In spite of immense job opportunity in this sector, only 54% of DCE graduates are employed. This figure did not incorporate the percentage of surveyed students who are looking forward to higher study. If it were not the case it can

be interpreted in another way that about 61% were employed. Whatever the percentage of the existing job status of DCE graduates enough room is seen ahead if corrections are made. CTEVT and the government of Nepal are major players to take initiation in this direction.

Conclusion

The information derived from this study will be useful to promote employment opportunity of DCE graduates of CTEVT. The findings of this study will help TEVT planners, curriculum developers and practitioners become aware of the current issues related with the employment opportunity of DCE graduates. Findings also identified strategies for resolving those issues to further improve DCE graduates employment opportunities. Based on the findings of the study CTEVT and government of Nepal can play vital role to improve the employability of DCE graduates in days to come by encouraging its offices to computerize and bring an act related with e-documents and information technology by following necessary steps as prescribed below.

Training institutes/colleges offering DCE courses have not maintained and managed training resources such as teachers, computers, library, books, internet and other physical facilities as prescribed by the guidelines of CTEVT for establishment and affiliation of training institutions. To impart competent workforce laborers, institutes should strictly follow standard guidelines of CTEVT and manage all the essential human and physical resources required for DCE courses.

Most of the trainers are fresh university graduates and are not trained in teaching methodology and have fewer practical skills so that they need to be provided methodology training and practical exposures. CTEVT should monitor and supervise

affiliated institutes regularly by professionals’ supervisors and take necessary remedial and firing action as per the need. Curriculum should be updated regularly as per the need of the market. Practical work should get more emphasis than theory and students should get more exposure of practical work during training periods. Unnecessary parts of the theory should be omitted and new topics like active server pages, hypertext preprocessor, virtual places, software design and multimedia should be added. There should be some provision of elective courses in curriculum that could be offered in line with local market needs. Curriculum should cover all newly emerged technology in computers and micro syllabus of all subjects with subtitles should be developed in detail. Examination systems should be improved and question patterns should represent all chapters based on hours allocated to each chapter. Existing three years curriculum should be split into two parts as 2.5 years for institutional teaching and half year for internship. There should be provisions of project work for each individual student.

DCE graduates came into the market in 2004 and they can satisfy the need of the middle level computer workforce. Employers (especially government offices) are not aware of the competencies and production of DCE graduates who are far better in all cases as compared to short term training holders. In this regard, CTEVT should approach PSC, ministries, corporate, industries and other potential employers to create position for DCE graduates. PSC should recognize the DCE courses and should stop competition from short term training holders in its examination for the recruitment of vacancies in the Nepal government. The Government of Nepal should encourage the private sector to invest in the development of hardware, software, establish an information technology park, and manufacturing computers and accessories.

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