IDD Vision
The IOCOM Digest and Dialogue (IDD) is to be recognized as a world class outcome management Journal/Periodical.

IDD Mission
IDD’s Mission is to provide useful, timely and thought-provoking content in outcome management driven disciplines that addresses a broad spectrum of practices for knowledge exchange among academicians, researchers and practitioners.

IDD Objectives
1. Bridge the gap between academicians and practitioners in the discipline of outcome management
2. Provide a platform to academic researchers and practitioners for disseminating their research work.
3. Promote adoption of innovative outcome management disciplines
4. Highlight challenges being faced by the outcome managers (practitioners)

IDD Scope
1. The IDD journal will cover application of the cross cutting themes of Outcome management disciplines. No other journal in the world is having such orientation.
2. IDD journal’s main emphasis is on applied research.
3. IDD journal will accommodate articles based on both qualitative and/or quantitative approaches. However, preference will be given to mixed methods and action research.
4. Geographical territory of our journal is the entire globe.
5. Our target audience includes academics and practitioners in outcome management.
Introduction of IOCOM

IOCOM is a not-for-profit corporation registered in Canada. It is an organization of professionals, academics and an alliance of international and national associations, societies and networks engaged in the discipline of outcome management.

IOCOM invites professionals and academics to create a forum for the exchange of useful and high-quality theories, methodologies and effective practices in outcome management drawn from all management disciplines. IOCOM encourages management practitioners contributing to outcome management in all fields to make use of our resources, to participate in our initiatives and to contribute to our goals as individuals or through outcome management organizations. We offer global linkages to outcome management professionals, organizations and networks about events and important initiatives, as well as opportunities for exchanging ideas, practices, and insights with peers throughout the world.

**IOCOM’s Vision**

To create a world where professionals, academia, organizations and networks with a focus and interest in effective outcome management, collaborate to strengthen the theory and practice of the discipline that benefits society.

**IOCOM’s Mission**

To promote outcome management in the world at large through multidisciplinary professional and academic collaboration and the quest for evidence in decision making for business and organizational viability.

IOCOM organizational and individual memberships are free and provide the benefits of professional connectivity worldwide. Please visit our web site at www.iocomsa.org and join IOCOM.

Please send your write-ups and comments to:
editorsIDD@iocomsa.org
IOCOM Board of Directors

Mr. Sandiran Premakanthan (Chair)  Canada
Mr. Zicky Hammud (Secretary General)  Canada
Ms. Kunzang Lhamu  Bhutan
Dr. Ishwar Awasthi  India
Mr. Prabin Chitrakar  Nepal
Md. Abu Hanif  Bangladesh
Ms. Anzel Schönfeld  South Africa
Dr. Atiq ur Rehman  Malaysia
Mr. Awuor Ponge  Kenya
Mr. David Roberts  Australia
Mr. Nalin Wijetileke  New Zealand

Web/Postmaster

Mr. Raymond Peterkin  Canada
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Message from the Chair/President</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Editors’ Note</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>ARTICLES</td>
<td>Artificial Intelligence is reshaping the work force of tomorrow and impacting our lives</td>
<td>Sandiran Premakanthan</td>
</tr>
<tr>
<td>16</td>
<td>ARTICLES</td>
<td>Learning and Innovation in Vocational Education: Challenges and Recommendations</td>
<td>Atiq ur Rehm</td>
</tr>
<tr>
<td>22</td>
<td>ARTICLES</td>
<td>Cyber-attacks: Some lessons for fighting the menace of hackers</td>
<td>Nalin Wijetilleke</td>
</tr>
<tr>
<td>28</td>
<td>ARTICLES</td>
<td>Outcome and learning orientation of Big Data: Implications for South Asia</td>
<td>Zubair Faisal Abbasi and Atiq ur Rehman</td>
</tr>
<tr>
<td>34</td>
<td>Authors’ Introduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Call for Articles and Submission Guidelines</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Welcome to this issue of IDD, focused on “Learning and Innovation”, which is a timely theme for outcome management. If recent closures of major manufacturing facilities have demonstrated anything, it is that the needs of the workforce in the 21st Century are shifting rapidly. This includes training needs. With more and more plants closing, there is a surplus of workers with well-established skills who need to find a way to develop them further or take them in a different direction.

In Canada in November, autoworkers, governments and unions were rocked by a decision by automobile giant General Motors to close its production plant in the city of Oshawa, 60 kilometers east of Toronto, the nation’s largest city. GM also announced it would close four facilities in the United States. The moves are part of a global reorganization that will see the company focus on electric and autonomous vehicle programs. GM announced the closures as part of a sweeping strategy to transform its product line and manufacturing process to meet changing demand in the transportation industry. It said the plan will save it US$6 billion by the year 2020. The Oshawa Assembly Plant employs 2,522 unionized workers. During its heyday in the 1980s, it employed roughly 23,000.

Officials warned the closure would have a “devastating” impact on the region in the heavily urbanized southern region of the province of Ontario. The blow to the Canadian auto sector workforce will be far larger than the 2,500 jobs lost at GM. Auto parts manufacturers warned that the plan would compromise the jobs of as many as 15,000 Canadians working for auto parts suppliers. A total loss of around 17,500 positions would wipe out around 14 per cent of Canada’s 125,000 auto industry jobs.

GM is planning to work with local colleges and universities as well as the provincial and federal governments to provide workers with potential training and educational opportunities. Not a moment too soon, unfortunately. Experts in retraining and reskilling have warned for years that the age of automation is catching up with the current workforce.

An article titled “Retraining and reskilling workers in the age of automation” published by McKinsey Global Institute in January 2018 concluded that “executives increasingly see investing in retraining and ‘upskilling’ existing workers as an urgent business priority that companies, not governments, must lead on”.

By 2030, according to a McKinsey Global Institute report of November 2017, “375 million workers—or roughly 14 per cent of the global workforce—may need to switch occupational categories as digitization, automation, and advances in artificial intelligence disrupt the world of work”. This means the career paths of individuals need to be aligned with the kinds of skills companies require.

McKinsey’s survey, which was in the field in late 2017, polled more than 1,500 respondents from business, the public sector, and not-for-profits across regions, industries and sectors. Its analysis focused on answers from roughly 300 executives at companies with more than $100 million in annual revenues. About 62 per cent of executives believe they will need to retrain or replace more than a quarter of their workforce between now and 2023 due to advancing automation and digitization. The threat looms larger in the United States and Europe (64 per cent and 70 per cent respectively) than in the rest of the world (only 55 per cent)—and it is felt especially acutely among the biggest companies.

About 70 per cent of executives at companies with more than $500 million in annual revenues see technological disruption over the next five years affecting more than a quarter of their workers. As for solutions, 82 per cent of executives at companies with more than $100 million in annual revenues believe retraining and reskilling must be at least half of the answer to addressing their skills gap.

Now the bad news: only 16 per cent of private-sector business leaders in this group feel “very prepared” to address potential skills gaps, with roughly twice as many feeling either “somewhat unprepared” or “very unprepared.” The majority felt “somewhat prepared”. As McKinsey put it, this is hardly a clarion call of confidence.

A recent McKinsey study conducted by Peter Gumbel, editorial director of the McKinsey Global Institute, and Angelika Reich, examined how companies are preparing to avoid large scale job losses through a strategic learning and innovation strategy. In essence they warn business leaders that “finding and training the talent that companies will need if they are to thrive in the future has become a defining issue in an era of advanced technologies”. They added that the process of retraining or “reskilling” is inescapable.

So this is the challenge facing governments and business. This warning equally applies to outcome management professionals who come from varied disciplines and performing their roles in accomplishing organizational goals and their desired outcomes and impacts. We have to move with the current waves of change and prepare ourselves by diversifying our knowledge and skills set to meet the new future.
Again, we appeal to all IOCOM members: let’s hear from you. IDD needs writers from all outcome management disciplines to maintain a continuous flow of articles, short or long. Tell us about your experiences. Let the world know what you are doing. As always, the editorial team welcomes suggestions for improving the quality of the IDD. It’s your e-journal. Help make it world class!

Chair/President
Sandiran Premakanthan
Editors’ Note

We feel immense pleasure in presenting you the second issue of the IDD for the year 2018. The main theme of the issue is “Learning and Innovation”.

In this issue we have articles about Artificial Intelligence (AI) and how AI is reshaping the workforce of tomorrow and impacting our life in general. The article talks about disruptions organizations and businesses will face due to technological advances and robotics invasion of the workplace. Other articles focus on cyber-attack and lessons for fighting the menace of hackers; challenges and recommendations in vocational education; and, finally outcome and learning orientation of Big Data and implications for South Asia.

Readers are always welcome to provide their feedback and suggestions for improving the quality of the IDD Journal and for increasing its usefulness. Interested authors are requested to submit their articles for consideration for any of our upcoming issues. Even though several themes have been suggested for our upcoming issues, the next issue is on the theme of financial, accounting and banking ecosystems and sub-systems.

We invite you to submit other manuscripts that don’t particularly fall into any of these categories or themes. We are always excited about sharing new and innovative ways of looking at outcome management in the various disciplines and areas of work.

Further details about our submission guidelines can be found on page 35.

Editors

Atiq ur Rehman, Susanne Moehlenbeck and John Flanders
Artificial Intelligence is reshaping the work force of tomorrow and impacting our lives

Sandiran Premakanthan

From chatbots to cloud platforms to industrial robots, machines are edging their way into our lives, affecting how we live, work and entertain ourselves. Make no mistake: artificial intelligence (AI) is reshaping the work force of tomorrow and is having a profound impact on our lives. In my Chair’s message in this issue, I quoted the McKinsey Global Institute’s forecast of the magnitude of the disruption to the workforce by the year 2030 resulting from digitization, automation and advances in AI. According to the report, “375 million workers—or roughly 14 per cent of the global workforce—may need to switch occupational categories”.

This paper focuses on artificial intelligence: what it is and how it is reshaping the workforce of tomorrow for businesses and consumers alike. It reviews the automotive industry’s investment in AI-driven applications to produce safe and reliable automobiles and other areas of AI auto ecosystems such as cloud services, automobile insurance, automobile manufacturing and driver monitoring. It also examines what businesses and higher learning institutions are doing to meet the demand for a reskilled and retrained work force. And it looks at the impact of AI-driven apps on our daily lives from driving to the use of smartphones.

AI: Creating intelligent machines that work and react like humans

Artificial intelligence\(^1\) is a branch of computer science that aims to create intelligent machines that work and react like humans. It has become an essential part of the technology industry. The core problems of artificial intelligence include programming computers for certain traits such as: knowledge; speech recognition; reasoning; problem solving; perception; learning; planning; and the ability to manipulate and move objects.

Knowledge engineering and machine learning are core parts of AI research. Robotics is also a major field related to AI. AI’s roots go back much earlier than the 21st Century, according to an article on the brief history of AI by Ariella Brown\(^2\). In recent times, AI is a buzz word. It is reshaping the way we work and live. AI algorithms are used in forecasting, medical diagnostics, fraud prevention and business innovation, and in the automotive industry.

\(^1\) https://www.techopedia.com/definition/190/artificial-intelligence-ai

\(^2\) https://www.techopedia.com/a-brief-history-of-ai/2/33628
AI and ecommerce
AI has invaded ecommerce, which is on its way to grossing $700 billion by 2022. One author describes 20 applications for AI in ecommerce. They range from chatbots, AI product descriptions, AI and Internet of Things (IoT), AI and warehouse automation (AI robots), AI cybersecurity solutions, AI inventory management prediction, AI-based sales forecasting, AI supply chain management solutions and many others.

AI applications in the auto industry
The value of artificial intelligence in automotive manufacturing and cloud services will exceed $10.73 billion by 2024, says author Lyudmyla Novosilska in an article titled “5 Ways Artificial Intelligence is Impacting the Automotive Industry”. Her report states that “before the automotive industry is comfortable letting AI take the wheel (driverless vehicles), it first wants to put it in the co-pilot’s seat”. Dozens of AI sensors are employed to monitor and identify dangerous situations. AI can then alert the driver, or take emergency control of the vehicle to avoid an accident. Some features can help avoid accidents, and save lives in the process. They include emergency braking, cross traffic detectors, blind spot monitoring, and driver-assist steering (lane departure alerts), surround scan (360 degrees) and warning of objects in proximity. There are many other AI features, such as climate control and AI-based touch locking and unlocking of your vehicle, memory seat settings, and so on. All add value to your investment.

Driverless vehicles: Waymo’s way forward
Google’s Waymo AI software crunches data from the vehicle’s radar, high-resolution cameras, GPS and cloud services to produce control signals that operate the vehicle. Waymo is leading the way to the autonomous production vehicle market. Waymo’s AI software is way more powerful, not only in its response to what is happening in the vehicle’s vicinity. AI deep-learning algorithms can accurately predict what certain objects in the vehicle’s travel path are likely to do. For example, in the case of a pedestrian on the sidewalk, Waymo knows the individual might at any time step onto the street. The ultimate outcome of the AI automotive application is said to be that it is “constantly learning, and adjusting the rules it uses to navigate the road. Each vehicle makes the information it learns available to the rest of the fleet. The result is a virtual neural network of self-driving vehicles that learn as they go”.

AI cloud services
AI cloud platforms ensure the data needs of connected autonomous vehicles with an AI driver or vehicles equipped with driver assist are met. In October 2018, Volkswagen and Microsoft announced a partnership designed to transform the auto company into a digital service-driven business. This means Volkswagen customers see the value in cloud-based AI solutions through predictive maintenance and Over The Air (OTA) software updates for their entire brand of

3 https://igniteoutsourcing.com/ecommerce/artificial-intelligence-ecommerce/
4 https://igniteoutsourcing.com/automotive/artificial-intelligence-in-automotive-industry/
vehicles. Predictive maintenance means drivers need not worry about being stranded due to a component failure. AI can spot minute changes that may indicate an impending failure of a component by monitoring thousands of data points per second.

**Automotive insurance**
AI and the insurance industry have one thing in common: investing a great deal of time and money to predict the future. The insurance industry has embraced AI to the liking of customers to make risk assessments in real time to speed up the process of filing claims when accidents occur. A new buzzword, Insurtech, is the AI deep learning technology in the insurance industry. An AI-powered driver risk assessment creates risk profiles based on drivers’ individual risk factors found in big data. It is claimed by experts that rather than relying on driving history to set premiums, AI looks at many less-obvious factors that can predict how safe a driver is likely to be.

In May 2018, the Chinese auto insurance industry benefited by the release of the AI-powered video app, Dingsunbao 2.0 by Art Financial. The company solidified its position in the Chinese auto market with the introduction of Dingsunbao. The AI application allows drivers to do their own auto damage assessment for their insurance companies. The driver is guided by onscreen instructions on how to video the damages for the claim. AI tells the claimant how to have his vehicle repaired, and what will be covered by insurance.

There is no room for doubt that from the savings achieved by the Chinese auto insurance industry from the introduction of the Dingsunbao AI app, every automotive insurance company will eventually provide such an app to their customers.

**AI in automobile manufacturing**
The AI driving features introduced in this article showed us how AI is changing what vehicles can do. AI can also change how vehicles are built. Assembly robots have been used in manufacturing since the 1960s; what is new are the smart robots that work with their humans rather than alongside them.

In early 2018, the Hyundai Motor Group identified Robot-Artificial Intelligence as one of five areas of future innovation and growth. As reported in web wire on October 24, 2018, Kia and Hyundai have ventured into the robotics industry of the future. Kia and Hyundai are to develop robotics technology in three areas: wearable robots, service robots and micro-mobility. The report states that Hyundai Vest Exoskeleton (H-VEX) and Chairless Exoskeleton (H-CEX) industrial robots increase efficiency and prevent work-related accidents. The first H-CEX was developed for industrial use. It is a knee-joint protective device that helps maintain a worker’s sitting position. Weighing in at 1.6 kg, it is light, yet highly durable, and can withstand weights

---

5 https://www.webwire.com/ViewPressRel.asp?aId=230472
of up to 150 kg. With waist, thigh and knee belts, it can be easily fitted and adjusted to the user’s height. H-VEX is a device that alleviates pressure on a worker’s neck and back by adding 60 kg of strength to the user when their arms are used overhead. It is expected to be very effective at preventing injury and increasing work efficiency.

**Driver monitoring**
AI driver features not only watch the road; they can also monitor driver performance. The Israeli start-up company eyeSight\(^6\) has developed embedded computer vision and AI solutions to provide advanced driver monitoring capabilities for safer and enhanced driving experiences. eyeSight’s driver monitoring solution tracks the driver’s eyelids, gaze and head pose to assess the driver’s level of attentiveness and detect when the driver is distracted or shows signs of drowsiness. Additionally, eyeSight provides gesture recognition capabilities and driver identification for personalized and convenient driving experiences.

In September 2017, Euro NCAP, the leading European car safety performance assessment programme watchdog, tackled the prevalence of distracted driving by urging automakers to add driver monitoring technology such as eyesight to their vehicles by 2020.

**Time for retraining is now**
The continuous learning challenge for workers of today and tomorrow and consumers is echoed by the authors in an article\(^7\) titled “The Time for Retraining Is Now” in the April 2018 issue of the Massachusetts Institute of Technology’s (MIT) Sloan Management Review.

The authors say that with the development of more sophisticated artificial intelligence problem-solving approaches, the employment landscape will be changing rapidly. In recent months, we have learned that Amazon Go will be opening more cashier-less, no-salesperson stores and that a burger chain has “employed” a robot to flip its burgers.

These recent AI introductions confirm that times are changing and that the robots are here to stay. We are uncertain of the technological future and its impact on society. In anticipation of this future trend, the authors say “we need to prepare for different skill sets to meet different job requirements. We need to act now to enable current employers and employees to gain the skills they are going to need in the brave new world of AI technology”.

They quote some examples of what is being done by technology companies to:
- train young adults (IBM has designed Pathways in Technology (P-TECH));

---


\(^7\) [https://sloanreview.mit.edu/article/the-time-for-retraining-is-now/](https://sloanreview.mit.edu/article/the-time-for-retraining-is-now/)
• retrain existing employees (Bit Source LLC, a software development company based in Pikeville, Kentucky, is training Kentucky coal miners to become software developers); and
• use new and broader digital education to train their own workers (Cognizant Technology Solutions Corp., an IT company based in Teaneck, New Jersey, with over 250,000 employees, recently retrained over 100,000 in new digital skills).

Readiness of universities and businesses
Another McKinsey Report of September 2017 contains a commentary on “Learning innovation in a digital age”. The authors emphasize the need for education and training to keep pace with a rapidly changing workplace. They question, while exciting experiments are under way, is this enough?” The report cites an urgent need for innovation in learning and development as technology transforms the workplace. It draws on a series of recent discussions by members of the Consortium for Advancing Adult Learning & Development (CAALD)—a group of learning authorities whose members include researchers, corporate and non-profit leaders, and McKinsey experts.

Many CAALD experts were skeptical about the ability of universities to respond rapidly enough to meet the challenges. Fortunately, the findings are that innovation is taking place both at universities and businesses, including AT&T, Microsoft and the Massachusetts Institute of Technology.

MIT Sloan Management Review
It is appropriate to provide a summary of the findings of the MIT Sloan Management Review findings from the 2017 Artificial Intelligence global executive study and research. The research is based on a global survey of more than 3,000 executives, managers and analysts across industries and in-depth interviews with more than 30 technology experts and executives. The goal of this report is to present a realistic baseline that allows companies to compare their AI ambitions and efforts. Here are the major findings:

• The research concludes that the gap between ambition and execution is large at most companies.
• Three-quarters of executives believe AI will enable their companies to move into new businesses.
• 85% believe AI will allow their companies to obtain or sustain a competitive advantage.
• Only about one in five companies has incorporated AI in some offerings or processes.
• Only one in 20 companies has extensively incorporated AI in offerings or processes.
• Less than 39% of all companies have an AI strategy in place.

---

• The largest companies — those with at least 100,000 employees — are the most likely to have an AI strategy, but only half have one.
• Research reveals large gaps between today’s leaders — companies that already understand and have adopted AI — and laggards.

Here is what Microsoft’s director for data science had to say about a misunderstanding about AI and data. “A mistake we often see is that organizations don’t have the historical data required for the algorithms to extract patterns for robust predictions. For example, they’ll bring us in to build a predictive maintenance solution for them, and then we’ll find out that there are very few, if any, recorded failures. They expect AI to predict when there will be a failure, even though there are no examples to learn from”. The notion is that sophisticated AI algorithms alone can provide valuable business solutions without sufficient data recorded on the problem.

Final thought from the research: “AI cannot simply be accurate and high performing; AI also needs to satisfy privacy concerns and meet regulatory requirements”.

On a personal note, I have experienced a learning curve to use my smart phone, for example, and to learn about AI-based apps that affect my life. These include driver assist features in my vehicle, as well as controlling the lights and the thermostat in my house. Whether we are part of the workforce of tomorrow or a consumer, AI will impact all of us.

Definitions

Here are the definitions of the three core branches of AI.

**Knowledge engineering**

Knowledge engineering is a field within artificial intelligence that develops knowledge-based systems. Such systems are computer programs that contain large amounts of knowledge, rules and reasoning mechanisms to provide solutions to real-world problems.

**Machine learning**

Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.

---

10 [https://www.researchgate.net/post/What_is_knowledge_engineering](https://www.researchgate.net/post/What_is_knowledge_engineering)
Robotics¹²
Robotics is an interdisciplinary branch of engineering and science that includes mechanical engineering, electronic engineering, information engineering, computer science, and others. Robotics deals with the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing.

Learning and Innovation in Vocational Education: Challenges and Recommendations
Atiq ur Rehman

1. Introduction

Khizer Hayat, 29, a married man living in a remote village of Pakistan, was unemployed. After completing 12 years of schooling, he tried endlessly to get a job, but failed miserably. The floods of 2010 destroyed his house, and whatever savings he had went into rebuilding it. His situation was getting more dismal day by day. The burden of responsibilities was increasing, as his two children were growing, and his hopes for employment were fading. Then one day, Khizer got information about vocational training. So he decided to take a welding course at the Vocational Training Institute (VTI) in Dera Ghazi Khan, Pakistan, operated by the Punjab Technical and Vocational Training Center (PVTC). To his surprise, even before completing his training, he got a job offer from Imran Mechanical Works, which manufactures agricultural equipment. “I had lost hope,” he said. “I did not know how I would rebuild my life. But now I feel I am on the right track.” (TAVTTC, 2018).

There are numerous such success stories around the world. However, contrary to Khizer’s story, several studies show that the vocational system is not producing the desired results in most nations, except for some such as Germany and Japan. In many cases, the reverse has occurred. In Hungary, wage returns from vocational education have declined (Domján, 2010). Mass production of skills simply increases the supply of skilled labour, leading to a decline in real wage rates.

Even in more developed countries such as Australia, vocational education and training are being treated as a failure (Quiggin, 2018). Quiggin believes that vocational education and training (VET) have proliferated worthless qualifications, which can further increase inequality. Simply imparting training does not offer solutions automatically. There are some risks and challenges that undermine the outcomes of efforts related to VET. Hence, there is a strong need for innovative solutions so that desired outcomes of investment in VET are achieved and benefits are shared with the intended beneficiaries.

According to World Bank estimates, in 2015 about 736 million people (10 per cent of the world’s population) were trapped in the clutches of poverty, living on a per capita income of less than US$1.90 a day (World Bank, 2018). Could the vocational system be used as a tool for alleviating poverty on a mass scale?
This article examines challenges faced by the TVET system, highlighting room for innovations from the perspective of developing countries. It offers recommendations to promote innovations in VET.

2. Challenges

Vocational education and training in developing countries face several challenges. The main challenge is how to promote the social value of VET.

According to UNESCO-UNEVOC (2018), “the image of technical and vocational education and training (TVET) is often quite low in many countries. This includes those with advanced industrial economies as well those with developing economies”.

In a May 2011 report, the OECD said that VET has been neglected. “It has received limited attention compared to other parts of the education system and is often seen as having lower status.” But the report adds: “A high-skilled labour force may encourage investment in the country, increasing economic growth, while an employee’s skills may promote the skills of workmates (i.e. creating positive ‘spillovers’).”

In Uganda, it has been reported that parents discourage their children from joining vocational education (Kitubi, 2017). This issue is linked with another: that vocational education is usually considered as a career path leading to a dead end. In many cases, once a person enters it, he gets trapped and rarely finds a way out. This issue must be addressed with some innovative solutions. One way out is to promote entrepreneurship. If a skilled person follows a track of entrepreneurship, then options are wide and open. However, a major constraint for such individuals is that they are mostly starved for money. Even financial institutions don’t provide them any help, as they don’t have the collateral required for loans. Hence, innovative solutions have to be worked out to deal with financial constraints for these individuals.

Market returns from vocational education not encouraging

Returns from vocational education are not encouraging. Egypt is one of the few countries in the world that has a separate ministry for vocational education. Besides, a large number of youth join different types of vocational training programs.

More than half of all secondary school students join vocational education: 50 per cent in industrial education; 35 per cent in commercial education; 15 per cent in agriculture; and 5 per cent in hospitality.
Egypt allocates a considerable amount of resources for VET. In 2015, almost US$1.25 billion was budgeted for it. However, outcomes are disappointing. The graduates of vocational training lack skills that are required by employers (El-Galil, 2017).

The market often disapproves of VET. An imbalance in the demand and supply for skills puts skilled workers at disadvantage. It is the main reason that some cite the need for policy interventions. One problem is the gap between vocational education and academic education, which is obvious around the world.

Australia and England have focused on reducing the gap between vocational training and academic education (Ali & Caulier-Grice, n.d.). Luxembourg has included vocational training related subjects in the school curriculum. Hungary has included a course in entrepreneurship as part of its school curriculum.

The mobility of vocational graduates is also restricted, primarily because of issues related to the equivalence of such qualifications. Vocational education frameworks differ from country to country. Eventually, issues related to the equivalence of vocational certificates crop up when a skilled workforce moves from one country to another.

However, it is an encouraging sign that in some parts of the world, some consideration is being given to standardizing frameworks. The Bruges-Copenhagen Process is one such initiative. The objective of the Bruges-Copenhagen Process is to promote co-operation in vocational education and training in Europe. It is progressing toward developing a single framework for transparency of competences and qualifications.

3. Recommendations

The TVET system needs innovations for achieving value for money and the desired results. Here are some suggestions:

- Vocational education is costly. Its outreach is even costlier. However, it is a good omen that information technology (IT) has a potential to help in addressing this issue. Technology not only increases the reach of vocational education, it increases its effectiveness, too.

- One assumption is that the vocational system has no role in innovations, rather that its main objective is to promote the adoption and diffusion of innovation. This is problematic and is causing a barrier to promoting innovations. The fact is that innovations can come from anyone -- from the experiences of individuals, private and public institutions, research and development organization and communities. Governments can work out a clear policy agenda for innovations. Here it is crucial to understand the dimensions of performance: cost, quality, speed, flexibility and dependability (Slack et al., 2004). When designing any
learning and innovation model, we need to prioritize performance objectives. To achieve any of these objectives, policy makers need to design target-oriented strategies. These may include changes in the ways of doing things (processes), introduction of a new technology or introduction of a new product or a service.

- A good performance management system needs to be put in place, covering the entire spectrum from community to TVET, from industry to policy makers, and from academia to research and development organizations. Creative minds should be posted on tasks related to performance management so they can play their creative roles in not only measuring innovations in the system, but also working out creative solutions to catalyze the process of innovation.

- No matter how small an innovation is, it must be valued. The addition of a small value in an existing technology/trade can make a big impact. Developing countries can learn from the experience of Germany. In 2014, Germany gave awards for outstanding innovations in vocational education; each amounted to 3,000 euros (BIBB, 2014).

- Innovations in vocational education programs may be linked to the UN’s Sustainable Development Goals (SDGs). Goal 9 under the SDGs is related to innovations. It is stated as: “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”. Another relevant goal of SDG is SDG4 which reads: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. Linking VET with SDGs will help in allocating resources and monitoring performance.

- Developing countries can take advantage of the experience of the countries, such as Germany (Lawlor, 2018) Japan and Korea where VET is considered successful.

4. Conclusion

The vocational education system has tremendous potential for alleviating poverty, but it has not yet been unleashed fully.

VET can help in tapping an untapped potential if targeted well. The innovation agenda should be linked with prioritized performance objectives (speed, cost, quality, dependability and flexibility) depending upon the local product market and social system before devising strategies for promoting innovations.

A culture of innovation must be nurtured through planned intervention. Small, incremental improvements in the vocational system can be triggered by putting in place a series of attractions for innovations such as rewards, recognition, and so on.
References


Cyber-attacks: Some lessons for fighting the menace of hackers

Nalin Wijetilleke

Introduction

Early in 2018, news broke that a political consulting firm, Cambridge Analytica, had harvested raw data from up to 87 million Facebook profiles without their consent and used it for political purposes. The scandal precipitated a massive decline in Facebook’s stock price and demands for greater protection for consumers in online media.

Are we learning anything from cyber-attacks? Many managers find that hard to answer. Today’s business landscape is in a state of constant flux. Cyber threats are one of society’s main concerns. They are not only increasing, they are becoming complex. Such threats have manifested into deadly incidents impacting organizations and society, both on a physical and non-physical level. Managing these threats is a challenging task, and many organizations really do not know how to safeguard themselves. Good examples of recent cyber-attacks are in August 2018, hackers had targeted websites and login pages of 76 universities in 14 countries. The attackers managed to steal the credentials of users who attempted to sign-in, gaining access to some vital records and intellectual property, belonging to the universities.

Also, in August this year, an international phishing campaign against 2700 bank domains, including Bank of America, Citibank etc. was launched, posing off as employees of an India based bank.

In October 2018, British Airways informed that more than 185,00 of their customers’ data had been compromised in a cyber-attack. The stolen data included payment card details of their customers.

This article provides awareness of cyber threats in an increasingly evolving digital business world. It alerts business leaders to invest in organizational experts trained in cyber resilience and security to minimize the threat through systematic approaches. It highlights the need to create a cyber security culture to mitigate threats, as well as the consequences of failure if no action is taken. Taking the right steps will in the long run help organizations remain viable and profitable.
Cyber security vs. information security

Often there is confusion between the terms cyber security and information security. Are they one and the same? The answer is ‘no’. An organization’s information can be stored in various forms, such as paper records, photographs, digital media (electronic), and so on.

When data are in ‘electronic’ form, the information is termed ‘cyber’. We can say that cyber security is a subset of information security. Information security ensures protection of confidentiality, integrity and availability of data and information, regardless of whether it is in digital or another form.

Some organizations more at risk

Some organizations are more at risk of cyber threats than others. The level of threat depends primarily on the nature of the business in which the organization is engaged, not its size. Often there is a misconception that the larger the organization, the greater the risk or the greater the vulnerability to cyber threats.

Organizations such as banks and financial services entities have value-based transactions. Hospitals and health service providers possess sensitive patient data; some data service providers hold their client data and facilitate data storage.

Others store valuable patents, designs and intellectual property of their own or of others, while public sector ministries and departments hold sensitive public data. These organizations are more at risk and are obvious potential targets for attackers.

Impacts of cyber-attack are harsh

Cyber-attacks, or breaches, result in a dangerous exposure of an organization’s assets. They are engineered by unauthorised masterminds, taking advantage of vulnerable information technology systems. The assets may include protected data, client or patient information and records and intellectual property as well as money, physical systems, plant, buildings or even the organization’s reputation.

Unlike in physical warfare, cyber war happens in the ‘dark’. That makes it so challenging, not only to identify the attacker and determine the location of the attack, but to figure out how to protect ourselves. It helps to realize that predators are everywhere! Their intentions are wide and varied. Some target groups for ransom or money, while others aim for intellectual property, personal attacks or sexual harassment. Some hackers are politically motivated, while others just
want to create mischief. Most are unscrupulous and smart, and they can bring an organization to its knees.

**Business Continuity Institute survey**

The 2018 Cyber Resilience Report of the Business Continuity Institute revealed interesting facts relating to different types of cyber-attacks. The most common cause of cyber security incidents appears to be phishing attacks, comprising 72% of all such incidents. Other common causes were malware, ransomware, denial of service attacks and software obsolescence.

The survey also showed that:

- Two-thirds of respondents said they suffered at least one cyber disruption in the 12 months prior to the survey;
- A positive 57% reported high top management commitment and 85% had business continuity arrangements in place;
- 88% said they only take one day or less to find out about a breach.


How should organizations address this menace? There are several good practice frameworks available and organizations should adopt what is ‘fit-for-purpose’. The fundamental approach is to base the risk mitigation approach on the three pillars of cyber security: people, processes and technology.
Cyber security culture

A good cyber security culture is a must. With well-crafted policies and the right monitoring tools, organizations can achieve a good level of comfort. A good culture is equally applicable, whether the organization is large, medium or small. Smaller organizations should be vigilant and guard themselves against cyber-attacks, as they are the ‘soft targets’.

We have seen in many organizations in which a ‘blame culture’ prevails; these have been very vulnerable to cyber-attacks and disruptions. A cyber resilient organization will have a consistent approach toward educating their employees with good rules and guidelines, built on a well-designed framework. It is an ongoing effort and organizations must keep a close eye on the blind spots.

Checklists: Simple, yet remarkably effective

Checklists are simple, yet remarkably effective. However, they should consist of more than ‘ticking the box’; they must logically address the issue. Cyber threats must be taken seriously. Any vulnerability in the system can destroy a business completely.

- **Assign a senior staff member to be responsible for cyber resilience and security.** He or she should be reporting to the top management. When senior managers show interest and involvement, the outcome becomes effective. Depending on the size of the organization, it could build a cyber resilience team, with members from IT, legal, forensics and operations.

- **Establish well written cyber policy.** This should explicity set out what people must do and not do. It should also spell out key cyber security roles and responsibilities. It can be appropriately included in the Information Security Policy.

- **Ensure applicable legal, regulatory and compliance requirements are built into policies and procedures.**

- **Prioritize areas of business and associated information assets that should have highest protection and build robust controls on those initially.**

- **Establish the validation and testing regimen of controls that are implemented.** Any non-conformance or risk issues should be reported to senior managers. In addition to ‘self-assessment’, periodic independent audits and reviews are extremely beneficial. Well planned pen testing and red-team exercises are essential to remain free of trouble. The entire digital system, including the network, is scanned for vulnerabilities that an attacker could exploit. The ‘red-team’ testing simulates real-life scenarios so the system
undergoes rigorous testing. Expert testers use a wide range of tools to pinpoint weak spots and vulnerabilities in the IT infrastructure.

- Establish a ‘management review’ team consisting of senior managers and define the cycle to monitor the information security performance, including related risk issues and resource requirements as well as audit findings.

- Ensure security processes are effective, that is, they are not too complex and they have adequate controls that are continually improved.

Unforeseen events

It is hard to predict when things will go wrong. Data theft and cyber-attacks are becoming a common phenomenon. On the positive side, every incident is a learning opportunity. If the lessons are systematically captured, indexed and documented, they will be a great resource in reducing cyber risks.

The fight against attacks is an ongoing effort, applicable to projects and programs or in the overall governance. Effective capture of data and information must be encouraged by the top management and must be a part of the organizational culture. The capture of lessons from cyber-attacks and recycling the lessons can be graphically represented as such:

This is a basic model, which can be further developed and adapted to suit the scale and needs of the organization. The organizations that have a learning culture and systematic capture of events and incidents, be it cyber or any other business disruptions, have achieved phenomenal results. The number of attacks is proactively reduced and even if an incident occurs, the response teams search out patterns and similarities to address the issue quickly and effectively.

Future challenges

Digital transformation will continue to evolve rapidly in future, empowering users and businesses. The volume of data is expanding exponentially; this presents opportunities for hackers to modify or alter the data, or even break into data storages for monetary or personal gain.
To assess cyber risk in real time is a challenge. However, past incidents provide clues to build greater visibility. Cyber security professionals will be able reduce the complexities in the controls and focus on protecting hardware and software that really matter. Businesses will proactively protect themselves and be more resilient.

References
Outcome and learning orientation of Big Data: Implications for South Asia

Zubair Faisal Abbasi and Atiq ur Rehman

“Land was the raw material of the agricultural age. Iron was the raw material of the industrial age. Data is the raw material of the information age.”
(The Industries of the Future by Alec Ross p. 152)

Introduction

Why measure outcomes? Quite simply, managers require some means of determining whether their programs are effective. They must determine what is strategically important for their organization, develop indicators to be measured and identify measurements for the indicators. Then they must track those significant indicators. Every organization hopes to deliver quality services; measuring outcomes helps managers understand whether theirs does.

South Asia has a centuries-old tradition of collecting data to monitor different types of government interventions. During the British Raj, data were collected on prices and living conditions of people, and on social, political, and economic histories of administrative territories. These data were made part of the official district gazettes that were published periodically. Over time, the spectrum of data collection started to expand; many indicators of social and economic conditions were added in different kinds of surveys.

These indicators included integrated household surveys, demographic and health surveys, social and living standards measurement surveys, industrial and agriculture census, and the census of population.

The use of data gradually evolved into a full-fledged discipline. Nowadays, data have become an important element of decision-making in governments. Even the corporate sector and non-profit sectors are extensively taking advantage of innovations in the field of data science. These innovations have not only contributed towards achievements of desired outcomes, but also fostered the process of learning.

This article presents an overview of the use of “big data” in development sector and poses challenges on this front. It presents a list of common problems with datasets in use in developing countries; it highlights how data analytics can help fix those problems; presents an overview of the use of big data in sustainable development, politics and corporate world; and highlights some
challenges. Finally, it offers suggestions for promoting big data use in the eight nations of the South Asia Association for Regional Cooperation (SAARC).

**Common problems with datasets**
The quality of data matters a lot. Without doubt, it is a key factor behind the success of developed countries. The Economist newspaper rightly notes: “There are troves of good data on the American economy: that makes it easier for researchers to focus on the country”13. The reverse is true for most developing countries. It is often argued that the data collected in many less developed countries have serious problems as well as shortages14. Some of the issues related to data are as follows:

1. There is a serious shortage of data for analysis and policy advice15;
2. Data may not be collated for two or three years after collection. By that time, issues may have changed and the data may not reflect the true picture required for policy action;
3. Data collection may be hampered by various situations, such as civil strife; respondents who fail to respond honestly to questionnaires; a lack of logistical support to access locations; poorly trained enumerators and poor quality assurance mechanisms; insufficient budgetary allocations; and a sheer lack of autonomy in statistical offices;
4. Much of the collected data may not be designed to inform policy analysis; and,
5. Most of the data may not be shared with people.

**Big data as a solution**
What is “big data”? According to Furht & Villanustre (2016): “Big Data represents the general realm of problems and techniques used for application domains that collect and maintain massive volumes of raw data for domain-specific data analysis”16. Extremely large datasets are available in many forms, structured or unstructured. With the advent of modern information communication technologies (ICTs), such as satellite images, videos, text messages, internet, emails, biometric systems and social media websites, new sources of data have been created.

We are living in the regime of data revolution. According to estimates, roughly 90 per cent of the available data today was created in the last 20 years and is estimated to grow at the rate of 40 per cent a year17.

---

14 For details see http://www.pbs.gov.pk/sites/default/files/articles/Elahi%20Article%20-%20For%20FBS%20Homepage.pdf [Last accessed: November 15, 2017]
However, efficient and effective use of that data is a big challenge. Hence, big data show “how a large amount of data can now be used to understand, analyse, and forecast trends in real time”\(^\text{18}\).

**Uses of big data**

The use of big data has demonstrated benefits in many domains:

- **Monitoring the progress towards achievement of SDGs:** Advancements in big data can help improve the effectiveness of poverty reduction programs, as well as increase efficiency in policy actions. The most important point is that the countries in South Asia must learn to use big data in the context of measuring progress towards sustainable development goals (SDGs) and also developing targeted interventions for measuring the impact of the development interventions.

  In this way, big data analytics can help governments to execute mid-course corrections for better development outcomes. There is a potential to learn from the experiences of different countries, notwithstanding. However, looking at the current state of cooperation in the SAARC region, it seems advisable that multinational companies and international financial institutions such as the World Bank should work closely with governments, the private sector, and civil society organizations to help use big data analytics for social and economic development causes such as health, education, gender-based violence, deforestation and crime control, among others. This would set the stage for creation of an eco-system for cooperation. The Global Pulse - an initiative of the United Nations -- is also a step towards the promotion of the use of big data for sustainable development.

- **Measurement of urban land use:** The World Bank has used satellites to look at images of earth at night – often referred to as “night lights” - in different locations of South Asia. Using complex modeling, the Bank could show a correlation between economic growth and the night lights of megacities.

  At the World Bank, the “South Asia unit uses night lights data that indicates how overall urban land use is increasing over time. Not only are Indian cities growing in size, but the intensity of activity within certain urban regions (such as Coimbatore) is growing as well. In fact, the areas registering the fastest rates of growth are those in close proximity to existing cities – Delhi, Hyderabad, Lahore, Mumbai, etc”\(^\text{19}\). Night light shows economic activity, prosperity, and production of more goods and services. An interesting aspect of the indicator of nightlight is that it is same everywhere and “an excellent indicator of economic activity”\(^\text{20}\).


\(^{19}\) For details visit [https://blogs.worldbank.org/category/tags/nightlight](https://blogs.worldbank.org/category/tags/nightlight) [Last Accessed: November 17, 2017]

At the same time, there are many other sources of big data such as cellular companies that have data on text messages and calls, and there is whole range of social media providing an enormous amount of data. All these sources of data can be and should be used for economic measurement.

- **Disease control**: The Government of Punjab, with the help of Teradata (an IT company), worked on a dengue fever epidemic project. It used big data analytics to understand the incidence and spread of the disease and develop interventions to control the menace, which was killing people. It has been reported that the interventions were successful.

- **Learning through big data**: Big data offer many avenues for learning, which can be used in achieving greater effectiveness of the development programs through better designing and more efficient execution.

- **Taxation collection**: Another notable intervention comes from Sindh province where land records and electricity metering systems are being digitized. According to media reports, the data on electricity use and land ownership will help improve economic governance, as well as create better policy actions for tax reforms (working with the Federal Board of Revenue) and provision of economic incentives.

- **Measurement of poverty**: Big data offer numerous opportunities for more accurate estimation of poverty. However, there some challenges, too. A good example is from the SWIFT Project of the World Bank where small survey and big data are being simultaneously used for poverty estimation. It is said:

  “Like typical “Big Data” approaches, SWIFT applies a series of formulas/algorithms, as well as the latest ITS technology, to cut the time and cost of data collection and poverty estimation. For example, SWIFT does not estimate poverty from consumption or income data, which is time-consuming to collect, but uses formulas to estimate poverty from poverty correlates, which can be easily collected. Furthermore, by embedding the formulas into the SWIFT data management system, the correlates will be converted to poverty statistics instantly. To further cut the time for data collection and processing, SWIFT uses Computer Assisted Personal Interview (CAPI) linked to data clouds, and if possible, adopts a cell phone data collection approach.”

- **Big data in politics**: One of the biggest and most successful uses of big data for politics occurred during the two presidential campaigns of former U.S. President Barack Obama. In

---

21 For details, see [Tech Experts Dive into Big Data Potential](https://tribune.com.pk/story/1151447/telecommunication-tech-expert-dives-big-data-potential-pakistan/)

the data analytics, emails were analyzed in real time to understand which variant of email message was able to generate more funding. It made it one of the most effective campaigns.

- **Market intelligence:** Pakistan has also started using big data with various degrees of success. For example, there is evidence that telecommunication companies in Pakistan are investing in technologies associated with big data and deep analytics. The drive is coming from multinational companies that want to understand the markets and from their customers in the face of market competition.

In addition, global market players are also picking the best brains from Pakistan for data science advancements. Pakistan is also witnessing a government and private sector cooperation in big data. Teradata, a U.S. based firm, works closely with National Database and Registration Authority (NADRA) in analyzing demographics and support intelligence, and also provides help in criminal investigations.

**Challenges in using big data: volume, velocity and variety**

There are many issues and challenges in big data analytics for South Asian countries. As data increase, so do the complexities. It is said that in every nine-second one petabyte (equivalent to one million gigabytes or $10^{15}$ bytes) of data is added in the global virtual repository. So the volume and velocity of data have increased enormously.

At the same time, variety in data has also increased exponentially. Now there are emails, videos, photos, text messages, social media content and calls, in addition to existing databases of economic indicators. Over and above, most of the data are unstructured and multilingual, requiring filtering and storage, and retrieval and discussion before even starting analysis.

However, big data technologies are fast solving the problems of inter-language communication; real time auto-translators have almost demolished the language barriers. The good news is that the emerging technologies, both hardware and software, are not only capable of analysis, but are increasingly being enabled to neatly undertake analytics and generate reports so desperately needed for measurements.

We do not need super computers to develop and use algorithms for big data analytics because computing power and software functionality are increasing very fast. An even bigger challenge posed by big data is security, in addition to issues related to privacy.

---

23 Ibid. p. 155.
Suggestions
The current state of statistical cooperation needs a thorough rehashing of policies and practices related to data management in South Asia. The national governments need to understand that governments and public policies now need rapid action to stimulate responses in economic and social development fields.

The time lag in stimulus and response creates more problems than it solves. In fact, big city management in South Asia really needs smart data collection, interpretation and reporting platforms. Many of the problems such as poverty and hunger that have endangered South Asia can be solved with fintech and smart precision agriculture, which are nothing but big data-based interventions. Big data is said to be both a telescope and a microscope.

On a note of caution, although there are serious security concerns about data protection and data governance, there are solutions provided in new technologies as well. Nations need to explore security options seriously so that a confidence level is achieved for further advancements. South Asian countries need to harness those technologies and bring in private, public and the third sector to rebuild and strengthen institutional arrangements for sound evidence-based and policy relevant economic measurement systems.

A real south-south cooperation (this terms is used to denote cooperation among developing countries in the form of sharing resources and knowledge) can help change the economic measurement and policy action landscape in the region. In this context, some recommendations are offered here:

- The eight SAARC countries should develop a program for big data in their human resource development units;
- Scoping studies are needed to incorporate regional advances in big data uses, advancements and plans;
- Governments must jointly, and in stand-alone fashion, engage in open dialogue with multinational private sector firms to assist their national statistics bureaus;
- Governments should link up with the development agencies such as the World Bank and social and economic research organizations to raise awareness about the new technologies and new data; and,
- SAARC countries must organize serious dialogue and high level commissions to report on advances in big data in the region and how intra- and interregional cooperation is possible.
Introduction of authors

- **Atiq ur Rehman (Malaysia)**: He holds a PhD in HRD. He is the Chief Operating Officer of People Talent Tech, Sdn Bhd. Cyberjaya, Selangor, Malaysia. His email is: atiq787@gmail.com

- **Sandiran Premakanthan (Canada)**: He is the Founder President/Chair of IOCOM. He holds a Master's in Business Administration (MBA) from the University of Ottawa with concentration in Finance, Accounting, Auditing and Evaluation. He is the President and Principal Consultant of Symbiotic International Consulting Services (SICS), Ottawa, Canada.

- **Nalin Wijetilleke** is a Business Continuity and Organisational Resilience professional with over three decades of industry experience across various countries. Nalin is a thought leadership speaker, mentor, trainer and an advisor, based in New Zealand. He is the Managing Director at ContinuityNZ – a consulting and training entity supporting businesses to be resilient against unforeseen events. They help businesses to build ‘fit-for-purpose’ frameworks and management systems. Nalin is also the country representative/board director of the Business Continuity Institute – Australasia chapter. Contact – nalin@continuitynz.co.nz

- **Zubair Faisal Abbasi** is an international trade, industry, and development specialist. Since 1998, he is associated with the development sector and has worked with many national and international development players such as United Nations University (UNU), International Development Centre of Japan (IDCJ), Oxford Policy Management (OPM), the United Nations Industrial Development Organization (UNIDO), United Nations Development Programme (UNDP), and National Commission for Human Development (NCHD).
Call for articles

Volume 4, No. 3 – July-Sep 2018

**Issue 4.3: Financial, accounting and banking Ecosystem**
Sub-themes: Financial ecosystem - formal and informal, Banking ecosystems, digital currency, fintech, cryptocurrency, financial inclusion, innovative financial solutions for poor

*Last date for the submission of articles: 15Feb, 2019*

Volume 4, No. 4 – Oct-Dec 2018

**Issue 4.4: Supply Chain Ecosystem**

Sub-themes: Supply chain ecosystem, Supply chain visibility, Green supply chain, Risk and supply chain resilience, Integrated logistics hubs, One Belt One Road

*Last date for the submission of articles: 15 March, 2019*

General Submission Guidelines

| Words limit: 1500-1750 |
| Referencing Style: APA |
| Font size: Times New Roman, 12 pts |

**Previous issues** are freely accessible: [http://iocomsa.org/node/121](http://iocomsa.org/node/121)

**Send your articles to:** editorsIDD@iocomsa.org

Dear Sir/Madam

The IOCOM Digest and Dialogue (IDD) is an e-journal of the International Organization for Collaborative Outcome Management (IOCOM). It is web-based openly accessible periodical published on a quarterly basis. Its readers include members of the IOCOM present in more than 80 countries with a distribution of about 5000 active readers. Readers tend to be (managers, directors, consultants etc., ) with an interest in exploring how to improve the delivery of outcomes across diverse societal sectors.
The editorial team invites you to write 2000-2500 word articles on any of the outcome management ecosystems and sub-themes. Articles on a chosen sub-theme should address the impact or influence on targeted populations in society. Please e-mail your interest to write an article indicating the title and an abstract of about 100 words.

Outcome management ecosystems

This concept of business ecosystems could be adopted to develop a tree of outcome management ecosystems. Here are some examples of outcome management ecosystems:

- **Leadership and people management ecosystem and subsystems**: sub-themes: Leadership development, leaders & managers, union-labour management, strategic planning and management, facets of human resources management; building & leading teams, negotiation and conflict resolution, complex employee behaviours in the workplace; motivating people, recruitment, retention, staff/employee appraisals, career & professional development, building employee capabilities, stress management, work-life balance, women & gender studies, organizational justice, participatory management.

- **Financial, accounting and Banking ecosystem and sub-systems**: corporate finance, international finance, forensic accounting and fraud investigation, financial economics; cost-benefit analysis, contribution analysis, banking ecosystems: money laundering, digital currency, fintech, cryptocurrency, financial inclusion, innovative financial solutions for poor (micro financing); financial insurance; financial risk management: risk & loss control management.

- **Business Management/Administration**: business economics; business law, organizational behaviour, business ethics; business continuity, management reporting.

- **Oversight management ecosystem and interconnected sub-systems**: evaluation, total quality management (TQM) and ISO family of standards; continuous improvement, auditing ecosystems: Auditing Environmental and

- **Government and Non-government organizations management ecosystem and sub-systems**: Good governance, organizational diversity, gender and minority issues at workplaces, cultural diversity, diversity and talent management, social and functional categorisation, diversity and ethical issues.

- **Digital economy management ecosystem and sub-systems**: Digitization, automation, digital transformation, transparency in e-government, e-democracy, citizen-centric e-government, development of smart cities, integration of e-government initiatives, challenges to digital governments, managing change during the implementation of e-government initiatives, trends in e-governance.

- **Information technology and Information management ecosystems and sub-systems**: Information resource management; information and communication technology (ICTs); digital preservation, cybersecurity, internet, data ecosystem including big data, data analytics; artificial intelligence, blockchain, machine language.

- **Learning and Innovations Ecosystem, sub-themes**: Management of Innovation; Learning ecosystem, learning culture, learning fit, measurement, innovation ecosystem, start-ups ecosystem, technology eco-system; innovation, law, and technology.

- **Industrial/Manufacturing management ecosystems and sub-systems**: Product design and development, Production management; Plant maintenance; Statistical Quality Control, Quality Assurance; Productivity sciences ecosystems: Industrial Engineering/Work study (Motion & Time Study), Method Study (Process Re-engineering), Work Measurement, Ergonomics and Workplace design; Operations management; Robotics, Marketing and distribution.

- **Supply chain management ecosystem and sub-systems**: Logistics, procurement, product life cycle management, asset management, supply chain
planning, supply chain enterprises applications; supply chain visibility, green supply chain, risk and supply chain resilience, integrated logistics hubs, One Belt One Road (OBOR).

● **Engineering Management Ecosystems and sub-systems:** civil Engineering; Mechanical Engineering, Electrical and Electronics Engineering, Aeronautical Engineering, Architectural Engineering, Computer & Software Engineering, Environmental Science Engineering.

● **Agricultural management ecosystem and sub-systems:** agricultural policies, agricultural management services, food security and environment, sustainable agriculture, gender in agriculture, trade of agricultural commodities, World Trade Organization (WTO) agreement on agriculture, use of digital technology in agriculture, land grabbing, natural disasters and resilience;

● **Health management ecosystem and sub-systems:** patient care, health outcomes and quality of life; health information systems ecosystem: eHealth: informatics, innovations and information systems; occupational health & safety: law & regulations; occupational hygiene; health law, ethics, & policy; health administration, quality of life, health emergency response management, health services research, pharmaceutical outcome research management and policy.

● **Criminal Justice administration ecosystem and sub-systems:** criminal law; Law enforcement (law & order), legal administration, offender (correctional) management; parole system, crime & socio-Legal Studies, e-justice.

● **Education management ecosystem and sub-systems:** Educational administration; e-educational environments; Educating citizens of the 21st century; collaborative learning culture; collective intelligence; emotional education (social and emotional well-being); ecology of learning ecosystem: families, schools, community, networks and society.

● **Four possible levels of outcome management ecosystems and sub-systems:**
  ◆ Those driven by clusters of management and technical disciplines;
◆ Those driven by sector agendas: agriculture, education, health, social services and so on;
◆ Those driven by national (country) level results agendas (political agendas); and
◆ Those driven by international and global agendas: climate change, sustainable development goals, World Health Organization (WHO) and other United Nations (UN) agendas.

General Guidelines: 1) Referencing/citation style: APA (6th ed.); 2) font type and size: Times New Roman, 12 pt. Send your articles to: editorsIDD@iocomsa.org Authors are encouraged to view previous Issues of the IDD which are freely available at: http://iocomsa.org/node/121.

With kind regards

Editorial Team