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Characterizing information and communications technology industry in Davao region

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ABSTRACT

The study aimed to characterize the Information and Communications Technology industry utilizing online Google forms for ICT inventory and characterization to 37 respondents working in different ICT firms around Davao Region. The distribution of the firms cut across categories of enterprises, from small to large firms. Findings revealed that most of the ICT firms are new entrants of which a greater number are micro-enterprises that need government support in form of capital. In addition, the industry is predominantly populated by academic institutions that offer trainings and seminars to supplement skills and competencies needed by ICT industry. Furthermore, there is a shortage supply of ICT workers is evident and the number of ITE graduates joining the labor pool is not enough with the demand for ICT workers which will push the wages up as a result of shrinking number of workers or piracy of highly-skilled workers among ICT firms. The industry may need to strongly link with the academic institutions to imbibe corporate culture on top of the required skills of graduates. Hence a strong partnership between ICT industry and academe is indeed necessary.

Keywords: *Davao Region, ICT, Profile.*

INTRODUCTION

Collecting information on the industry can help improve strategy analysis and plan of actions. The information can be made into a map for a quick reference of

available data bank and number of experts in the industry (Woo, et al. 2004), solve problems (Tserng & Lin, 2005) and communicate important and actionable information in the context of the organization (Wexler, 2001). Basic information about the industry would enable small and medium enterprises to navigate and compete (Hari, *et al*. 2005) through effective management (Davenport & Volpel, 2001). Educators may also utilize information derive from a knowledge map to improve abilities of the learners (Weigmann, et al., 1992). Thus a knowledge map is useful to the industry and educational institutions.

In Davao City, ICT act as one of the primary aide player for government institutions to deliver services to the community through an effective on-line transaction to hasten processing of business permits for example and encourage private sectors to invest in the city and create jobs for residents thus at least reducing unemployment and poverty in Davao. Currently, 50 ICT players are established in Davao City directly involved in BPO voice contact centers, non-voice process outsourcing, animation, graphics, and content development and engineering service and design. At present, Davao city is encouraging ICT investments and other related activities through building infrastructure, creating conducive environment for ICT growth, job generation, and socio-economic gains and sustainability. However, the profile of ICT players in the city is virtually unknown. Hence, this study was conducted to characterize the Information and Computer Technology (ICT) industry in Davao Region.

MATERIALS AND METHODS

An online survey form was used utilizing google forms for ICT inventory and characterization available at https://drive.google.com/a/umindanao.edu.ph/ preview template? id=0AvA7V mcMxMy4dC1pZ0pRQ196cERqNzlkUnJ HNnFoVlE & mode=public&urp= https://docs.google.com/ previewtemplate?id%3 D0AvA7Vm&pli=1&ddrp=1# targeting the Business Process Outsourcing firms (BPO), government-based ICT, private firm-based ICT and the Information Technology Education schools. The online survey was conducted between the months of February and March 2015. Quantitative analyses were used to describe associations between variables.

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RESULTS AND DISCUSSION

Based on the respondents position in their organization revealed 25% are employees and freelance professionals or part-time ICT professionals helping the firm. The freelance are those who do seasonal jobs with the company by they are not formally connected to the firm, though they still do high-valued activities. While 22% occupy top level management either as president, CEO, COO or as owner of the firm; and a little lower are those respondents coming from the lower level management being supervisors in the organization (19%). Of equal number are respondents who are consultants, middle managers and upper level management at 3%. Given the variety of respondents' perspectives, their perspectives will provide interesting analysis on the situation of the ICT Davao.

In terms of years of operation, firms operating within 0-3 years constitute 35%, while second are those firms who have operated for 10 years (32%), 19% have just entered maturity years or 11 years or more. Surprisingly, survey revealed that there are 3% of firms operated for 48 years. Mostly these firms are cooperative-based ICT. Perhaps, the growth of the cooperative has something to do with the strong and highly functional ICT system put in place for the organization. A greater number of are members of the Council of Deans (16%) followed by DabaweGNU (14%). The ICT workers are also members of Philippine Society of IT Educators (8%), Transcription Alliance of Davao (5%), Davao Gamers Society (5%) and Davao Bloggers Society (5%).

The ICT firms participated in the survey are mostly operating with an initial capital of less than a million (50%) while big investment firms ranging from 1 million to a hundred million are only a handful in Davao Region comprising between 6-11%. This is an indication that the industry for ICT in Davao Region remains to be a playing field for entrepreneurial engagements where small-scale players can join without fear of being compromised by huge investment firms. On the other hand, this is also something to look into as there are a fewer number of large investment firms pouring in their capital in the Region. *It is a good area to look into the perceptions of the huge-investing firms in the many areas of engagements such as labor force, laws and market.*

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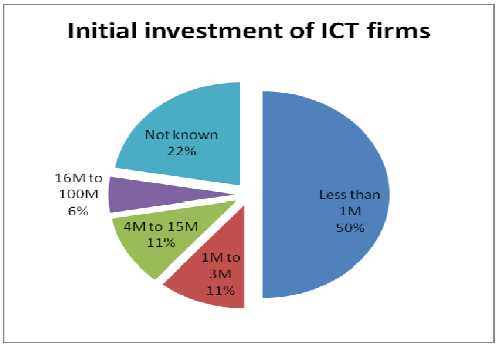

Fig.1 Distribution of firms by investment value

Most of the respondents are into business process outsourcing (BPO) segment doing information technology jobs (32%); software and applications (11%); or a handful of jobs supporting telecommunications, software applications, computer hardware and information technology (5%); as well as those in the academe (5%). All others are spread in the segments of information service, broadcast media, digital media for marketing, and in weather bureau all at 3%.

The number of employees of the participating firms range between a lone employees to a thousand. Some firm have one employee the owner is also the sole employee and others have 3000 employees. Part-time workers could reach as high as 100. Taking the average, the participating firms are employing 251 workers, and taking the maximum to a thousand more. This is a significant number of productive workers earning income at relatively better amount ranging between P8000 to P20000 on the average. Income from employment in the industry may reach Php3million a month which is readily spent in the domestic economy. This is a significant impact. Under a growth analysis perspective, job impacts mean new jobs go to new residents' thus encouraging population growth, eventually increasing consumer spending on local products (Hughes, 2003) which is a very interesting impact.

Table 1. Number of workers by part-time and full-time

Type	Min	Max	Mean	stdev
Full- time	1	3000	243	684
Part-time	0	100	8	22

The firms' number of workers can help in describing enterprise category. It is of good note that the Philippine government recognizes micro, small, medium enterprises (MSMEs) through RA 10644 of 2014 which lay incentives schemes for MSMEs that include start-up funds, technology transfer, management and marketing. This is an opportunity for the surviving ICT firms in the Region as a greater number of those surveyed are micro enterprises (18 firms) that employ between 1 to 9 workers; 8 are small enterprises with employees ranging between 10 to 99; and 6 are large enterprises with more than 200 workers. The typology of the industry poses potential of improving the local economy's growth through employment creation and innovation (Aldaba, 2012).

Table 2. Distribution of category of firms by number of full-time workers

Category[i]	f	number of workers
1.) Micro enterprise	18	1 to 9 workers
2.) Small enterprise	8	10 to 99 workers
3.) Medium	0	100 to 199 workers
4.) Large	6	200 and above workers

The firms generally offer software (57%), while a quarter are composite of software and hardware products (30%), while a small number (14%) did not indicate their products. Perhaps the respondents do not certainly know the products that their firms offer as some of the respondents were regular employee in the rank and file positions. Even still, the findings provide a good picture of the current situation of the ICT industry; a big number of the firms are into software development. Click and Duening (2004) forecasted that in 15 years, 3.3 million jobs will move to countries like Philippines, China, Russia and India from the Unites States and that the Philippines competitive advantage is on administrative. Better if the industry can intensify its perceived specialization in the eyes of the locators and improve its offering and services as well.

Moreover, the services offered by the firms are mostly into chat and email support (14%), research data (8%), and medical transcription and back office support (8%). Search engine optimization, graphics, and multimedia; search engine optimization, digital media, PR and marketing; search engine optimization, software development and graphics shared 5% a piece. All other services are spread at 3% including software development, technical support, and software development on graphics, web development, telephony, voice-

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inbound & outbound, system administration and many others. ICT industry in Davao Region is taking a good lead in the offering its services. Rodolfo (2005) believed that Davao Region has taken a good share of the pie of the BPO development.

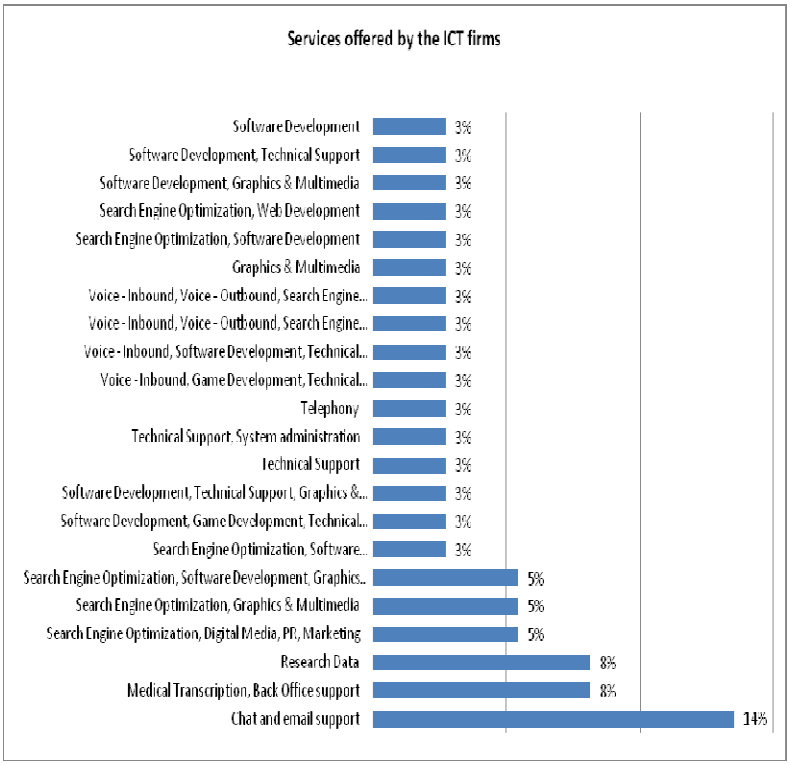

Fig. 2 Services offered by the ICT firms in the Region

A number of highly specialized ICT workers who possess particular knowledge on applications and language are also noted. Survey revealed that there are 76 experts: 31 C# programmers, 31 Visual Basic experts, 24 ASP, 23 Java programmers, 14 specialists on C/C++, 13 have knowledge on Visual C++, one was identified to have knowledge on Delphi; while available expert on Python, PERL and Ruby on rails.

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Table 3. Number of programmers per type of language (n=37)

language	f	%
1.) Java	23	62
2.) C/C++	14	38
3.) Visual Basic	31	84
4.) Visual C++	13	35
5.) C#	31	84
6.) PHP	76	205
7.) Python	0	0
8.) Delphi	1	3
9.) PERL	0	0
10.) Ruby on rails	0	0
11.) ASP	24	65

The number of personnel involved in the stages of software development was found to be huge in systems analysis (111%), and then followed by those in systems design (36%), project management (78%), technical writing (57%) but none for software testers. Software testing is considered to be literally hard because of the rigid requirement of becoming one such as having an abundant toolkit of fundamental testing techniques, understanding of how the product will be used in the operating environment, ability to identify subtle bugs and ability to flush out the bugs (Whittaker, 2000). The latter skill set is an important ability that Myers, Sandler & Badgett (2011) alludes to as the dark art of software testing. Identification of software testers among the ICT firms is directly suggestive of the advance quality of the products offered by such firm.

Table 4 Number of personnel on software development per type phase (n=37)

Type	f	%
1.) Software testers	0	0
2.) Project management	29	78
3.) Systems analysis	41	111
4.) Systems design	36	97
5.) Technical writing	21	57

In addition, a quarter of the respondent-firms have programmers that specialize on android application development (32%) while a small number are into iOS application (8%) and on Windows Phone application development (11%). There seemed to be a strong demand for specialized application for game development.

Table 5 Distribution of programmers per type of game development app (n=37)

Game development app	f	%
1.) Android application development	12	32
2.) iOS application development	3	8
3.) Windows Phone application development	4	11

Moreover, the technical support engagement of the employees is mostly in systems administration (65%), hardware support (62%), systems administration (62%) and database design (51%) and less engagement for network administration (46%).

Table 6 Distribution of employees per type of technical support needs

Technical support	f	%
1.) Network administration	17	46
2.) Hardware support	23	62
3.) Systems administration	23	62
4.) Database administration	24	65
5.) Data administration	18	49
6.) Database design	19	51

The ICT firms commonly use MySQL (14%) and in combination with MS SQL server (11%) for the database management system. A marginal number employ MS Access in addition to MS SQL (3%), IDB-DB2 in combination with mySQL and MS SQL server (3%), Mongo (3%) and Oracle (3%).

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Table 7 Distribution of firm-respondents by DBMS used

DBMS	f	%
1.) MS SQL Server	2	5
2.) MS SQL Server, MS Access	1	3
3.) MySQL	5	14
4.) MySQL, MS SQL Server	4	11
5.) MySQL, MS SQL Server, IBM - DB2	1	3
6.) MySQL, MS SQL Server, MS Access	2	5
6.) MySQL, MS SQL Server, MS Access, IBM - DB2, Mongo	1	3
7.) Oracle	1	3

Employees engaged in multimedia and graphics abound skills in Adobe Photoshop (103%), Adobe illustrator (41%), CorelDraw (38%), Adobe Premiere (30%). There is an observed demand for Poser (3%), all the more for Maya 3D there could scarcely be a specialist being identified

Table 8 Distribution of firm-respondents by number of employees in graphics/multimedia (n=37)

Graphics/multimedia	f	%
1.) Adobe Photoshop	38	103
2.) CorelDraw	14	38
3.) Poser	1	3
4.) Maya 3D	0	0
5.) Adobe Premiere	11	30
6.) Adobe Illustrator	15	41

The firms that participated in the survey were also characterized according to their area of operation. It was found that almost half (43%) of the firms are serving the Philippine market, followed by those firms that serve Philippine and US markets (8%). There are also firms that serve multiple markets like Philippines, USA, Australia and New Zealand (5%) while another firm serve a single market, the USA (5%). All other firms serve many markets like

Philippines, South Korea, India, rest of Asia, USA, Australia and New Zealand (3%) or serving a single market in UK (3%).

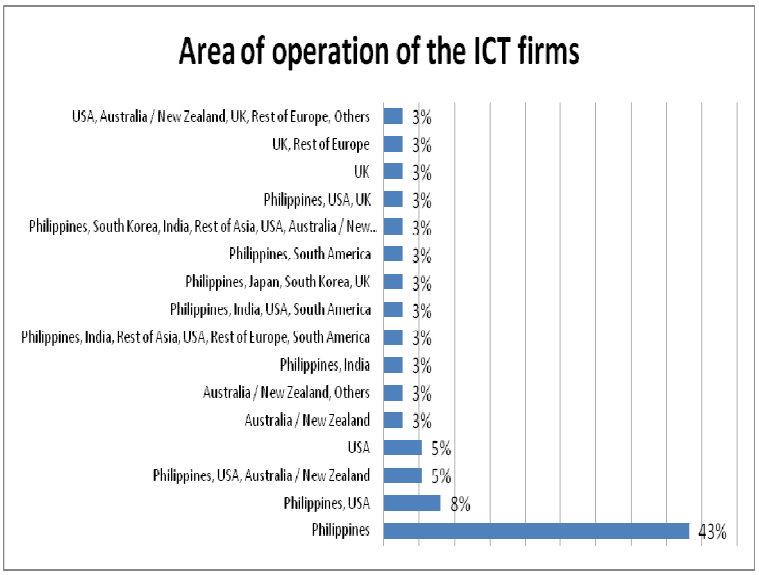

Fig. 3 Area of operation of the ICT firms

The head office of the participating firms are mostly homegrown, 57% are located in Davao Region, while a number have main offices in USA (23%), others in the Philippines outside the region (11%). There are also firms with main offices located in UK (6%) and in Latin Americas (3%).

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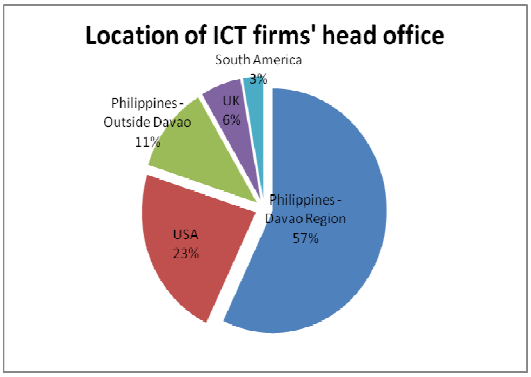

Fig. 4 Location of head office of the ICT firm

Supply and demand for ICT human resource

With their current number of personnel, the ICT firms express need to expand their labor force. Of the 37 firms, 10 manifested the need to hire additional workers in the next 9 months; 6 firms consider the next 3 months to be a high time to hire new workers; 3 firms eyeing for the next 6 months; 1 firm plans to expand personnel within a year; while, 2 firms are continuously recruiting workers to their organizations. This is a barometer of the dynamic activity of the industry.

On this, the firms were asked how many workers they will hire the moment they start pooling in recruits. 3 firms would need 100 to 150 new employees within a year's time; 21 firms would need no more than 10 new workers; 1 firm would need 11 to 20 additional labors; and another firm would need 21 to 31 new workers. Thus, the firms would need an estimated 711 new workers within a year, expected to surge within 9 months.

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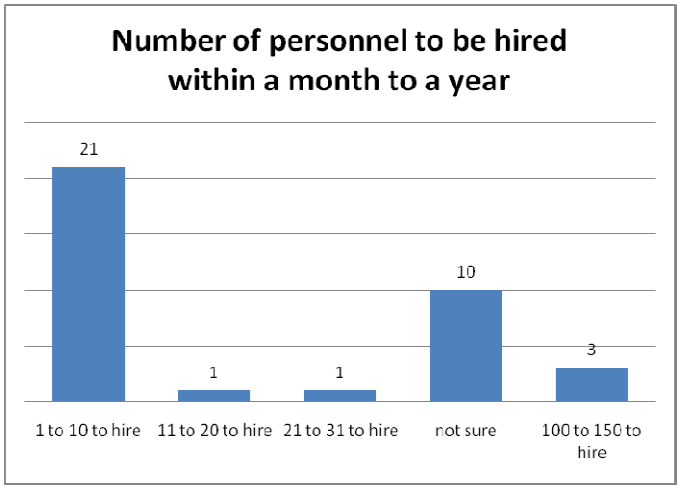

Fig. 5 Estimated numbers of expected new employees to be hired

The students of ITE range from a handful to a thousand students, on the average, close to a thousand students are enrolled in the higher learning institutions. There were 4 HLIs (higher learning institutions) which participated in the survey. These institutions have been producing an average of 158 graduates in a year on the average, combining the four institutions supply of ITE workers, there is an expected 632 new graduates joining the ICT industry annually.

Table 9. Number of ITE enrolled & ITE graduates every year

Number	Min	Max	Average
ITE students (1st to 4th)	3	1710	928
Estimated ITE graduates every year	30	300	158

Given demand for new workers at an estimated average of 700 and supply of ITE workers at 632 on the average, there is an expected shortage of human resource for the industry. This will have good and adverse impacts on both demand and supply sides. Firms that can offer better compensation can set a premium of wage to attract skilled workers, either new or seasoned, to their organizations. This will adversely affect the small and micro firms who barely struggle in its operation.

On the other side, ICT industries will likely still have unemployed skilled human resources while the prevailing wage could be high. This is the Shapiro-Stiglitz theory (1984) where workers would choose to shirk job because anytime the worker gets hired in another firm, then the firm responds by increasing wage to keep the worker in the job. If paying higher wage would work, then it will not hold all other firms for offering higher wages, thus reducing the incentive of staying in a particular firm. In general, wages may spike up while productivity will remain the same.

Thus, to reduce the potential of shirking of workers, ICT firms may introduce corporate values in the learning institutions to imbibe among students the organizational values evident in their workplace. Meglino, Ravlin and Adkins (1989) found that strong corporate culture is a function of congruence of the workers values and of that with their supervisors. If firms share their culture among the students, when they join the industry, their sense of belongingness increases thereby contributing to the improved operation and revenue generation of the organization. This is loyalty-based model (Reichheld, Markey & Hopton, 2000).

Trends in ICT Industry

The respondents were asked of their observed trends in the ICT industry in the Davao Region. To them, ICT trend seemed to be just fair and moderate (mean=6.1). No dramatic occurrences were observed. Academe seemed to be eager in the ICT-related development initiatives (mean=6.9) such as giving seminars and trainings to supplement human resource inadequacy of some skills (mean=6.6). It is considered as a twin growth, the ICT grows as a result of improved workers' productivity, and other industry grows including the academe (mean=6.6). In this instance, the industry is assured that ITE graduates are equipped with the needed competencies expected in the ICT industry.

The stable condition in the ICT industry may also be attributed to the less observed pirating of well-trained workers (mean=5.5) by competing firms. In addition, the perceived slack of the industry may also be attributed to the lack of capital needed to scale up operations. The industry needs to improve its partnership with the government agencies. There is an observed need of putting on networks and climate of partnership with the government. The ICT firms may enjoy the benefit of **RA 10644 of 2014** where micro, small, and medium enterprises may avail of a funding support.

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Table 10 Trends in the ICT industry

Indicators	Mean	Desc.
1.) Government support for ICT development initiatives (infrastructure, services & policies).	5.8	FE
2.) Cooperation and unity among industry members for any ICT development initiatives	6.1	FE
3.) Government plans for sustainability of ICT in Davao City	6.1	FE
4.) Participation of academe in ICT-development initiatives	6.9	FE
5.) Curriculum & instruction of academic institutions address needs of industry	6.2	FE
6.) Graduates of ICT and other related courses have competencies required by the industry	6.3	FE
7.) Trainings and seminars for individuals who lack skills required by the ICT industry	6.6	FE
8.) Adequate number of skilled and competent manpower for any job placement	6.1	FE
9.) Adequate supply of skilled manpower in ICT industry	5.9	FE
10.) Industry players do not pirate well-trained manpower from other firms	5.5	FE
11.) The academe meets required number of human resources for ICT industry.	5.9	FE
12.) Globalization in the ICT industry poses a threat to local innovativeness.	5.8	FE
13.) Growth of ICT industry complements with growth in other industries.	6.6	FE
14.) Government provides incentives to local small and medium players of the industry	5.5	FE
15.) Trainings and seminars afforded to ICT professionals for advancement	5.9	FE
Mean	**6.1**	**FE**

Legend: Mean descriptions: 8.21 – 10.0 Very strongly evident (VSE); 6.41 – 8.20 Strongly evident; 4.61 – 6.40 Fairly evident; 2.9 – 4.60 Less evident; 1.0 – 2.80 Not evident (NE).

Efforts and initiatives of ICT industry

Current efforts and initiatives mostly comprise reinforcement of skills, simplification of permit application to make Davao Region a destination of ICT investment. In particular, efforts and initiatives to fortify the industry were observed in providing trainings and seminars (mean=7.1). The training courses are aimed to be updated and cope with the changing global demands of products and services. Moreover, the ICT Davao had been gaining impression in promoting the region as prime destination for ICT investment (mean=7.0) and in the simplification of registration of ICT-oriented business (mean=7.0). The free exchange of views and ideas through conferences improves the relationship of the academe, industry and the government (mean=6.9) with the common aim of ensuring adequate supply of highly-skilled and competent ICT professionals (mean=6.9).

On the hind side, there is the need to closely work with the government agencies to provide safety nets for the ICT firms against volatility of the exchange rates (mean=5.9). Stronger peso would mean income loss among the firms; weaker peso would mean better income for the firms. Therefore, a good balance must be observed by the government in issuing monetary policies. Perhaps, a dynamic communication line is a good start. In addition, the ICT Davao may improve its engagement with various agencies to secure endowment or capital venture funds for the firms (mean=6.1). Likewise, the industry may establish a strong partnership with academic institutions that produce graduates for ICT in the form of endowment funds (mean=6.1).

Table 11. Efforts exerted by ICT Davao to address common and related concerns.

Indicators	Mean	Description
1.) Promulgation of laws to ensure sustainability of ICT industry	6.3	Moderate efforts
2.) Regulatory framework and strategic plan for ICT Davao	6.7	Strong efforts
3.) Financial endowment to enhance ICT industry	6.1	Moderate efforts

4.) Promotion of Davao Region as prime location for ICT investment	7.0	Strong efforts
5.) Supply of highly-skilled and competent ICT professionals	6.9	Strong efforts
6.) Mismatch of skills of graduates and needs of ICT industry	6.4	Moderate efforts
7.) Creation of conferences where academe, industry and government exchange views, ideas and plans	6.9	Strong efforts
8.) Short trainings and seminars to cope with changing international requirements	7.1	Strong efforts
9.) Regulatory policies for importation of software	6.4	Moderate efforts
10.) Simplification of registration of ICT-oriented business	7.0	Strong efforts
11.) Ethical guidelines for ICT professionals	6.5	Strong efforts
Regulation of competency standards among computer and IT-related courses	6.4	Moderate efforts
12.) Provision of physical facilities for the ICT professionals	6.6	Strong efforts
13.) Flexibility of ICT curriculum to integrate needs of industry	6.5	Strong efforts
14.) Endowment funds from industry to schools that produce graduates for ICT industry	6.1	Moderate efforts
15.) Demand for ICT professionals facilitated through immediate employment of graduates committed by a school	6.2	Moderate efforts
16.) Competitiveness of local products in the international markets	6.6	Strong efforts
17.) Enhancement of ICT technicians and professionals to cope with evolving market	6.6	Strong efforts
18.) Safety net against volatility of exchange rates	5.9	Moderate efforts

19.) Support of market expansion	6.6	Strong efforts
20.) Government outsourcing of services to ICT industry for efficiency	6.4	Moderate efforts
21.) ICT industry roadmap promulgated by government, private organizations and academe	6.8	Strong efforts
Mean	**6.5**	**Strong efforts**

Mean description: 8.21 - 10.0 Very strong efforts; 6.41 - 8.20 Strong efforts; 4.61 - 6.40 Moderate efforts; 2.90 - 4.60 Weak efforts; 1.0 - 2.80 Negligible

Future trends in ICT Davao

Although ridden with sluggish current trend, the ICT industry is expected to become a strong driver of growth as Davao Region will soon be a prime destination of ICT investments (mean=7.9) for big business process outsourcing companies (mean=7.8). With the anticipated flooding in investments in the ICT, the industry will become one of the biggest employer of the human resource in the region (mean=7.6), will become a big contributor to the income of the region (mean=7.5). This means job creation, and more people finding work which will result to increase in the demand for local products. Ultimately, the local economy expands as a result of the investments poured in the ICT industry (mean=7.3) brought by transfer to Davao the operations of international and national locators (mean=7.2).

A good case to look also is the role of the academe in the coming future. The survey reveals that industry-based curricula and instructions implemented in the academe (mean=6.6) will be the least among the expected things to happen in the coming years. Perhaps, the industry is confident of the current initiatives of the academic institutions to connect theories with practice, values formation to corporate culture.

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Table 12. Future trends of the ICT industry

Indicators	Mean	Description
1.) Government relies strongly on ICT industry	7.3	Strong likelihood
2.) ICT industry as one of the biggest employer of Davao Region	7.6	Strong likelihood
3.) International and national locators transfer to Davao its operations	7.2	Strong likelihood
4.) Academic institutions produce enough adequate number of skilled and communication proficient graduates	6.7	Strong likelihood
5.) Industry-based curricula and instructions of academe	6.5	Strong likelihood
6.) Davao Region known for game and software products internationally	6.6	Strong likelihood
7.) The ICT industry will be a big contributor to the income of Davao Region	7.5	Strong likelihood
8.) Global reputation of local professionals and technicians	6.9	Strong likelihood
9.) Expansion of local economy due to investments in ICT	7.3	Strong likelihood
10.) Davao Region as home to big BPOs	7.8	Strong likelihood
11.) Davao Region as prime destination for ICT investments	7.9	Strong likelihood
Mean	**7.2**	**Strong likelihood**

Mean description: 8.21 - 10.0 Very strong likelihood; 6.41 - 8.20 Strong likelihood; 4.61 - 6.40 Moderate likelihood; 2.90 - 4.60 Weak likelihood; 1.0 - 2.80 Very weak likelihood

Cross-tabulation analysis by size of the firm

The sustainability of the firm depends on its investment. On this, a cross-tabulation analysis was conducted to extract the trends and observed initiatives of the ICT Davao in the perspectives of the firms. It was observed that firms with very huge investments are observing strong movement in the ICT industry while firms with relatively large investments, between Php4M to Php15M are

the least to observe activities in the ICT industry. They are followed by the micro firms with investment less than Php1M. This is a promising finding; the large investors are here to stay longer because of their positive observation of the dynamics in the industry.

Table 13. Level of current ICT trend characterized by investment value

Investment	Mean	Description
1.) Less than 1M	5.9	Fair trend movement
2.) 1M to 3M	6.3	Fair trend movement
3.) 4M to 15M	5.5	Fair trend movement
4.) 16M to 100M	7.5	Strong trend movement
5.) Not known	6.3	Fair trend movement

The results however vary on the efforts of ICT-Davao to address concerns and issues of the industry. The most impressed are the firms with investment ranging between Php1M to Php3M followed by the large firms (Php16M to Php100M). The least convinced, however, are the smaller ones with investment less than Php1M. Perhaps this concerns with the endowment funds for the firms which is found to be the least among the many efforts of the ICT Davao, yet the most important among the smaller firms.

Table 14. Level of observed efforts by ICT-Davao to address concerns

Investment	Mean	Description
1.) Less than 1M	6.1	Moderate efforts
2.) 1M to 3M	7.7	Strong efforts
3.) 4M to 15M	7.0	Strong efforts
4.) 16M to 100M	7.5	Strong efforts
5.) Not known	7.0	Strong efforts

Finally, firms were asked of their forecast of the future of the ICT Davao. The firms with investment between Php1M to Php3M are the most confident of the good future of the ICT in Davao Region, followed by the small and large

enterprises. The general expected trend of the ICT is to grow and swell with investments due to international locators transferring operations in the region and these firms expect to benefit directly from these trend.

Table 15. Future trends in ICT industry

Investment	Mean	Description
1.) Less than 1M	6.9	Strong future trend movement
2.) 1M to 3M	8.3	Very strong future trend movement
3.) 4M to 15M	7.5	Strong l future trend movement
4.) 16M to 100M	7.5	Strong future trend movement
5.) Not known	7.1	Strong future trend movement

ICT trend and efforts by type of area of operation

Moreover, a characterization was conducted on trend and efforts of ICT industry in the perspectives of the members of the industry themselves putting into consideration their area of operation. It was observe that the most confident and impressed with the current trend in ICT are those that serve the markets of Australia and New Zealand, followed by firms that operate in the Philippines and India industries. The least confident and less impressed with the current ICT trend in Davao Region are those that serve the US market followed by those that serve the markets of Philippines, India, USA and South America. It seemed like the current ICT trend does not fit with the market of the United States. On the other hand, firms that are serving the markets of Philippines and India seemed to enjoy the local initiatives of the industry.

Table 16. Observed ICT trend by firms characterized by area of operation

Area of operation	Mean	Description
1.) Australia / New Zealand	5.0	Fair ICT trend
2.) Australia / New Zealand	10.0	Very strong ICT trend
3.) Philippines	6.3	Fair ICT trend
4.) Philippines, India	8.0	Strong ICT trend
5.) Philippines, India, Rest of Asia, USA, Rest of Europe, South America	6.0	Fair ICT trend
6.) Philippines, India, USA, South America	4.0	Low ICT trend

7.) Philippines, Japan, South Korea, UK	8.0	Strong ICT trend
8.) Philippines, South America	7.0	Strong ICT trend
9.) Philippines, South Korea, India, Rest of Asia, USA, Australia / New Zealand, UK, Rest of Europe, South America, Others	5.0	Moderate ICT trend
10.) Philippines, USA	5.3	Moderate ICT trend
11.) Philippines, USA, Australia / New Zealand	6.0	Moderate ICT trend
12.) Philippines, USA, UK	5.0	Moderate ICT trend
13.) UK	6.0	Moderate ICT trend
14.) UK, Rest of Europe	6.0	Moderate ICT trend
15.) USA	3.5	Low ICT trend
16.) USA, Australia / New Zealand, UK, Rest of Europe, Others	7.0	Strong ICT trend

Likewise, efforts and initiatives of ICT-Davao were characterized according to firms' area of operation. It was found that firms that operate in the market of the Philippines are the most appreciative, then those firms that serve the market of Philippines and South America, and UK and Rest of Europe. The less appreciative are firms that are into the markets of Australia and New Zealand, UK and USA. Along with firms that serve Philippines and South America, firms that serve not only UK but also other parts of Europe consider the initiatives helpful. The promotions and trainings initiated address concerns of these firms. Yet, these efforts fall short of expectations and bereft of impacts among firms that serve the southern hemispheres of Australia and New Zealand as well as the big market of the United States. There seemed to be dissociations with the BPO industry in the United States and the movement of the BPO industry in the Philippines.

Table 17 Observed efforts of ICT-Davao of firms characterized by area of operation

Area of operation	Mean	Description
1.) Australia / New Zealand	6.0	Moderate efforts
2.) Australia / New Zealand, Others	5.0	Moderate efforts
3.) Philippines	10.0	Very strong efforts
4.) Philippines, India	6.5	Strong efforts
5.) Philippines, India, Rest of Asia, USA, Rest of 6.) Europe, South America	7.0	Strong efforts
6.) Philippines, India, USA, South America	7.0	Strong efforts
7.) Philippines, Japan, South Korea, UK	7.0	Strong efforts
8.) Philippines, South America	8.0	Strong efforts
9.) Philippines, South Korea, India, Rest of Asia, USA, Australia / New Zealand, UK, Rest of Europe, South America, Others	7.0	Strong efforts
10.) Philippines, USA	6.0	Moderate efforts
11.) Philippines, USA, Australia / New Zealand	6.0	Moderate efforts
12.) Philippines, USA, UK	6.0	Moderate efforts
13.) UK	5.0	Moderate efforts
14.) UK, Rest of Europe	8.0	Strong efforts
15.) USA	5.0	Moderate efforts
16.) USA, Australia / New Zealand, UK, Rest of Europe, Others	8.0	Strong efforts

Finally, firms that are serving the Australia and New Zealand markets do not make unified expression of the future of the ICT in Davao Region in context of their operation, yet firms that serve all other markets on top of the Australia and New Zealand markets are seeing very good future of the ICT. In addition, firms that serve Philippines, India, Japan, South Korea, UK and rest of Europe are confident of the good future to come to the ICT industry of Davao Region.

Table 18 Perceived future trend of ICT by firms characterized by area of operation

Area of operation	Mean	Description
1.) Australia / New Zealand	5.0	Moderate future trend
2.) Australia / New Zealand,	10.0	Very strong future trends
3.) Philippines	7.3	Strong future trends
4.) Philippines, India	9.0	Very strong future trends
5.) Philippines, India, Rest of Asia, USA, Rest of Europe, South America	8.0	Strong future trend
6.) Philippines, India, USA, South America	7.0	Strong future trend
7.) Philippines, Japan, South Korea, UK	9.0	Very strong future trend
8.) Philippines, South America	8.0	Strong future trends
9.) Philippines, South Korea, India, Rest of Asia, USA, Australia / New Zealand, UK, Rest of Europe, South America, Others	6.0	Moderate future trend
10.) Philippines, USA	6.0	Moderate future trend
11.) Philippines, USA, Australia / New Zealand	7.0	Strong future trends
12.) Philippines, USA, UK	6.0	Moderate future trend
13.) UK	7.0	Strong future trends
14.) UK, Rest of Europe	6.0	Moderate future trend
15.) USA	6.0	Moderate future trend
16.) USA, Australia / New Zealand, UK, Rest of Europe, Others	9.0	Very strong future trends

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CONCLUSIONS

ICT industry in the Davao Region can be generally described as growing from its infancy and it is expected to grow in the coming years. Its players are composed of new entrants but not necessarily young firms. The industry, in its current state, is led mostly by the people in the academe which set the source for supplementing the required skills and competencies of the workers in the industry. Expected number of workers needed by the firms within next year is more than the number of graduates produced by the institutions every year indicating shortage of labor that will distort wage and resource-pool of the firms. This situation can be arrested in its onset by facilitating a *strong partnership between the firms and the academic institutions*. It is also good to pay attention on the global trend that affects local development. For instance, the markets of the United States, Australia, and New Zealand seemed not to coincide with the local initiatives and dynamics of the international markets. There are also instances when UK market did not fit well with the local conditions. Though, Philippine, India, other Asian markets, and South Americas markets enjoy benefit of the local programs and projects. It is recommended that the perceptions of the ICT investing firms in the areas of engagements such as labor force, laws, and other market ventures would be studied.

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