Meeting users' needs for indicators on the knowledge-based economy (KBE), while reducing collections on the agro-industrial economy

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Abstract

This paper expounds the need for collating knowledge based economy (KBE) indicators in a holistic manner under the official statistical system. The paper argues, the official statistical user needs and demands have changed drastically in recent years. Rapid information communications technological (ICT) upheavals have made profound impacts on all spheres of life, as such the way one work, learn, interact, transact and communicate have embraced changes unprecedented in human history. The changes challenge not only public policy formulation activities but also raise questions on validity of certain statistical concepts and definitions as well as data aptness. The current official statistical system is based on agriculture and industrial settings and lack adequacy and comprehensiveness in depicting the information age developments. Beginning with the advent of online connectivity and real time interactive Internet features in early nineties, the KBE is incrementally shaped by broadband communication; borderless networking irrespective of geography and time; intensification of digitization processes and contents; miniaturization of computing devices enhancing business mobility and agility; new transactional and analytical models like outsourcing, cloud computing, cognizance computing, big data analytics and pay as you use e-services increasingly typify contemporary businesses. As such, changes in policy institutions, organizational structures, governance processes, people's lifestyles and millennial workforce new demands and behaviours have emerged, thus exerting unduly pressures not only on public policy strategies but also on national statistical system. Reckoning the imperatives, the paper is making a clarion call to scrutinize, review and realign the current official statistical system, including incepting totally new statistical surveys on gauging KBE. In support of the claim, the paper highlights the Malaysian KBE statistical experiences, wherever deemed relevant.

Keywords: Knowledge based economy; official statistical system; information communications technology (ICT); KBE statistical experience

1. Introduction

This paper expounds information age statistical compilation activities and challenges, in particular information communications technology (ICT) and associated knowledge based economy (KBE) indicators. Statistical user demands have begun to shift towards KBE since commercial advent of Internet technology in the early nineties that distinctly has marked the beginning of information age (Turner, 2000; Ramachandran, 2008). This age inadvertently comes with online connectivity, real time interactive features and digitization processes as well as convergence of ICT technology, institutions, people and processes (Graham, 2008). Consequently, the information age has registered numerous shades of digitized products and services as well as new business models unprecedented in human history (Manyika, J. et al, 2013). As Drucker cited, the steam engine, triggered the industrial revolution just as the computer triggered the information revolution (Drucker, 1993). Drucker also succinctly pointed out that in the early nineteenth century the steam engine was applied only to create a product but it was the railroad was truly revolutionized the economy and rapidly changed the mental geography and helped humanity to master distance. Analogously Drucker noted that, computer helped mankind to do things faster and cheaper, perhaps more efficiently and effectively. But it hadn't helped mankind to do new and transformative things until e-commerce emerged as key factor in the information revolution, like rail road was to the industrial revolution. In this evolutionary process data, information and knowledge as well as its networks and nexus explicitly have become key components in business and development equations, besides the traditional factors of production namely land, labour, capital and manufacturing technology (Earl, 1999). The borderless phenomena are not only

come with new opportunities but also come with new threats in various forms and shades, thus posing challenges to traditional societal values, cultures and life style (Bhatnagar, 2006;).

Recognizing the development challenges, by dawn of new millennium the Government of Malaysia pronounced Knowledge Based Economy (KBE) (EPU, 2001). This was considered a major policy shift in ushering the nation from agro-industry to knowledge and innovation based, in which contemporary ICT assuming an explicit role as driver and enabler of society and economy. Driven by such policy vision and direction the Government has initiated a number of ICT programmes in addressing the challenges such as liberalization of telecommunication sector; harnessing convergence of technology, provision of broadband, bridging digital divide; producing graduates in adequate number in the field of ICT, engineering and knowledge economy; privatization of education as a revenue generating sector; promoting new age business models like outsourcing and e-commerce as new sources of growth sectors, establishing research and development funding directed towards innovation, patenting and commercialization activities (EPU, 2001). It has been long since the ICT and KBE initiatives have been put in place, however, the challenge still remains to what extent the official statistical systems in the country have risen to the occasion in gauging the impacts and effects of new age phenomena on society and economy. Besides expounding the notion of KBE, the paper elucidates a number of challenges affecting the current official statistical system.

2. Basic Notion of Knowledge Base Economy (KBE) and its Measurability Aspect

Industrial era saw the emergence of factories; mechanization of mass production; demand for skilled and semi-skilled professionals as well as low-cost labour; output and inputs system; new breed of consumers for manufactured products and services opposed to agricultural based subsistence consumption previously; and creation of working class and nuclear family formation as industry took worker out of the home (Drucker, 1993; Bhatnagar, 2006). Similarly information era has been continuously shaping society, economy and governance as well as individual life style and behaviours, in its own unique way. As such the way one work, communicate, interact, perform business transactions, deliver goods and services, network and learn have been undergoing tremendous changes structurally and institutionally. Some upheavals are disruptive and revolutionary, unprecedented in human history (Christensen, 2011). To name a few, in the product market mobile phones have pushed the landlines to the back; digital word processing made type writers consigned to obsolescence; Sony Walkman that once ragingly dominated song market irrevocably replaced by Apple iPod; and Netflex online video service provision made blockbuster filing for bankruptcy. The profound impacts are not only being experienced in product markets but also in the provision of services (Saleh, 2012). Specifically, intensification of digitization processes taking place irrespective of time, geography, cultures and traditions (Pepper et al, 2009) have given rise to new business and behavioural models such as traditional postal services have become less appealing with the introduction of e-mail and short messaging services (SMS); Internet driven mobile commerce makes online shopping a lot easier and convenient opposed to physical travelling presumably costly and time consuming; e-commerce, mobile commerce and Internet banking increasingly becoming typical features in business transactions; cloud computing driving down ICT infrastructure cost and reducing over dependency on computing experts and proprietary software enable technology adoption by small and medium enterprises (SME) et cetera (Carlton, 2012; Ingelbrecht, 2014).

The foregoing new age activities presumptuously create, share and distribute data and information in a prolific manner unprecedented in human history (Ramachandran, 2008). When data and information are internalized and converted into knowledge, it creates new economic, social and public values (Rahman, 1990; Ramachandran, 2008) that surrogated for KBE. Converting data and information into knowledge is not a new activity; on contrary, it has been in existence since the beginning of human civilization. However, like many other items knowledge is an abstract item. It cannot be measured using any gadget like thermometer used for measuring heat or formulae for measuring gravity or statistical criterion “worked at least one hour in gainful employment during reference work” for

measuring work in relation to labour force participation, unemployment rate and under employment rates. Analogously, features, characteristics, attributes and assemblages of contemporary ICT as well as its diffusion and usage patterns, impacts and effects on all spheres of life can be construed to provide surrogate measure for KBE activities, which can be monitored, measured and evaluated over time, by geography and demography.

3. Official Statistical System at a Crossroads Again?

It must be reckoned that the current official statistical systems that have been founded upon agro-industrial settings are conceptually not adequate in gauging new age phenomena (Ramachandran, 2008). Like in the past the official statistical system is once again at a crossroads for a review and realignment. It is simply because the information age policy demands significantly differ from preceding agro-industrial settings. Starting with its first complete census inception in 1911 (UN, 1987), followed by first national accounts statistical compilation in 1962/63 using value added expenditure approach the Malaysian statistical systems have come of age (Oines, 1976). In the sixties the official statistical system successfully met the policy needs of laissez-faire economy and rural economic development followed by agro-industry economy planning needs in the seventies and heavy industrialization strategies in eighties and thereafter. Despite major shifts in economic policies, the main motivations and aspirations for producing official statistics essentially remain the same till to date (Edmunds and Marchantt, 2008). Increasing revenue through enhancing productivity and competitiveness and ensuring delivery of public services of high quality have been typically top-priority in the provision and the usage of official statistics. With societal advancements statistics that support democratic accountability of Governments and addressing environmental degradation and climate change challenges have been added to the official statistical compilation list. However, compilation of ICT and KBE indicators as an integral of official statistical system yet to realize, despite top-down policy intervention in countries like Malaysia the policy excerpt extracted from the Eighth Malaysia Plan (2000-2005), is shown below:-

"Promoting R&D on Soft Factors (Chapter 13, Eighth Malaysia Plan (2000-2005)
13.66 The contemporary information and communication products and services such as radio, television, cellular phones, e-mail, Internet, computers and video conferencing are changing the way individuals, organizations and societies are communicating, interacting, doing business transactions and learning. Recognizing the ubiquity and the nature of emerging Information Age issues and challenges, the Government, in collaboration with the public policy and higher learning institutions, will undertake research on the soft elements of ICT development. These include monitoring and evaluating ICT impact on public, private and household sectors; Internet subscription and usage profile; emerging work culture characterized by the rise of knowledge workers and teleworking modes; measuring knowledge developments and the formation of information and knowledge-based societies through Knowledge Imperative Index (KIX) and Knowledge Economy Model (KEM) initiatives; and realigning trade, industry, product and occupational classifications to define the information sector".

4. Limited Understanding on ICT Beyond Technology

The shortfall in the policy implementation above partly could be due to lack of adequate allocations and resources or possibly the mainstream policy formulators and planners as well as the statistical community fail to comprehend adequately the potential capability of contemporary ICT beyond technology, that is, as a driver, enabler and transformer of economy and society (EPU, 2001). And as such, much of the current ICT data collection activities are technology centric as reflected in the Population & Housing Census 2000 (Census 2000), which marked the first initiative in the country on collecting data on ICT diffusion at household level (Ramachandran & Vigneswarer, 2011). The ICT items probed included were radio / hi-fi, television, video / VCD/DVD, fixed telephone line, cellular phone, personal computer and Internet. Thereafter, similar data have been collected whenever national household surveys were launched, beginning with Household Basic Amenities Survey (HBAS) 2004,

as a tag-on survey attached to the inter-census household surveys. The primary purpose of HBAS is to collect information on the level of basic amenities enjoyed by households; no probing was done at individual level. As such, ICT items are also considered as one of the basic household amenities in Malaysia, alongside with other items such as motor vehicles, air-conditioners, washing machines, refrigerators et cetera. Even a decade later in the Population & Housing Census 2011 and thereafter ICT data collection are carried out with the same objective, scope and coverage, indicating the official statistical system is not adequately sensitive to tremendous changes that have occurred in the ICT products and services landscape. For instance, it is a redundant effort to collect data on uptake of fixed lines, fax machines, video and DVD that drastically registering a declining trend at household and business sectors. It is also disappointing to note that new ICT items, in particular wearable technology in the form apparels and textiles such as Google glasses, smart watches, jewelry, headgear, belts, arm-wear, wrist-wear, legwear, footwear, skin patches, exoskeletons and e-textiles and Internet of Things embedded in smart devices are increasingly penetrating at household and enterprises level but yet to be considered in the ICT data collection activity.

5. On-going Statistical Measurement Challenges in Relation to ICT

5.1 Labour Force Measurement Criterion

The Internet phenomena have been continuously challenging the validity of certain statistical concepts and definitions that are currently in use. For instance, it is not uncommon to find students, housewives, retired people and elderly folks after mid-sixties being engaged into gainful employment vide Internet driven working arrangements for at least one hour during the reference week that Malaysian Labour Force Survey (MLFS) attempts to measure. Such changes in employment pattern directly pose challenges to the current definition on out-side labour force, which precludes those below 15 years and above 64 years old. Thus, affecting data quality that official statistical system is primarily concerned about. Tersely put, both the public policy formulators, development planners and official statistical community need to be consciously aware that the current labour dynamics is different from what have been experiencing in the preceding agro-industrial era. Similarly, since 2010 number of employed persons in the information communications has become a regular feature in the MLFS publication but the numbers have been fluctuating, from 207,600 in 2011 shored up to 209,2000 in 2012, before declining to 191, 300 in 2013. Very likely the undulating trend is due to sampling fluctuations that warrant due attention in the context of validity and reliability of official statistics.

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5.3 Shortfalls in the Definition of ICT as per MSIC 2000 and MSIC 2008

The definition of ICT has taken a new shape under MSIC 2008, which views the sector solely from services perspective. In the earlier MSIC 2000 the definition of ICT sector entailed in one part the manufacturing components and the other part was services components as per OECD recommendations. The manufacturing components entailed items such as manufacturing of office, accounting and computing machinery; electrical machinery and apparatus; radio, television, communication equipment and apparatus; and medical, precision and optical instruments, watches and clocks. The services components entailed only telecommunication and computer services. The MSIC 2008 classification, which was derived from International Standard Industry Classifications Revision 4 (ISIC Rev.4) recommendations, entails additional four division namely publishing activities, motion pictures / video / television/ sound and music production, programming and broadcasting activities and information activities have been added on in defining ICT Services, together with earlier telecommunication and computer services, thus causing disruptions in the time series compilation and more so, confusion among the user communities in in setting policy and business targets.

5.3 Understatement of ICT Services Sector

A close scrutiny of MSIC2008 revealed that the contribution of ICT Services sector is apparently understated owing to preclusion of a number of ICT relevant services. Namely, these include telecommunications wiring (43212), computer network and cables television wiring (43213), satellite

dishes installation (43214), wholesaling electrical and electronic services (46496), wholesaling of computer controlled machines (46593), retail sales of audio and video equipment (47420), musical records (47,620), Internet retail auctions (47914), credit card services (64922), telephone based information services (63990), R&D (72106), intellectual property (77440), call centre services (82200), desktop publishing (82192), mail box rental and mailing services (82195), digital printing (82196) and computer repair training (85222), as they are classified elsewhere as depicted by the codes in parenthesis. Further examination showed that some activities are not appropriately defined in the current classification, like publishing activities (58) entails not only online publishing but also traditional publishing of books, brochures and publications, which rightfully belong to industrial order, not KBE. Under estimation becomes accentuated when contribution of new age ICT services such as e-commerce, mobile commerce, outsourcing, broadband, electronic government services et cetera are classified under business services. Convergence of technology and contents, which mars the functionality of the product; for example, a cellular phone is used not only for communication purposes but also as a camera, digital diary, mail box, directory et cetera.

6. Emerging public policy and statistical concerns

6.1 Cross-borders data

The export and imports of ICT services data published by DOSM differed significantly from similar data compiled from internal records of MSC Malaysia programme, which is an ICT flagship managed by Multimedia Development Corporation (MDeC). Succinctly put, the export contributions from MSC Malaysia programme alone registered an increase from $1.24 billion in 2003 to RM11.5 billion in 2012 registering AAGR of 20.2% per annum. In comparison, DOSM data showed only RM8.706 billion in 2012 for ICT services exports, indicating large discrepancy in the data. Technically speaking, for having nationwide coverage DOSM figures should be higher than MSC Malaysia figure. Understandably, both organizations have different data collection approaches and strategies. Historically DOSM has a long track record of publishing exports and imports data on merchandized goods, sourced from the periodic returns furnished by the Royal Malaysian Customs of Ministry of Finance. Following the Government announcement on its aspirations to increase the share of services component in economy to reach 70% by 2020, DOSM in collaboration with Central Bank of Malaysia commenced compiling exports and imports data on ICT Services but using indirect estimation. In comparison, MSC Malaysia collects data from ICT companies that come under their purview, vide periodic reporting system. Moreover, MSC data is collected by technology cluster entailing software, mobility, embedded software & hardware (MeSH), shared services and outsourcing, creative multi-media, internet based businesses and institutes of higher learning (IHL) incubators, thus paving improved accuracy in the collection procedures. It is also pertinent to noteworthy that most, if not all of the agro-industrial based statistical compilations are confined to national boundaries including trade statistics, which have implicit processes and documentations providing the requisite control over flow of goods across borders. On comparison, in the information era the profound impacts of new age ICT are not only confined to national boundaries but also entail borderless phenomena that cannot be controlled easily especially detailing out capital flight across-borders vide online transactions is not easily tenable in the balance of payment accounting system by Central Bank of Malaysia. Such data discrepancies can be only sorted out provided data compilation agencies speak the same statistical language spearheaded by statistical leadership.

6.2 Responsive to emerging policy demands

Through aggressive industrialization strategy the unemployment rate in Malaysia has been well below 4% since early nineties, even during the Asian Financial Crisis 1997 and Global Financial Crisis 2009. In addressing tight labour environment situation, the country has been importing cheap foreign workers especially to meet the labour shortages in production, construction and food sectors. Similarly, the Government of Malaysia initiated knowledge intensive industries under Industrial Master Plan II and launching of MSC Malaysia programme in mid-nineties when many labour

intensive industries have begun to relocate to newly liberalized economies where the labour cost was cheap. Subsequently with the introduction of KBE the structure of Malaysian economy has been increasingly shaped and characterized by contemporary ICT led innovation, R&D, patenting intellectual property, commercialization of indigenous inventions, copyrights, trademarks, acquiring globally reckoned certifications pertaining to quality, process improvement standards and developing competent workforce. In support of KBE the country also has been aggressively importing highly skilled and competent workforce specializing in computing, information communications technology, multi-media and creativity disciplines, especially knowledge workers from countries like India. Despite local shortages, the country also has been experiencing outflow of talented workers especially ICT talents in search of better remuneration and career advancements in Asian and English speaking destinations. Organizations tend to suffer when competent staffs leave knowledge organizations where staffs are considered valuable assets not as liability as used to be in the traditional human resource and accounting practices. On the supply side the ICT enrolment numbers on an average almost have halved from 100,000 in 2000 to 50,000 by 2014 (PIKOM, 2014). Succinctly put, the MLFS that has been in force since mid-seventies failed to rise up to the occasion of measuring new labour dynamics, instead focus is still very much on gauging labour force participation rates and unemployment .

6.3 Technological Advancements and Statistical Processes

Despite technological advancements and broadband penetration standing at 67.1% in 2014, which was 31% five years ago, much of the statistical processes in the country are very much still manual. The first ICTization of statistical process started in 2008 when for the first time DOSM introduced Internet browser system and e-mail communications modes in data collection activities in International Trade Survey (Jaafar J., 2012). Thereafter, Census 2010 also saw adoption of e-mail communication system in managing “drop off” and “pick-up” services in cases where self-administered questionnaires system were deployed. (Jaafar J., 2012) but coding, editing and quality checking confined to manual procedures like in the past. Handheld devices in the collection of consumer prices data nationwide also have been introduced but unfortunately data uploading or processing are still being carried out manually, not in real time. Similarly, scope and coverage of online data dissemination system in meeting customer aspirations is confined to only certain publication series. Presumably, the ICTization of statistical processes would have brought about cost and time saving, accelerated response rate and increase in statistical operational efficiency as well as enhanced customer satisfaction (Jaafar, 2012; Lazar & Preece, 1999; Oppermann, 1995) but such achievements are considered only marginal anf more so, ad hoc given current rate and pace of technological advancements and digitization processes as well as online readiness of population and businesses.

6.4 Increasing Role of Private Sector in Official Statistical Compilation

In the MLFS compilation activity occupation and industry data have been disseminated only at one digit level as per Malaysian Standard Classifications Occupations (MASCO 1998) and MSIC 2008. Detailed data on ICT occupations at two or three digit levels pertaining to IT managers, computer professionals and electronics, telecommunication engineers, data entry operators and tele-marketers, though MASCO 1998 depicts occupation codes, but not published; rather subsumed under one-digit professional and managerial category. However, the demand for ICT occupation data at two or three digit levels are highly sought by both public policy formulators and private sector practitioners. In the absence of official data, in the recent years the mainstream policy makers and planners have turned to salary profile of ICT professionals published by The National ICT Association of Malaysia, popularly known as PIKOM (PIKOM, 2014). The salary profile entails average salary by industry, ICT segments, job category, work experience, employment size, location, job function and regional benchmarking. Being market focused, the quality of private sector data is typically questionable (Wykoff, 2000), which the national statistical office could play an extended role in validating the reliability of all private sector data before they are used in public policy activities.

Conclusion

The paper surmises that the foregoing issues and challenges could be duly addressed, perhaps by migrating current official statistical systems from agro-industrial based to information age statistical settings. Proposed strategies include reviewing validity of current statistical concepts and definitions in the context of contemporary ICT development; distinctly defining information sector as an economic sector by restructuring the current industry, product, trade and occupational classification systems; instituting holistic and pragmatic approach in instituting new data compilation mechanisms on ICT and KBE entailing new national level surveys and exploring administrative records of regulatory and development institutions; records probing ICT and KBE developments; technologizing statistical processes towards increasing efficiency and efficacy aimed at producing timely, valid and reliable statistics at reduced cost; exploring collaboration with private sector industry associations who have online and real time connectivity and interactivity with their members especially in data collection activity; and more importantly, enhancing competency of statistical community through interdisciplinary approaches. These require not only national level political will and administrative commitments but also advocacy and intervention by international statistical organizations especially United Nation Statistical Development (UNSD) and international statistical organizations who like in the past could play a significant role in shaping harmonious and comparable statistical system globally.

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