

**A DOCUMENTATION
ON THE**

4TH

MINDANAO POLICY RESEARCH FORUM

**HARNESSING THE FOURTH
INDUSTRIAL REVOLUTION IN
MINDANAO: CREATING OUR
FUTURE TODAY**

September 11, 2018

The 4th Mindanao Policy Research Forum “Harnessing the Fourth Industrial Revolution in Mindanao: Creating our Future Today” took place on September 11, 2018. The said event was jointly organized by the Philippine Institute for Development Studies (PIDS), Mindanao Development Authority (MinDA), and the University of Science and Technology of Southern Philippines (USTP).

OPENING CEREMONIES

The Opening Ceremony was held at the USTP Performing Arts Theater located at the 6th Floor, Engineering Complex. The Invocation and the National Anthem was led by the USTP Sanghimig Corale. The Welcome Remarks was given by Dr. Rosalito A.

Quirino, OIC-President of USTP. The Opening Remarks was delivered by Dr. Celia M. Reyes, President of PIDS. The Keynote Address was given by Cagayan de Oro City Mayor Hon. Oscar S. Moreno. The Ribbon Cutting Ceremony for the Opening of the Exhibit was held next, which commenced the opening ceremonies.

Dr. Ismael N. Talili, a professor of Research and Communication in USTP was the Master of Ceremonies.

PRESS CONFERENCE

The press conference for the forum took place at the USTP Board Room – Administration Building. The panelists for the said press conference were Dr. Celia M. Reyes of PIDS, Mayor Oscar S. Moreno, Dr. Rosalito A. Quirino of USTP, Dir.

Reyzaldy B. Tan of MinDA, Dr. Ramon A. Razal of the Department of Science and Technology-National Research Council of the Philippines (DOST-NRCP) and the Session Speakers.

CEREMONIAL SIGNING OF THE MEMORANDUM OF COLLABORATION WITH NRCP AND MINDA

The Ceremonial Signing of the Memorandum of Collaboration with NRCP and MinDA culminated the event, which was followed by Closing Remarks delivered by Dir. Reyzaldy B. Tan of MinDA. Before the program officially ended, finale pictorials briefly took place.

SESSION ONE:

MINDANAO

IN THE ERA

OF THE FOURTH

INDUSTRIAL

REVOLUTION

SESSION ONE: MINDANAO IN THE ERA OF THE FOURTH INDUSTRIAL REVOLUTION

The first session entitled “Mindanao in the Era of the Fourth Industrial Revolution” was spearheaded by guest speakers Dir. Reyzaldy B. Tan, Dr. Elmer P. Dadios, Dr. Ramonette Serafica, and Dr. Roehlano Briones.

Mr. Reyzaldy B. Tan is the Director for Policy, Planning and Project Development Office (PPPDO) of MinDA. He facilitated the talk on Mindanao 2030 Peace and Development Framework and the Mindanao Development Corridors Strategy. Dr. Elmer P. Dadios is a Professor for the Manufacturing, Engineering and Management Department of De La Salle University, while Dr. Ramonette Serafica is a Senior Research Fellow of PIDS. They facilitated the talk on The Fourth Industrial Revolution (FiRe):

Opportunities and Challenges for the Philippines. Lastly, Dr. Roehlano Briones is also a Senior Research Fellow of PIDS. He facilitated the talk on A Roadmap for Agro - Industrial Development in the Philippines.

The open forum was facilitated by Dr. Alexander M. Campaner, a professor of the Southern Philippines Agribusiness and Marine and Aquatic School of Technology (SPAMAST). He was joined by two (2) Discussants, namely: Dr. Marieta B. Sumagaysay of NRCP and Engr. Diogenes Armando D. Pascua of USTP.

Mr. Reyzaldy B. Tan Director IV, Mindanao Development Authority (MinDA)
(Mindanao 2030 Peace and Development Framework and the Mindanao Development Corridors Strategy)

Dir. Reyzaldy B. Tan of the Mindanao Development

Authority (MinDA) was the first speaker for Session One. The first part of his lecture was an Audio Video Presentation (AVP) on the Mindanao 2030 Peace and Development Framework and the Mindanao Development Corridors Strategy. He shared about the advocacies and plans of MinDA for the next ten (10) years that will support the Fourth Industrial Revolution (FiRe). Dir. Tan also highlighted that MinDA has a BIG dream that stands for “Balance,” “Inclusive” and “Growth” which is sustainable.

Further, Dir. Tan also shared the eight (8) “Is” which are essential for the growth and development of Mindanao. The first “I” that will be supported by the other seven (7) “Is” is **IQL** which stands for **Improved Quality of Life** which the Fourth Industrial Revolution is also trying to espouse. Another “I” stands for **Interconnectivity** through infrastructure. The

reason why Mindanao is pursuing agro-economic zone strategy in strategic areas is to have investors pouring in resources in Mindanao. Dir. Tan also stated that if you have **Incentives** which is the third “I,” then these will bring in the fourth “I” which is **Investments**. With those investments, the fifth “I” will come which is **Institutions** managing the investments. The sixth “I” refers to **Industries**. The seventh “I” is the **Integrity of the environment** and the eighth “I” is **Innovation**.

Moreover, Dir. Tan said that he would like to share researches using the World Economic Forum about innovations which can be used as reference in pursuing FIRE. He cited a list of countries which are leading in innovation: Korea is the most innovative country in the world; Singapore has the most excellent innovation; Japan is driven by medium-sized enterprise; Switzerland

has world-class research; Finland is leading in knowledge management; France is leading in disruptive energy innovation; and Israel on research and development.

Thus, there is a need to establish a culture for research and development, a culture for innovation and a culture of synergy. This can be done by starting with a happy culture.

Dr. Elmer P. Dadios

Professor, Manufacturing, Engineering and Management Department
De La Salle University
(The Fourth Industrial Revolution (FIRE): Opportunities and Challenges for the Philippines)

Dr. Elmer P. Dadios’ presentation talks about the background of the Fourth Industrial Revolution (FIRE). This revolution also called Industry 4.0 emphasized

the importance of the transition from the first to the third before reaching the Fourth Industrial Revolution (FIRE). The First Industrial Revolution started from 1760 to 1840 where the tagline for the period was mechanization using water and steam. This period started in the United Kingdom with the mechanization of textile industries. Beforehand most manufacturing was done in homes and small shops. The transition from using hand tools and basic machines to power special purpose machinery and factories happened in this era. As a result, groups of workers attacked factories and destroyed the machinery as a means of protest, so there was literally a revolution that happened. The Second Industrial Revolution was from 1870-1914. This period was tagged as mass production using electricity. The outcomes of this period include the first electric railroad and electric cars and the birth of radio communications and the first radio wave

transmission across the Atlantic Ocean. The Third Industrial Revolution was from 1950-1980 where the tagline for the era was automation using digital electronics and information technology mass production. This period was also known as the Digital Revolution. The Fourth Industrial Revolution which is the current decade has the tagline of innovation based on fusion of physical, digital and biological. This period involves emerging technology breakthroughs in fields of artificial intelligence, robotics, the Internet of Things, autonomous vehicles, nanotechnology, biotechnology, materials science, energy storage, and quantum computing.

Dr. Dadios stressed that putting intelligence to the robot is a challenge, producing a machine that can reason out and can understand what is right and wrong. Artificial intelligence is the key in developing more sophisticated and

intelligent machines. In the Industrial Revolution, the living standards of people are improved overtime because more value products are created. Subsequent jobs can be minimal because of sophisticated robots and machines. However, Dr. Dadios reminded us that the fear of losing our jobs because of robotization proved to be wrong.

Moreover, when we look at the share of agriculture and services sectors, they have the highest contribution to the Gross Domestic Product (GDP) in Indonesia, their contribution to Thailand is 23%-24% while their contribution to the Philippines is just around 10%-20%.

Further, Dr. Dadios discussed about disruptive technology which is defined as the one that displaces an established technology and shakes up the industry or a ground-breaking product that creates a completely new

industry. The personal computer displaced the typewriter and forever changed the way we work and communicate. Email transformed the way we communicate, largely displacing letter-writing and disrupting the postal and greeting card industries. Cell phones made it possible for people to call us anywhere and disrupted the telecom industry. The laptop computer and mobile computing made a mobile workforce possible and made it possible for people to connect to corporate networks and collaborate from anywhere.

Dr. Ramonette Serafica

Senior Research Fellow,
Philippine Institute for
Development Studies
(PIDS)

*(The Fourth Industrial
Revolution (FIRe):
Opportunities and
Challenges for the
Philippines)*

Dr. Ramonette Serafica's
presentation was related

to the visual presentation of Dr. Dadios. It highlighted primarily on the challenges faced by the government and gave emphasis on the fact that FIRE can potentially solve many problems, making growth and prosperity development more inclusive and sustainable. She stated that attaining food security and improving the quality of health care are crucial in attaining Sustainable Development Goals (SDGs). Thus, the aspiration they have is similar to that of AmBisyon Natin 2040. Dr. Serafica also discussed about the coping study on the FIRE that they have conducted and its implications to the Philippines. In the said study, they have focused on the policy landscape.

Dr. Serafica introduced the interesting application on the new innovation on agriculture. She encouraged everyone to click the particular link as everyone had a copy of her presentation. Further, she cited examples of

applications in the area of healthcare. Another significant way in which the new technology has open-up opportunities for everyone is through trade. The Philippines has already overcome the constraints in trade through digital platforms, tapping customers, suppliers and talents. The moment a business has been set up, it is already going global. The experience of being able to export to any part of the world through the E-commerce platform is one of the opportunities that the FIRE technology provides even for Small and Medium-Sized Enterprises (SMEs).

According to an International Labour Organization (ILO) study, nearly half (49%) of wage workers which is comprised of 44% males and 52% females is at high risk of getting affected by automation. Around 89% of salaried workers in the Business Process Outsourcing (BPO) sector falls into the high risk

category of automation, where high growth was experienced in the past.

Furthermore, as a result of the application of the new technologies, FIRE will trigger selective reshoring, nearshoring other structural changes to global value chains. Rapid improvements to automation have now increased three (3) reshoring or transfer of production activities back to the home countries in labor - intensive manufacturing areas such as garments and footwear, electronics and auto production. Dr. Serafica concluded the discussion on the various opportunities and risks on the FIRE.

The other Association of Southeast Asian Nations (ASEAN) countries are also preparing for the FIRE. According to the World Economic Forum (2017), Indonesia, Cambodia and Vietnam are considered as Nascent countries. Nascent countries have limited current base and are at

risk for the future. However, Indonesia has already started an initiative towards Industry 4.0. This was recently launched by the President of Indonesia. Malaysia and Singapore are considered as Leading countries because they are empowered and have lots of initiatives toward FIRE. Leading countries have strong current base and are positioned well for the future. Philippines and Thailand belong to the same cluster which is the Legacy countries. Legacy countries have strong production base today, but they are at risk for the future due to weaker performance across drivers of production, which include technology and innovation, human capital, global trade and investment, institutional framework, sustainable resources, and the demand environment. However, these countries have already started their initiatives toward FIRE since 2015. With this, Dr. Serafica noted that the ways forward toward FIRE

and the type of political support can be tackled in the afternoon session.

Furthermore, Dr. Serafica mentioned that the Philippine government agencies are not behind in terms of preparing towards FIRE. The Department of Trade and Industry (DTI) has already spearheaded innovation for the industrial strategy towards Industry 4.0, wherein the Department of Science and Technology (DOST) has also adopted this kind of initiative. However, PIDS is recommending for a holistic government approach towards FIRE. The government should nurture the innovations in the country by preparing the groundwork through building up the human resources needed in order to drive the innovation forward, laying down good policies and programs for research and development, providing financial support especially for scientists who will invent and innovate, creating more jobs in the country.

The key is to learn more, learning in order to be learned and learning how to learn because these are the most important skills that everyone should acquire. However, learning how to learn is a key skill that needs to be developed among learners. There is a need to embrace lifelong learning which includes continuous training and retraining. Everybody must be able to do the different challenges and opportunities that FIRE can bring.

According to the World Economic Forum (2015), the different skills required to thrive in the 21st century can be grouped into three (3). First, there is a need to acquire foundational literacies such as scientific literacy, Information and Communication Technology (ICT) literacy, among others. Second, one needs to have competencies. One must assess on how to approach complex challenges. Third, one needs to have character

qualities to be able to adapt in the changing environment.

In terms of nurturing the soil, PIDS has been conducting innovation service for the last five years. In 2015, PIDS has done two already. The survey on innovation activities suggests that one out of five firms innovate. The proportion of innovators is higher among large firms than SMEs. Thus, there is much to be done to enhance the ecosystem including spending for Research and Development (R&D). While, there has been an increase in the expenditure of R&D to GDP in recent years, this spending is still at less than a fifth of one percent of GDP, which is below the one percent benchmark recommended by the United Nations Educational, Scientific, and Cultural Organization (UNESCO).

In terms of watering the plant, the innovation system in the country has been getting a lot of

support in recent years. Today, DTI has a new industrial strategy in collaboration with DOST and the Commission on Higher Education (CHED). DOST is advocating for the Science for Change Program (S4CP), Balik Scientist 2.0 and SETUP. Dr. Serafica stressed that the establishment of the Department of Information and Communications Technology (DICT) is a significant development in the last few years as there is now a dedicated agency which addresses the state of the ICT infrastructure in the country.

Even if the Philippines decides to spend much on R&D, issues about absorptive capacity arise. Sometimes, even if one spends so much on it, the Return of Investment (ROI) may even be negative. Dr. Serafica noted that this is one area where the government has neglected the most. Per Organisation for Economic Co-operation and Development (2016),

Foreign Direct Investment (FDI) restrictions in the Philippines are high by both regional and global standards. Dr. Serafica highlighted that we need to have a bigger perspective in terms of assessing national interest. China, Vietnam and other countries are open to new investments. It is essential to work hard in removing the barriers/regulations when starting a business. Per Dr. Serafica, these are the very basic things that the government needs to focus on.

In spite of the many challenges ahead, regulators should be able to adapt to the emerging new technologies and innovations. It is not just the business sector that needs to innovate, even the government needs to innovate too. Examples of responsive and adaptive regulations are regulatory sandbox and “Whole of Government” approach. Innovation is a government agenda. It is important that everybody works together. One

agency is pushing for this and another agency makes all the regulatory barriers which result to frustrations in implementing innovation.

Furthermore, Dr. Serafica explained the socio-economic aspect as one of the challenges facing the FIRE. Some people lack either the ability or the opportunity to discover and reach their creative potentials. This will require social protection, specifically on universal basic income.

In line with the new reality of work and aging, it is vital to review the measures for work support for older workers. The social security benefits need to be portable so that people will not experience the loss of contribution and benefits transferring from one job to another. Reforms on taxation pertaining to policy and collection must be implemented. This is not just about raising money but being able to prioritize.

In conclusion, Dr. Serafica said that PIDS is beginning their exploration in understanding what FIRE is all about. They will be hosting a high level policy forum to discuss the issues on FIRE by next week. She invited everyone to stream in Facebook for more information on FIRE. She also invited everybody to access the link on their coping study, should they be interested.

Dr. Roehlano M. Briones

Senior Research Fellow,
Philippine Institute for
Development Studies
(PIDS)

(A Roadmap for Agro-Industrial Development in the Philippines)

Dr. Roehlano M. Briones started his presentation with a situationer stating that the national poverty incidence is at 21.6% with the following breakdown using merged data, to wit: rural – 30.7%, urban 12.2%, and agricultural workers 62.4%. He discussed also the

difference between the traditional industrial strategy and the new industrial strategy. Some of the features of the traditional industrial strategy include top-down approach, picking winners and protection from foreign competition. Dr. Briones cited that during the Martial Law Period, this type of strategy occurred. In that era, 11 basic industries were set up including a petrochemical complex. The traditional industrial strategy protects industrial supermarkets, giving protection and incentives to the chosen industries. They aspired to be successful in the world market but it did not happen. The birth of the new industrial strategy, on the other hand, brings even playing field, diagnosis of binding constraints, participatory roadmap based on problem analysis and bottom-up approach. In this type of strategy, the problems and the key binding constraints were diagnosed. The stakeholders were asked

to come up with their own roadmaps to address the constraints and be able to achieve development goals. This is called participatory planning, employing a bottom-up approach. The government played a huge part of the process by providing support but the drivers of the process were the industry players including the workers, entrepreneurs, among others.

Further, Dr. Briones also discussed farm production to agribusiness. Agricultural development is more than increased farm yield. It is agribusiness value chain and based on comparative advantage. Agribusiness is defined as agriculture plus closely-linked sectors (forward and backward linkages). Given the perspective of value chain, agriculture should not be left on its own or else it will fail. Dr. Briones emphasized that we should always look up at the various sectors and consider the forward and backward linkages such as

fertilizers, chemicals, among others. In developing Asia, the trend of agricultural growth is always accompanied by the development of associated value chains. This is called as agribusiness transition.

On the short term way forward, Dr. Briones cited that there is a need to adopt vertical measures by creating a coordination mechanism among stakeholders. This is done through the development of a participatory competitiveness working group for agro-industry on a sector-specific basis and at a local level. The objective is to lay the groundwork for competitiveness strategy embodied in a roadmap.

With regard to medium term vertical and horizontal measures, increase in investments for R&D, extension systems, irrigation facilities, regulatory systems and transport infrastructure are needed.

In terms of the long term

agenda for horizontal measures, Dr. Briones mentioned some approaches like regulatory system facilitating business registration and licensing, standards and enforcement, contract compliance; efficient land administration system; regulatory framework for agriculture securities, warehouse receipts; incorporate agribusiness in industrial incentives and zoning; and comprehensive competition policy vs anti-competitive practices.

Dr. Marieta B. Sumagaysay

Executive Director,
National Research Council
of the Philippines (NRCP)
Discussant

The Fourth Industrial Revolution (FIRe) introduces processes and procedures where blockchain, the internet of things, 3D printing, artificial intelligence, supercomputing, hallograms, cryptographs,

robots, genome editing, and various forms of automation become embedded in societies and even inside human bodies. It is a revolution that will change the way we live, work and relate to one another (Schwab, 2016). We ask how? But there is more to the “hows.” It is important to recognize who are at highest risk with automation. Which jobs are most likely to be lost and destroyed, and how fast will these jobs be lost and destroyed? Who will be the bigger loser when the cyberspace becomes the fourth avenue for engagement and decision making, next to land, water and air? The Men? Women? Let us not forget that technology can only work if it benefits men and women.

There are indications that point to the high probability of the rise in the feminization of poverty due to FIRE. The gender gap may widen – nobody can tell exactly at this point. Nevertheless, the preparation of safety

nets particularly for women who will lose jobs due to the disruptive technologies must ensure least divergence in men’s and women’s roles in the future. These must necessarily be research and evidence-based, and not products of anecdotes. This underscores the importance of collecting sex-disaggregated data, and analyzing the differential situation of men and women through a gender lens. For information, the Philippines is the most gender equal nation in Asia (Wood, 2018).

If you are a woman and you are a loan officer, or a receptionist, an information officer, a legal assistant, or a retail salesperson, then you are in a job which is identified in the top five jobs most immediately at risk of automation (University of Oxford, as cited by Reif, 2018). The Malaysian Foresight Institute (Rahim, 2017) adds travel agents, journalists, and bank tellers. These are

female-dominated jobs. Corollary to this, gender studies reveal that these tasks are generally extensions of homework for which women have been best prepared by home and society. That is, receiving visitors, recording, budgeting, negotiating.

If you are a woman and your job is in the value chain node of input provision, processing, and trading, then you are most likely to lose your job due to automation. Tasks in these value chain nodes (may it be fishing, farming, manufacturing or the service sector) are mostly performed by women. Accessing credit, marketing / peddling, cooking / food preservation, packing, cleaning / washing, labeling, record keeping, and budgeting are traditionally-female tasks. If you are a woman and you are engaged in jobs that do not require highly cyber skills, or in jobs that can easily be digitized such as in call centers and service industries, then

you can easily be replaced by robots and chatbots. In 10 years, it is expected that 60% of jobs will be completely new (Rahim, 2017). Goodbye to traditional career models; welcome to the bloggers, apps developers, and data scientists.

How do we craft policies for the management of the transition to FIRE such that FIRE does not drive further gender inequality? Do we expect greater promise for inclusive growth, or do we become hostage of a technological disruption? Do we expect a rising trend of UN's observation in 2013 where more people in the world have access to a mobile phone than basic sanitation (Davis, 2016)?

In the age of FIRE, women's roles will be in jobs that machines cannot fill up and jobs that require the maternal and nurturance nature of women such as those that require empathy and compassion (WEF, 2016). This calls for the continuous uptraining of

women workers' competencies and skills in order to supply jobs that have yet to be created within the cybersystem platform. Automation will surely transform lives of men and women, hence, this urgent call to prepare today in reinventing male and female future jobs. After all, who can exactly tell today the future impact of FIRE?

The Fourth Industrial Revolution, on the other hand, might even prove to have positive impact on women. There is nothing to fear about the feminization of poverty due to FIRE. FIRE might even be the enabler to address gender discrimination and gender equality issues as women start to move toward STEM courses today (Moosajee, 2016), and courses that will require creativity and skills in negotiation, coordination, people management and emotional intelligence.

The bottom line: calling for a gender lens in FIRE

to ensure that no woman is left out from the opportunities and benefits that the Fourth Industrial Revolution brings.

Engr. Diogenes Armando D. Pascua

Faculty Member, College of Engineering and Architecture
University of Science and Technology of Southern Philippines (USTP)
Discussant

Engr. Diogenes Armando D. Pascua discussed about FIRE: The Distributed Future during the 4th Mindanao Policy Research Forum. Engr. Pascua noted that Industry 4.0 is actually a new paradigm which is still in the stage of trial 4.0. He considered himself fortunate enough as one of the centennials, compared to the baby boomers who were majority present in the forum than the millennials. Engr. Pascua then differentiated the three (3) generations. Millennials today are

inclined to be very dynamic and courageous but some says they are careless. They are born during the digital age, hence, they absorb the noise. As an educator, Engr. Pascua expressed that they really need to harness these benefits. The baby boomers, who belong to either Second or Third Industrial Revolution do not have the luxury of getting information right away. They need to visit the libraries to do their research. The good thing about it is that they have developed their patience and the ability to critically filter out information unlike in today's generation.

Engr. Pascua said he was born during the 70s. Information was difficult to get since internet did not yet exist. He compared it today since the advent of the 90s was exposed to Industry 4.0 such as the social media. Based on experience, he considered himself lucky for possessing two different qualities. First,

the centennials have the ability to filter out information and have patience. Second, they have adopted the dynamism of the millennials.

Moreover, Engr. Pascua mentioned that he started doing research to correlate digitization to efficiency. He asked the participants if they have seen the Cogon market in Cagayan de Oro City. The people value none chain course where some products go to the export market business. Meanwhile, some people are doing the traditional method of merchandise which is the market. If they can use Industry 4.0 for digitization to help the people in the business, it would be the best scenario.

Engr. Pascua shared that the problem is the varying prices of farm produce at different times of the day or night. For instance, the carrots sell at Php 70.00 per kilo from 8:00 pm to midnight. By 1:00 am, the retail price would be

reduced to as low as Php 30.00 to Php 5.00 per kilo. The reason for the cheaper price is that the products were no longer fresh and might be damaged in the morning. The sad fact is that they ended up becoming garbage. Engr. Pascua highlighted that the rotten fruits and vegetables also required energy to be produced and transported, and they contributed to the carbon footprint in the environment. He said that if waste could be reduced, then the energy needed to produce these goods in the first place could be reduced as well.

Furthermore, Engr. Pascua is doing a research on how digitization can improve efficiency on the way people do business. There is a need to assess how digitization has improved the way people utilize energy, enhance productivity, save time, mitigate climate change and reduce waste. He stressed that digitization and Industry 4.0 could solve a lot of problems if

these two could only be connected.

On energy utilization, Engr. Pascua highlighted that the waste can be traced down to every aspect of the agricultural production, even agri-business and energy generation. He believes that there is no scarcity in energy but considers the lack of energy due to the amount of energy needed. If one looks at the efficiency, the waste in terms of energy is usually 30%. There is no need to produce this much energy because people do not waste this amount of energy. This is where digitization could solve the energy problem.

Industry 4.0 is the driver for the distributed future. Technology is enabling each of us. The power of Industry 4.0 is actually empowering people to change the world. Almost everyone has Facebook account and smartphone. The future is actually not centralized but distributed. The people can actually create their

own website and firm, just like Wix.com. The people can even broadcast information since they are no longer hindered in traditional disadvantages. As long as one has the connection to the Internet, one can actually do anything.

Engr. Pascua noted that technologies like blockchain, 3D printing and the open source movement are enabling everyone to build faster and challenging roles. The builder and the driver of enterprises are not the big companies but are actually the smaller companies. The innovators are actually driving them. As what the author Winston Damarillo said in his book "Ready or Not: The 6 Big Disruptions That Will Change The Way We Do Business," he said that the future is controlled by the innovators, not by the big companies.

According to Engr. Pascua, today's large companies are no longer driving on creating their own products. Instead, they

hire new innovators to do it for them. Look at Google, they bought Android. Look at Microsoft, they are willing to get their own and see the value of embracing Industry 4.0. Mr. Damarillo said that you need to embrace being innovators.

Innovators are not found in large companies. They are found everywhere. Because of Industry 4.0, the universities are harnessing individuals to become student innovators. They are not just users of technology but eventually become creators of technology. Everything can be learned in the Internet. One does not have to go to school to learn everything but just study the core subject like Mathematics. Therefore, the key for the educators to do is to allow the students to develop themselves to become innovators - the ones who love discovering and creating new things. Engr. Pascua hopes that Industry 4.0 will aid in discovering new features

which can solve
inefficiencies and
empower everyone.

SESSION TWO:

AGRO-INDUSTRIAL TECHNOLOGIES

SESSION TWO: AGRO-INDUSTRIAL TECHNOLOGIES

The second session was held in the afternoon with Ms. Ria Persad as the first speaker. Ms. Persad is the Founder and CEO of StatWeather. She presented StatWeather: Technology Application for Weather Forecasting.

Engr. Alex L. Maureal, Faculty Member of the Electronics Engineering Department, College of Engineering and Architecture and Director for Innovations and Technology Solutions of USTP presented the Design and Development of Management Information System for Smart Agriculture (MISSA): An Integrated ICT-based Platform Introducing Smart Farming in Region X. On the other hand, Engr. Miriam A. Mejias, Faculty Member of USTP made a presentation on the Geolocation of Small-Scale Fishermen Boats With Emergency Communication Using

Sub-1 GHZ Network. Dr. Elmer P. Dadios made another presentation on Robotics and Mechatronics: Agriculture and Industrial Applications.

The open forum ensued, with Dr. Geraldo S. Petilla, Chief Administrative Officer of NRCP as the moderator. Among the discussants were Dr. Glenn S. Banaguas, OYS of the Environmental and Climate Change Research Institute (ECCRI), Mr. Edgar Bullecer of the Promotion of Investments Sustainability Organization in ARMM, and Dr. Emmanuel P. Leaño of NRCP.

Ms. Ria Persad

Founder and CEO, StatWeather
(StatWeather: Technology Application for Weather Forecasting)

Ms. Ria Persad, a mathematician, has devoted years in studying the use of technology in weather forecasting to assess the accuracy of

weather prediction. She focused her efforts on applying sophisticated mathematical techniques for the prediction of weather and climate systems. Per Ms. Persad, the whole idea is to predict the weather ahead and be accurate about the prediction. In doing so, people will have more time to prepare for natural calamities. As a mathematician, her work is to calculate the probabilities and the risks for these extreme events. Through computers, data science emerged and the rise of technology brought about sectors of intelligence, allowing computers do the work, calculate and compute data. Ms. Persad's focus is to predict when the typhoon is going to happen, how it will happen, how intense it will be, and how long it will last. She highlights that StatWeather is about doing predictions and disaster risks.

So, how do they predict the weather? According to Ms. Persad, 100 years

ago, people would predict the weather by recalling previous disasters which occurred. They would analyze the patterns of the weather and use the historical information to provide bases for future information which is the the very foundation of data mining. With computers, because they are capable of analyzing mathematically, they are now the ones predicting the patterns. This is referred to as artificial intelligence and machine learning. In relation to this, weather benefits a lot from data mining because it is free from human biases.

Ms. Persad stressed that since we are dealing with forecast, we are also dealing with probability and we are never 100% accurate. The goal, however, is to be as accurate as possible, with less margin of error. She said that it is a statistics game. Ms. Persad further highlighted that the study of statistics and the understanding of uncertainty are of great

importance in science and innovation.

In 2015, the Philippines was rated as #1 in climate disasters. The Philippines had the highest number of occurrences of extreme disasters. Moreover, Ms. Persad stated that climate has become more extreme and intense that even if we completely go with renewables, we will still suffer from extreme weather conditions in a minimum of 30 years. And by that time, the entire Philippine island, which suffers in weather conditions due to its coastal location, would be nonexistent.

A lot of models have been accurate in predicting the climate and they have been beneficial to countries which utilized them. Miami, USA, for example, should have been completely underwater right now. However, they built drainage systems and other necessary systems to push water away from the land and back to the ocean.

Ms. Persad mentioned that there is a mathematical way to get rid of typhoons. In her study, they discovered that ocean spray leads to strong typhoons and in order to avoid typhoons, they use oil. Oil, according to Ms. Persad, creates surface tension in the water. In order to test the idea, the University of Miami built a \$45 million building, a giant fish tank. They experimented by creating all types of typhoons. They also developed an oil substance which is organically safe enough for marine life. They would spray about one liter of the oil to the ocean water and the typhoon would not intensify. The next step is to apply the method in the Philippines. They see this as a necessary step since the islands are located near the Pacific Ocean, the source of typhoons in the country. They are currently working on their legal permits to allow them to use their oil substance in Philippine water.

During the final parts of the presentation, Ms. Persad pointed out three (3) major keys to innovation, to wit: setting goals, out-of-the-box thinking, and collaboration. She encouraged everyone to have a passionate motivation to solve a problem, think out-of-the-box, and seek out those who can help.

Engr. Alex L. Maureal

Faculty Member, Electronics Engineering Department, College of Engineering and Architecture and Director, Innovations and Technology Solutions, University of Science and Technology of Southern Philippines (USTP)
(Design and Development of Management Information System for Smart Agriculture (MISSA): An Integrated ICT-based Platform Introducing Smart Farming in Region X

Engr. Alex L. Maureal gave a presentation on the

Management Information System for Smart Agriculture (MISSA), with the hope of introducing the idea of smart agriculture throughout Mindanao.

According to Sec. Emmanuel F. Piñol, PhD of the Department of Agriculture (DA), “Success in agriculture is all about correct data, right strategy and immediate action.” It was reported that Manila consumes 50,000 boxes of tomatoes per week, yet there is still an oversupply of tomatoes. Because of this, unconsumed tomatoes were just thrown away and wasted. Therefore, data on planting and harvesting is crucial. Sec. Piñol called out the DA officials for using outdated data especially on soil analysis.

The goal of the study is to establish an integrated ICT-based platform to improve agricultural production and marketing of agri-based products in Region X. There are four (4) components of the

project. The first one is the Soil Fertility Sensing Device. At its core is the Raspberry Pi based device designed to provide aid in nutrient management and data interpretation for nutrient addition. This will lead to an optimization of crop produce while minimizing adverse environmental impact of fertilizer application. Nutrient testing is done thru colorimetric method. Data is then stored and managed within the MISSA platform. The next component is Farm Profiling Mobile Application which is an android application that profiles farmers, farms, and crops as well as data on planting and harvesting. The third component is the Trading Stations Agri-Products Monitoring Mobile Application. This is also referred to as the “tagging and monitoring” application. Through this android application, agricultural products are tagged with QR codes containing relevant information of the farm location, farmers’ profile

and quality of products rating and other relevant information for monitoring. The last component is the MISSA Portal. This is a web-based application software that facilitates the dissemination of information regarding current agricultural production, price discovery for farmers, traders and other market participants. The application also provides farmers with vital cropping information and improves the farmers' decision-making (e.g. What crops to plant or produce, etc.).

With this innovation, Engr. Maureal hopes that the MISSA platform will introduce the whole idea of smart agriculture, not only to Region X but the whole of Mindanao as well.

Engr. Miriam A. Mejias

Faculty Member,
University of Science and
Technology of Southern
Philippines (USTP)

(Geolocation of Small-Scale Fishermen Boats With Emergency Communication Using Sub-1 GHZ Network)

The Philippines is a fishing nation. Fishing is not just an industry but is also a way of life. Fishing at sea is one of the most dangerous occupations in the world. In the Philippines, there are about 1.6 million Filipinos involved in fisheries. When fisherfolks are in emergency situations while at work, there is a dire need to communicate to others for assistance. However, since they are cut off from communication when they are at sea, it is very difficult to call for help. To make matters worse, identifying the fisherfolks' location while at sea proved to be hard too.

Engr. Mejias stressed that there are devices used by fisherfolks to communicate while at sea. There are radio transceivers or walkie talkies which provide two-way communication but

need a license to acquire them. Another alternative are satellite phones which still provide two-way communication but are rather costly. Mobile phones, while a common device, are unstable when away from shore. There is also the vessel monitoring system which is used by the commercial fisherfolks to locate every boat at sea. None of these can be supplied by the small scale fisherfolks due to the cost of these equipment.

Further, Engr. Mejias noted that in December 2012, 300 fisherfolks were missing when Typhoon "Pablo" struck Mindanao. In 2017, 40 fisherfolks were missing in Palawan due to tropical storm "Vinta." Due to the limited communication and location identification methods, it is hard to provide rescue operations to the fisherfolks who are in danger while at sea. Sometimes, the rescue operations were put to an end because of no progress and were too costly. Because of this,

family members of the fisherfolks were distraught.

When Engr. Mejias and Cenie Malabanan prepared the study, their goal is primarily to design and develop an on-board device that can send emergency signals to the base station and receive warning signals at the base station. Another objective is to design and develop a geolocation software using Global Positioning System (GPS) that can track the real time position and the traversed paths of the vessels.

Engr. Mejias explained that the way it works, there is a base station at the shore with its own Radio Frequency (RF) technology and mapping software. The boats will have nodes built in which would allow them to be located via GPS. The signals would then be continuously streamed to the Bantay Dagat. This would allow for faster and more accurate tracking of fisherfolks in distress at

sea. Engr. Mejias highlighted that with the monitoring system, the Bantay Dagat would be able to track also the location and the path history of the boat. The data gathered would serve as reference in taking necessary action.

In order to determine whether the system works or not, they conducted a test using two small fishing boats and a house near the shore which served as the base station. Per Engr. Mejias, they were able to locate the boats using the mapping software and identify the traversed paths of these boats. The identified optimum distance tested was around five kilometers. They also tested sending emergency messages using the software.

In conclusion, Engr. Mejias highlighted that the experiment proved that the devices were able to successfully transmit and receive emergency communication. The coordinate mapper

software was also able to pinpoint the exact nearest location of the boats. It is recommended, however, to test the radio frequency transceivers to have longer range and design a new prototype that can withstand heavier weather conditions. If further developed, this can be useful in many other risk and disaster management applications.

Dr. Elmer P. Dadios

Professor, Manufacturing, Engineering and Management Department
De La Salle University
(Robotics and Mechatronics: Agriculture and Industrial Applications)

Dr. Elmer P. Dadios, in his presentation, enumerated several innovations in the field of robotics and mechatronics and how they can be applied in different agricultural and industrial functions.

The first innovation is the vision-based A1 Analytics

software for traffic and transport applications. This is also known as “Catch All.” This is a vision-based system that incorporates artificial intelligence algorithm used for vehicle and violation identification. This was based on the premise that Metro Manila’s traffic situation is difficult to control. Further, Dr. Dadios mentioned that there are two (2) main factors for the heavy traffic in Manila, namely: volume-based and behavior-based. Volume-based refers to the fact that there are just too many vehicles in Manila and behavior-based because the drivers in Manila have no discipline.

Dr. Dadios elaborated that this innovation utilizes an A1 camera, which uses a video capture system, in order to apprehend traffic violators. The smart camera also has a video analysis system that inputs to the database. The resulting output is a profile of the violator,

plate number, and proof of violation. With the raw video storage and automated database encoding, the system can analyze and enhance plate numbers.

Further, Dr. Dadios introduced the idea of “software as a service” which allows for customizable features aimed at the core functions of the project. He added the use of computer vision to detect the quality of raw food. In the study, the qualities of mangoes and raw fish were assessed using video camera capture.

The next innovation is the automation of coconut sugar production. Dr. Dadios stressed that there are many coconuts in the Philippines, especially in Mindanao, and that these can be used to produce sugar by building a machine that helps in its processing. This resulted to an increase in production and quality control of coconut sugar as well as provision of business

opportunities and livelihood to coconut farmers.

Moreover, another innovation is the smart farm for all-season tomato production. It uses a wireless sensor network with a bamboo environmental chamber. It also uses a solar power system and an automated irrigation system. Through this, the people can control the amount of light coming in, temperature, irrigation, and power.

The last innovation is the unmanned serial swarm robotics. The idea is to use drones to move an object from one place to another. To achieve swarm intelligence, they used several sets of algorithms which allowed the drones to copy the behavior of ants. If one fails, others can still come to help. In addition, Dr. Dadios said that they have used several drones, one by one, without the use of remote control. These drones were made to carry a variety of load. He

stressed that this innovation can be applied to farming, allowing farmers to monitor the status of the farms.

SESSION THREE:

PANEL

DISCUSSION ON WAYS FORWARD— SHAPING MINDANAO'S FUTURE IN THE ERA OF THE 4TH INDUSTRIAL REVOLUTION

SESSION THREE: PANEL DISCUSSION ON WAYS FORWARD – SHAPING MINDANAO’S FUTURE IN THE ERA OF THE FOURTH INDUSTRIAL REVOLUTION

The panel discussion which was the last session was participated by the following guests, namely: Dir. Linda O. Boniao of the Department of Trade and Industry (DTI) Regional Office X, Dir. Miraluna Baje-Lopez of the Technical Education and Skills Development Authority (TESDA) Regional Office X, Dr. Sabdullah C. Abubacar, CESO IV of the Environmental Management Bureau (EMB) Regional Office X, Mr. Nestor Asiñero Lisondra of the National Economic and Development Authority (NEDA) Regional Office X, Mr. John Gaisano of the JHG Trading, Dr. Jinky B. Bornaes of the Mindanao State University-Iligan Institute of Technology (MSU-IIT), and Mr. Emil Benjamin B. Tapnio of the Philippine Development

Foundation (PhilDev). Dr. Sheila V. Siar, Director for Research Information of PIDS led the session as the moderator.

In this session, the panelists discussed on how various stakeholders can work together to help Mindanaoans harness the Fourth Industrial Revolution (FIRE) towards the achievement of accelerated and broad-based socio-economic development. This objective is particularly challenging for Mindanao given wide disparities in levels of development within the region. While some areas are enjoying progress, others continue to confront serious challenges, including high poverty incidence, low levels of literacy, poor infrastructure, and peace and order issues, compounded by climate-related disasters. It is important to ensure that Mindanao, especially its marginalized areas, will not be left behind in the age of FIRE.

Ms. Linda O. Boniao

Regional Director
Department of Trade and Industry (DTI)
Regional Office X
Panelist

Dir. Linda O. Boniao shared that the Philippines can ride on the FIRE by implementing the Philippine industry roadmap strategy. At the heart of this strategy is competition, innovation, and productivity which are all elements prerequisite to FIRE.

Dir. Boniao also mentioned that FIRE brings in great opportunities as global value chain shifts to production line. DTI is investing in Shared Service Facilities (SSF) Project which aims to improve the competitiveness of Micro, Small and Medium Enterprises (MSMEs) by providing them with machinery, equipment, tools, systems, skills and knowledge under a shared system.

Ms. Miraluna Baje-Lopez
Provincial Director,
Provincial Office,
Misamis Occidental
Technical Education and
Skills Development
Authority (TESDA)
Regional Office X
Panelist

Dir. Miraluna Baje-Lopez presented the National Technical Education and Skills Development Plan (NTESDP) which envisions a “Vibrant Quality Technical-Vocational Education and Training (TVET) for Decent Work and Sustainable Inclusive Growth.” The Plan would be implemented under a Two-Pronged Strategy, that is, TVET for global competitiveness and workforce readiness, and TVET for social equity with three strategic responses to challenges posed before us. Dir. Lopez explained that the Two-Pronged Strategy embodies the essence of the NTESDP. It is the blueprint that defines our direction and courses of actions to respond to what has been presented before us.

Moreover, Dir. Lopez discussed on the various challenges. The first challenge is the advent of the FIRE which will accelerate the convergence of industrial technology and information technology and will pervade all facets of human activities, not to mention the growing clamor for 21st century skills by a more sophisticated and advanced education and employment environment. The second challenge is to meet the very huge demand for a skilled and conscientious workforce in the eight priority industries identified by the NTESDP, which industries are forecast to generate higher economic value and much larger employment markets. The third challenge is to affirmatively address the Filipino workforce who have been excluded and left behind by a fast growing Philippine economy largely focused on major urban areas and the formal employment sector.

On this note, Dir. Lopez explained the three (3) strategic responses identified in the NTESDP. The first strategic response is to have the agility to respond to the rapid changes we face by ensuring that TVET programs are globally competitive and aligned with international standards, among others. The second is the scalability to provide the required workforce quantity and quality by expanding the government-academe-industry collaboration, among others. The third is the flexibility and sustainability to directly and purposively address the needs of all stakeholders by enhancing community based training, among others.

Dr. Sabdullah C. Abubacar, CESO IV
Regional Director,
Environmental
Management Bureau
(EMB)
Regional Office X
Panelist

Dr. Abubacar shared that there is really a need for proper collaboration among policymakers, academe, and inventors in order to meet the challenges on FIRE. He also stressed about retrofitting the curriculum to address industry needs. Dr. Abubacar said that we are producing professionals who are not needed or are unhireable because of the skills mismatch. Hence, there is a need to address this.

**Mr. Nestor Asñero
Lisondra**

Chief Economic
Development Specialist,
National Economic and
Development Authority
(NEDA) Regional Office X
Panelist

In the presentation of Dr. Lisondra, he focused first on what the RDC can do within its jurisdiction, i.e., its own region, in this case Region X (Northern Mindanao).

The RDC X can help and ensure that there will be

synergy of efforts in helping Northern Mindanao keep up with the Fourth Industrial Revolution (FIRE) because it has the mandate, structure and processes to deal with it and the context within which the Council does its planning function.

Among the functions of the RDC X Executive Order No. 325 (series of 1996), being the highest development policy making body of the region, is to coordinate the preparation, implementation, monitoring and evaluation of short and long-term regional development plans and investment programs, regional physical framework plan and special development plans, including the formulation of policy recommendations. The current development planning, as enunciated under President Duterte's Executive Order No. 5, series of 2016, at the national, regional and local levels is geared towards Ambisyon 2040 when

Filipinos will enjoy a "Matatag, maginhawa at panatag na buhay." Ambisyon Natin 2040 is adopted as the twenty-five-year long-term vision for the Philippines for development planning, to wit: "By 2040, the Philippines shall be a prosperous, predominantly middle-class society where no is poor; our peoples shall live long and healthy lives, be smart and innovative, and shall live in a high-trust society."

Assisting the RDC X in discharging this planning function are its regular and special committees.

The regular committees include the following: (1) Macro and development administration committee; (2) Social Development Committee; (3) Economic Development Committee; and, (4) Infrastructure and Utilities Development Committee. The Council's special committees include: (1) Regional Land Use Committee; and, (2) Regional Research Development and

Innovation Committee; (3) Regional Statistics Committee; and, (4) Regional Project Monitoring Committee.

From the topics that have been presented earlier, we could say that shaping Mindanao's future or particularly Northern Mindanao's future in the era of the Fourth Industrial Revolution is multifaceted as the revolution itself is multifaceted and multi-sectoral. This means that the Fourth Industrial Revolution involves subject matters concerning macro and development administration, social development, economic development and infrastructure development and even land use. Cutting across these sectors is science, technology and innovation. All these subject matters are covered by the RDC X committees mentioned earlier.

Recommendations on development plans, programs, activities and

projects are being produced by these committees for support, endorsement, and approval by the RDC X. In some instances, prior to discussion by the sector committee concerned, focus group discussions and technical working group meetings are held to generate needed information or initial recommendation/s on subject matters at hand.

The membership of the RDC X and its sector committees are multi-agency (national and local governments) and include both public and private and Civil Society Organizations (CSOs). This set up fits well with the World Economic Forum recommendation that the response to the FIRE must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society.

The 2017-2022 Northern Mindanao Regional Development Plan will be

updated in 2019. This would be an opportunity to integrate into the Plan the policies, strategies, programs, activities and projects needed for the Region to adapt to the changes and enjoy the benefits brought about by the FIRE.

At Mindanao-wide level, there are two (2) bodies that the RDC are working with to address the island's development concerns, namely: (a) Mindanao Development Authority (MinDA) and NEDA Board Regional Development Committee-Mindanao Area (RDCom-Mindanao).

Together with the Chairpersons of the rest of Mindanao RDCs, the Chairperson of the RDC X is member of MinDA's governing board and the NEDA RDCom-Mindanao. It is through these bodies that the RDC X can contribute in helping Mindanao keep up with FIRE.

The recommendations generated from their respective regions can be

discussed in these two bodies to arrive at some collegial decision that could benefit the entire Mindanao Island.

Mr. John Gaisano

President, JHG Trading and Board Chairperson, Davao City Chamber of Commerce and Industry, Inc. (DCCCCI)

Panelist

Mr. John Gaisano commented that if we cannot pass the first Three Industrial Revolutions, there is no sense in talking about the Fourth. He emphasized that there are certain markets that are controlled by only a few players. For example are the energy and the communication sectors. Mr. Gaisano further noted on how we can be industrialized if the direction of these oligarchic sectors are dictated by only quite a handful. He then asked what the government can do to encourage more players, resulting to more healthy competitions. The

government should also address bottlenecks which preventing markets and sectors to be genuinely competitive.

Moreover, Mr. Gaisano pointed out that the government should appoint competent, honest and visionary leaders who have clear plans of executing their work. He noted that more often than not, our political leaders fail us because their interests always prevail. Mature constituency building is very important.

He also highlighted that Artificial Intelligence (AI) and robotics are the way to go. Obviously, these machines are more productive than humans in a sense that they do not get physically tired. What is needed therefore, is to maximize resources so they become tools for development.

In conclusion, Mr. Gaisano stressed that we cannot implement change unless we change the local and national

leadership. The government has to learn to sing and dance with the private sector. The judiciary, legislative, and executive branches of the government as well as the Civil Society Organizations (CSOs) can learn to work honestly if they think they can trust with one other.

Dr. Jinky B. Bornaes

Vice-Chancellor for Research and Extension, Mindanao State University-Iligan Institute of Technology (MSU-IIT)

Panelist

Dr. Jinky B. Bornaes emphasized that FIRE must be mainstreamed. However, it should be realized that human needs are more superior. Further, there is a need to analyze the four (4) disruptions that FIRE brings, which are big data, human and machine collaboration, 3d printing and robotics, and analytics. Dr. Bornaes said that the academe should be able to respond

to the vacuum that these disruptions bring. She said that there is a need for an appropriate response in the curriculum. Similarly, it is essential to develop a way of thinking adapting the 4Cs, namely: collaboration, communication, creativity, and competency. Dr. Bornales also posed the query on who will develop the curriculum if we lack the expertise. Who will spearhead in the preparation? Do we have enough skills to catch FIRE? She noted that these are the questions that the government should look into.