



CREATING AN INNOVATIVE MINDSET AND ECOSYSTEM

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I HAVE TO ADMIT THAT MY VIEWS ON MANUFACTURING ARE BIASED BY MY LIFETIME OF EXPERIENCE WORKING IN SILICON VALLEY IN THE FIELDS OF COMPUTING, COMMUNICATIONS, CONSUMER, AND ARTIFICIAL INTELLIGENCE/MACHINE LEARNING WITH MAJOR EMPHASIS ON COMPUTING ARCHITECTURE, CHIP DESIGN, SYSTEMS, AND SOFTWARE.

MANUFACTURING IN SILICON VALLEY IS HISTORY NOW. HOWEVER, IT DOES NOT MEAN WE DO NOT CARE NOR UNDERSTAND ITS REQUIREMENTS. IN ALMOST EVERYTHING WE DO, WE RELY ON STATISTICAL LIMITS OF THE PRODUCTION PROCESS. WE TAKE THIS INTO ACCOUNT IN OUR SIMULATIONS CONSIDERING VARIABLES WE SEE IN MATERIALS, CHEMISTRY, PHYSICS, AND PRODUCTION TOLERANCES.

DEPENDING ON THE STAGE OF MANUFACTURE, PRODUCTS MAY GO THROUGH EXTREME AUTOMATION AND OTHERS SIMPLY LABOR. IN ALMOST ALL CASES, AUTOMATION REQUIRES EXPENSIVE LABOR DUE TO MAINTENANCE AND EXPENSIVE INSTRUMENTATION ALL FOR THE BENEFIT OF QUALITY AND QUANTITY PRODUCED. THE REST ARE STRICTLY HUMAN LABOR AND CONTRIBUTE LESS TO THE VALUE OF THE PRODUCT.



I MENTION THIS CONTRAST ONLY TO HIGHLIGHT THE CHOICE WE MUST MAKE IN THE LEVEL OF EXPERTISE WE WANT TO APPLY TO OUR MANUFACTURING OPERATIONS. DESIGN, INNOVATION, AND VALUE ARE THE KEY DETERMINANTS OF THIS CHOICE.

SIMPLE HUMAN LABOR WILL EVENTUALLY BE REPLACED BY SOPHISTICATED MACHINES, ESPECIALLY NOW THAT ARTIFICIAL INTELLIGENCE IS HERE.

THE CHOICE SHOULD BE OBVIOUS. WE MUST CHOOSE THAT PART OF MANUFACTURING THAT USES DESIGN AND INNOVATION EXPERTISE.

JUST LIKE PRODUCTS, OUR EXPERTISE IN MANUFACTURING MUST CONSTANTLY IMPROVE IN DESIGN, PERFORMANCE, AND QUALITY.

WE HAVE A PRACTICE IN SILICON VALLEY WHERE DESIGN ENGINEERS HAVE A CHOICE TO MOVE INTO MANUFACTURING AS PRODUCT ENGINEERS. PRODUCT ENGINEERS HAVE UNIQUE ADVANTAGES OVER SOME DESIGN ENGINEERS DUE TO THEIR KNOWLEDGE IN THE LIMITS OF PERFORMANCE AND FUNCTIONALITY DUE TO THEIR KNOWLEDGE IN ENVIRONMENTAL USE CASES AND LIMITS.

THE QUALITY AND COMPETITIVENESS OF THE RESULTING PRODUCT REFLECT ITS EMBEDDED INNOVATION AND DESIGN COUPLED WITH QUALITY MANUFACTURING. AN EXCELLENT EXAMPLE WOULD BE SEMICONDUCTORS.

WE TAKE THIS INTO ACCOUNT IN OUR SIMULATIONS GIVEN THE VARIABLES WE SEE IN MATERIALS, CHEMISTRY, AND PRODUCTION TOLERANCES. IN OTHER WORDS OUR DESIGN PARAMETERS ASSUME HIGH YIELDS AND QUALITY IN PRODUCTION.

I AM DESCRIBING THIS PROCESS SIMPLY BECAUSE HIGHLY INNOVATIVE AND HIGH TECHNOLOGY CONTENT PRODUCTS ALSO DEMAND HIGH TECHNOLOGY PROCESSES AND EQUIPMENT IN THE PRODUCTION LINE. THE CONTRIBUTION OF LABOR IN PRODUCTION IS MINIMAL.

I SUGGEST THE PHILIPPINES SHOULD PLAN TO PARTICIPATE IN HIGH VALUE MANUFACTURING BASED ON TECHNOLOGY TO PRODUCE INNOVATIVE HIGH VALUE PRODUCTS.

HOWEVER, THERE IS MAJOR WORK WE HAVE TO DO TO BUILD A STRONG FOUNDATION IN SCIENCE AND ENGINEERING.

IN THE MANY YEARS THAT I HAVE SPENT HELPING THE COUNTRY, IMMERSING MYSELF WITH ACADEME AND THE GOVERNMENT, INITIATING PROGRAMS ALONG THE THEME OF RESEARCH AND DEVELOPMENT, I HAVE OBSERVED THE SCARCITY OF DISCUSSIONS IN DESIGN AND INNOVATION.

THE FOLLOWING ARE SOME OF THE FOUNDATION WORK THAT WE PUT IN PLACE WITH DIFFERENT DEPARTMENTS OF THE GOVERNMENT TO START THE JOURNEY TO BETTERMENT:

THESE THREE MAJOR PROGRAMS, ERDT, PCARI, AND CLOUDTOP, ARE THE BEGINNING OF A PROCESS OF BUILDING EXPERTISE IN R &D AND INNOVATION FOR PRODUCT DEVELOPMENT.

ERDT: ENGINEERING RESEARCH AND DEVELOPMENT FOR TECHNOLOGY

DURING THE ADMINISTRATION OF PRESIDENT GLORIA MACAPAGAL ARROYO, A GROUP OF US FROM PHILDEV, UP, DOST AND INDUSTRY EXECUTIVES PROPOSED A PROGRAM TO FUND ENGINEERS FOR POST GRADUATE STUDIES IN THEIR RESPECTIVE FIELDS OF INTEREST. THE IDEA IS TO REACH A GOAL OF BEING IN THE 80TH PERCENTILE OF WEC STANDARDS. THIS PROGRAM STILL EXISTS TODAY ON A BUDGET OF



ROUGHLY \$20M/YR AND CONTINUES GENERATE PhDs AND MASTERS IN ENGINEERING.

PCARI: PHILIPPINES CALIFORNIA ADVANCED RESEARCH INSTITUTES

IN THE AQUINO ADMINISTRATION, WE, PROPOSED ANOTHER PROGRAM TO CONDUCT RESEARCH UNDER TWO RESEARCH INSTITUTES, ONE IN INFORMATION AND COMMUNICATION TECHNOLOGY AND THE OTHER IN HEALTH SCIENCES.

THE UNIQUE ASPECT OF THESE INSTITUTES IS THAT THE UNIVERSITY OF CALIFORNIA SYSTEM OF UNIVERSITIES ARE PARTNERS WITH OUR LOCAL PHILIPPINE UNIVERSITIES. WE STARTED WITH BERKELEY AND SAN FRANCISCO. WE HAVE SINCE ADDED U.C. DAVIS, U.C. MERCED, AND U.C. LOS ANGELES. THIS PARTNESHIP WILL ENABLE US TO WORK SIDE BY SIDE WITH THE BEST UNIVERSITIES IN THE WORLD, HENCE, ACCELERATING OUR KNOWLEDGE IN RESEARCH AND GET INVOLVED IN PROGRAMS THAT HAVE IMMEDIATE SOCIETAL IMPACT.

WE ARE NOW IN OUR FOURTH YEAR OF THIS PROGRAM. THE TWO INSTITUTES ARE:

THE INSTITUTE FOR INFORMATION INFRASTRUCTURE DEVELOPMENT (IIID) WITH FOCUS ON ADVANCING INFORMATION TECHNOLOGY, ENERGY, e-GOVERNMENT AND e-EDUCATION IN THE PHILIPPINES THROUGH STRATEGIC RESEARCH AND EDUCATION,

AND,

THE INSTITUTE FOR HEALTH INNOVATION AND TRANSLATIONAL MEDICINE (IHITM) WITH FOCUS ON ADVANCING HEALTH CARE IN THE PHILIPPINES THROUGH STRATEGIC TECHNOLOGY, DELIVERY AND TRAINING.

R&D PROJECT CALLED CLOUDTOP

THIS PROGRAM WAS APPROVED BY THE AQUINO ADMINISTRATION FOR TWO REASONS:

1. TO DESIGN A COMPUTING AND COMMUNICATION INFRASTRUCTURE FOR THE DEPARTMENT OF EDUCATION THAT WILL REPLACE SIMPLE LAPTOPS PROVIDED FOR ELEMENTARY AND HIGH SCHOOLS THAT ARE INADEQUATE FOR THE NEW AND EMERGING DIGITAL CLASSROOM AND,
2. TO BEGIN THE PROCESS OF TEACHING OUR ENGINEERS IN THE PROCESS OF SYSTEMS DESIGN, SPECIFICALLY, COMPUTING AND COMMUNICATION SYSTEMS.

A PRIVATE COMPANY IS NOW AT THE PRODUCTION STAGE. DELIVERIES TO ELEMENTARY AND HIGH SCHOOLS HAVE STARTED. WE CAN NOW CLAIM THAT FOR THE FIRST TIME THERE IS A COMPANY IN THE COUNTRY THAT CAN DESIGN AND DELIVER A SYSTEM FOR COMPUTING AND COMMUNICATION.

WITH THESE PROGRAMS IN PLACE, THERE IS NOW A NEED TO CREATE AN INCLUSIVE INNOVATION CENTER WHERE ACADEME AND INDUSTRY COLLABORATE ON RESEARCH AND DEVELOPMENT WITH EMPHASIS ON NEAR TERM RESEARCH AND REAL PRODUCT DEVELOPMENT. THIS CENTER MAY ALSO BE THE BEGINNING OF TECHNOLOGY BASED START-UPS EMPHASIZING ENTREPRENEURSHIP.

IIC: INCLUSIVE INNOVATION CENTER

INCLUSIVE INNOVATION CENTER (IIC) HAS NOT BEEN PROPOSED TO THE GOVERNMENT AT THIS TIME. THE IDEA OF A PERMANENT CENTER WE CALL “INCLUSIVE INNOVATION CENTER” (IIC) MUST BE ESTABLISHED BY THE DEPARTMENT OF TRADE AND INDUSTRY (DTI), IN

COOPERATION WITH THE DEPARTMENTS OF SCIENCE AND TECHNOLOGY (DOST), THE DEPARTMENT OF COMMUNICATION AND INFORMATION TECHNOLOGY (DICT), AND SELECT UNIVERSITIES IN DEVELOPING TECHNOLOGIES AND PRODUCTS FOR LOCAL AND GLOBAL MARKETS.

THE SMALL RESEARCH[®] AND BIG DEVELOPMENT (D), r & D, WILL BE RUN BASED ON THE IDEA OF “MARKET DIRECTED RESEARCH”.

THIS INCLUSIVE INNOVATION CENTER WILL PROVIDE:

- A. A PHYSICAL SITE FOR BUSINESS INCUBATION, PRODUCTIZATION, AND COMMERCIALIZATION OF TECHNOLOGIES THAT COME FROM R&D INSTITUTES LIKE PCARI AND EVEN DONOR FOREIGN PARTIES.
- B. RESEARCHERS, DESIGNERS, AND ENTREPRENEURS. THESE EXPERTS WILL COME FROM THE BEST INSTITUTES OF THE PHILIPPINES AND SOME OF THE BEST ENGINEERS FROM OTHER INNOVATION HOTBEDS.
- C. A PHYSICAL LOCATION WHERE EXPENSIVE MANUFACTURING, TEST AND MEASUREMENT EQUIPMENT CAN BE HOUSED, MAINTAINED PROPERLY, AND SHARED WITH MULTIPLE PHILIPPINE COMPANIES.
- D. A WORLD CLASS MAGNET FOR FOREIGN PARTNERS SUCH AS THE WORLD BANK, THE ASIAN DEVELOPMENT BANK, AND RESEARCH FROM THE GLOBAL RESEARCH ALLIANCE.

IT IS IMPERATIVE THAT WE DO MORE OF THESE TYPES OF EDUCATION, RESEARCH AND DEVELOPMENT AND PRODUCT DEVELOPMENT PROJECTS.

THERE SHOULD BE NO DOUBT THAT THE FINAL INSTANTIATION OF THESE PROGRAMS IS THE GENERATION OF PRODUCTS THROUGH INNOVATION AND THE PRACTICE OF ENTREPRENEURSHIP.

INNOVATION AND ENTREPRENEURSHIP

TO COMPLETE THE BIG PICTURE, A FEW WORDS ON INNOVATION AND ENTREPRENEURSHIP

WITHIN THE LAST TEN YEARS, THE PHILIPPINES HAS IMPROVED ITS RANKING IN WORLD COMPETITIVENESS.

HOWEVER, THE PHILIPPINES' GROWTH IS BASED MOSTLY ON SERVICES, ASSEMBLY, TESTING, AND PACKAGING OF SEMICONDUCTORS AND ELECTRONIC SYSTEMS, AND REMITTANCES, FROM FILIPINOS OVERSEAS. WE REMAIN A CONSUMER BASED ECONOMY.

THE COUNTRY IS AN IMPORTER OF MOST HIGH-VALUE TECHNOLOGY BASED PRODUCTS ESPECIALLY THOSE THAT CONTAIN INTELLECTUAL PROPERTY IN COMPUTING, COMMUNICATIONS, AND CONSUMER MARKETS.

RESEARCH HAS SHOWN THAT THE ONLY WAY FOR A DEVELOPING ECONOMY TO SUSTAIN A HIGH RATE OF GROWTH AND TO HAVE INCLUSIVE GROWTH THAT BENEFITS THE LOWER ECONOMIC SECTORS OF SOCIETY IS THROUGH SCIENCE AND ENGINEERING EDUCATION AND INNOVATION ENABLING KNOWLEDGE BASED ENTREPRENEURSHIP FROM THE RANKS OF ALL REGARDLESS OF ECONOMIC STATUS.

IT IS VITAL TO THE COUNTRY TO HAVE ITS OWN LOCAL SOURCE OF EDUCATED WORKFORCE IN ENGINEERING, BUILDING AN ECOSYSTEM OF INNOVATION AND ENTREPRENEURSHIP. THIS STARTS WITH UNIVERSITIES AND INSTITUTES CONDUCTING RESEARCH AND DEVELOPMENT TO CREATE TECHNOLOGIES THAT WILL BE USED TO

CREATE INNOVATIVE PRODUCTS THAT ADDRESS THE NEEDS OF BOTH LOCAL AND GLOBAL MARKETS.

THESE TECHNOLOGIES AND PRODUCTS WILL PROVIDE THE PHILIPPINES WITH THE ABILITY TO DISRUPT IMPORTS AND ALLOW THE PHILIPPINES TO HAVE A BETTER TRADE BALANCE THROUGH IMPORT SUBSTITUTIONS AND EXPORTS.

ALSO, IT HAS BEEN SHOWN IN OTHER COUNTRIES THAT TECHNOLOGY BASED INDUSTRIES WITH PRODUCTS THAT ADDRESS BOTH LOCAL AND GLOBAL MARKETS TEND TO BE LARGE AND AS A RESULT INDUCES THE BUILDING OF SMALL AND MEDIUM ENTERPRISES AS PART OF THEIR ECOSYSTEM AND SUPPORTING INFRASTRUCTURE.

SOME OF THESE SME'S ALSO HAVE THE ABILITY TO BECOME LARGE ENTERPRISES OVER TIME. THIS CLOSED LOOP SYSTEM IS TYPICALLY CHARACTERIZED BY FAST GROWTH, COMPETITIVE, AND POPULATED BY RISK TAKERS OR ENTREPRENEURS AND INVESTORS. THIS CHARACTERISTIC OF RISK TAKING BY ENTREPRENEURS IS WHAT MAKES THE STRATEGY NATURALLY INCLUSIVE.

ANOTHER MULTIPLIER TO THIS EFFECT IS THE FACT THAT SUCCESSFUL START-UPS PRODUCE MORE ENTREPRENEURS.

TO CONNECT SCIENCE AND ENGINEERING EDUCATION AND ITS CONTRIBUTION TO ECONOMIES, WE NEED TO LOOK INTO HOW ECONOMIES GROW AND WHAT CAUSES SUSTAINED HIGH ECONOMIC GROWTH.

THE TWO MOST IMPORTANT CONTRIBUTION OF ENGINEERING EDUCATION TO ECONOMIC GROWTH ARE TECHNOLOGIES GENERATED FROM RESEARCH LABORATORIES AND ENGINEERS USING THESE TECHNOLOGIES INTO THE DESIGN OF PRODUCTS.

THE ECONOMIC IMPACT OF TECHNOLOGIES HAPPENS WHEN THEY ARE USED IN THE CREATION OF INNOVATIVE AND HIGHLY DIFFERENTIATED HIGH VALUE PRODUCTS AND SERVICES TO ADDRESS SOCIETY'S NEEDS. THESE PRODUCTS AND SERVICES MAKE PEOPLE BECOME MORE CREATIVE, PRODUCTIVE AND LIVE COMFORTABLE LIVES.

COMPANIES THAT INNOVATE, GENERALLY, ARE VERY SUCCESSFUL AND USE PROFITS TO CREATE MORE TECHNOLOGIES AND PRODUCTS.

OVER TIME, THE AGGREGATE PROFIT CONTRIBUTION OF THESE SUCCESSFUL COMPANIES CONTRIBUTE TO SUSTAINED HIGH ECONOMIC GROWTH IN THE COUNTRY.

SOME OF THE COMMON INDICATORS OF SUSTAINED HIGH ECONOMIC GROWTH ARE:

- POLITICAL LEADERSHIP AND ITS ABILITY TO DEPLOY THE RIGHT INFRASTRUCTURE AND BUSINESS POLICIES
- STRONG FOCUS ON INNOVATION FUNDED BY PRIVATE AND PUBLIC SOURCES
- LARGE AMOUNT OF PUBLIC AND PRIVATE INVESTMENTS
- HIGH RESOURCE MOBILITY
- HIGH LEVELS OF SAVINGS, AND A
- FUNCTIONING MARKET SYSTEM

OBSERVE THAT THESE INDICATORS POINT TO THE THREE BIGGEST AND INFLUENTIAL PLAYERS IN INNOVATION. THEY ARE, THE GOVERNMENT, INDUSTRY, AND ACADEME.

HOWEVER, SUSTAINED HIGH GROWTH LARGELY DEPENDS ON THE PRIVATE SECTOR'S ABILITY TO INNOVATE, INVEST, AND ENTREPRENEURSHIP RESPONDING NOT ONLY TO LOCAL BUT MORE IMPORTANTLY TO GLOBAL MARKET NEEDS.

AT THE RIGHT PRICES, THE GLOBAL MARKET IS UNLIMITED IN SIZE AND EXPORT PRODUCTS TEND TO PULL THE LOCAL ECONOMY ALONG. THIS IS ESPECIALLY SIGNIFICANT BECAUSE THE GLOBAL MARKET IS OPEN AND HIGHLY INTEGRATED AND ALWAYS IN NEED OF HIGH TECHNOLOGY BASED PRODUCTS.

IT IS INDUSTRY AND ACADEME'S TASK TO LEAD IN IDENTIFYING MARKET NEEDS, CREATE TECHNOLOGIES, AND INNOVATE IN HIGHLY DIFFERENTIATED PRODUCTS FOR BOTH LOCAL AND GLOBAL MARKETS.

INDUSTRY CONTRIBUTES TO THE TRAINING OF TECHNOLOGY EXPERTS THROUGH DESIGN AND DEVELOPMENT OF PRODUCTS, BUT, IT IS ACADEME, THROUGH ITS VARIOUS LABORATORIES AND RESEARCH INSTITUTES THAT BUILDS THE FOUNDATION OF TECHNOLOGY EXPERTS AND THE GENERATION OF NEW AND UNIQUE TECHNOLOGIES.

THEREFORE, ACADEME MUST DEFINE AND DIRECT ITS RESEARCH FOCUS WITH INDUSTRY TO ADDRESS MARKET NEEDS.

HOWEVER, IT IS INDUSTRY THAT TAKES THE ULTIMATE RISK AND PROVIDE INVESTMENTS NECESSARY TO CREATE PRODUCTS BASED ON THESE TECHNOLOGIES.

TO SUMMARIZE THESE ROLES:

1. GOVERNMENT CREATES THE RIGHT INFRASTRUCTURES AND BUSINESS POLICIES

2. ACADEME PRODUCES MANPOWER EXPERTISE THROUGH ENGINEERING EDUCATION AND RESEARCH INSTITUTES CREATING TECHNOLOGIES, AND
3. INDUSTRY TAKING THE RISK AND PROVIDES THE NECESSARY INVESTMENTS TO INNOVATE AND CREATE PRODUCTS.

WHEN SUCCESSFUL, EXTREMELY HIGH REVENUES AND CORPORATE VALUE IS ACHIEVED CONTRIBUTING TO HIGH LEVELS OF INVESTMENTS AND EMPLOYMENT.

INDUSTRY PROFITS HAVE IMMEDIATE IMPACT ON EMPLOYMENT, COUNTRY INFRASTRUCTURE DEVELOPMENT, AND FUNDING FOR FUNDAMENTAL RESEARCH BY ACADEME TO FUEL MORE INNOVATION AND PRODUCT CREATION BY INDUSTRY.

FURTHER, OVERALL SAVINGS BY THE POPULATION GROW SIGNIFICANTLY AND PROPERLY INVESTED, SIGNIFICANT GROWTH IN GROSS DOMESTIC PRODUCT (GDP) BECOMES AN INTERNATIONAL ATTRACTION FOR FOREIGN DIRECT INVESTMENTS (FDI) WHICH IN TURN BRING IN MORE TECHNOLOGY AND GLOBAL MARKET KNOWLEDGE.

THIS CLOSED LOOP SYSTEM PROMOTES SUSTAINABLE HIGH ECONOMIC GROWTH WHICH IS THE ONLY KNOWN SOLUTION TO ERADICATE POVERTY.

WHEN WE TALK ABOUT INNOVATION, IT IS IMPORTANT THAT WE MEAN INCLUSIVE INNOVATION. PROPERLY PLANNED, INCLUSIVE INNOVATION HAS THE POTENTIAL TO LESSEN THE GAP BETWEEN THE RICH AND THE POOR.

ONE OF THE TOOLS WE HAVE FOR INCLUSIVE INNOVATION IS ENTREPRENEURSHIP. WITH PROPER AND FAIR DISTRIBUTION OF EQUITY TO INVESTORS, ENTREPRENEURS, AND EMPLOYEES,

SUCCESSFUL EXECUTION BY START-UP COMPANIES RESULT IN SIGNIFICANT WEALTH FOR ALL PLAYERS IN THE ECOSYSTEM.

THIS IS ONE OF THOSE OCCURRENCES WHERE KNOWLEDGE IN DESIGN IS MORE VALUABLE THAN MONEY. THEREFORE, ENTREPRENEURSHIP IS THE FASTEST MEANS OF DIFFUSING WEALTH TO THE POPULATION.

IN THIS CONTEXT, THERE IS NO BETTER EXAMPLE OF ENTREPRENEURSHIP SUCCESS THAN SILICON VALLEY.

SIGNIFICANTLY, WITHIN THE LAST TEN YEARS, ENTREPRENEURSHIP PENETRATED THE AGENDA OF GOVERNMENT, ACADEME, AND INDUSTRY IN MANY DEVELOPING COUNTRIES. THIS HAPPENED SIMPLY DUE TO THE POSSIBILITIES THAT INNOVATION AND ENTREPRENEURSHIP BRING IN TERMS OF WEALTH CREATION.

INNOVATION AND ENTREPRENEURSHIP BECOME TOOLS FOR ECONOMIC DEVELOPMENT ENABLED BY TECHNOLOGIES AND EXPERTISE DERIVED FROM ACADEME AND INDUSTRY RESEARCH INSTITUTIONS.

FUTURE TECHNOLOGY ENABLERS

IN PICKING THE RIGHT AREAS FOR THE PHILIPPINES TO CATCH UP WITH SOME OF THE TECHNOLOGY CENTERS OF THE WORLD, I RECOMMEND TO START IN AREAS THAT I CALL “SOFT”, MEANING, SCIENCE AND TECHNOLOGY THAT DO NOT REQUIRE OTHER HARD TO DO AND EXPENSIVE INFRASTRUCTURES. SOFTWARE WOULD BE AN EXCELLENT EXAMPLE.

EXAMPLES WOULD BE IN THE FIELD OF COMPUTER SCIENCE, MATHEMATICS, NEW FORMS OF DATABASE MANAGEMENT SYSTEMS, SOFTWARE APPLICATIONS FOR SMALL TO MEDIUM SIZE ENTERPRISE APPLICATIONS, DIGITIZATION OF CONTENTS FOR EDUCATION,

ANIMATION, AND NEW APPLICATIONS OF ARTIFICIAL INTELLIGENCE ESPECIALLY NEURAL NETWORK DESIGN FOR ALL ASPECTS OF OUR LIVES AND INFRASTRUCTURE EFFICIENCY AND PRODUCTIVITY.

OTHER AREAS WOULD BE ARTIFICIAL INTELLIGENCE AND DEEP NEURAL NETWORK MACHINE LEARNING APPLICATIONS FOR HEALTH SCIENCES, DISEASE CONTROL, NEW DRUG DESIGN, HEALTH AND DISEASE DIAGNOSIS, TRAFFIC CONTROL, ETC.

NOTES ON VARIOUS OPPORTUNITIES

SKILL SETS:

1. FOR THOSE ALREADY WORKING IN ELECTRICAL ENGINEERING, COMPUTER SCIENCE, MATHEMATICS, PHYSICS, STATISTICS, COMPUTER VISION, DATA MINING, AND OTHER RELATED FIELDS, COULD MOVE INTO COMPLEX AND BIG DATA APPLICATIONS BY ADDING DATA SCIENCE AND DATA MINING SKILLS TO THEIR KNOWLEDGE BASE. ALL OF THOSE EXPERTISE ARE APPLICABLE TO THE TIDAL WAVE ABOUT TO ENGULF US ALL, THAT IS, ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING.
2. APPLICATION ENGINEERS FOR MACHINE LEARNING. IT IS A FOREGONE CONCLUSION THAT MACHINE LEARNING WILL MAKE AN IMPACT ON ALMOST ALL ASPECTS OF OUR LIVES. WITH A GOOD GRASP OF DATA SCIENCE, THERE WILL AN EXPLOSION OF EMPLOYMENT FOR DATA SCIENTISTS AND NEURAL NETWORK DESIGNERS. THIS WILL BE A FIELD THAT WILL NEGATIVELY IMPACT THE SOFTWARE DEVELOPMENT INDUSTRY.
3. BIOLOGY AND LIFE SCIENCES EXPERTS MAY ADD EXPERTISE IN AUTOMATION, COMPUTING, ARTIFICIAL INTELLIGENCE, DIAGNOSTICS, IMAGING, ETC. IN OTHER WORDS, THERE IS A NEED FOR BIOMEDICAL ENGINEERS.

4. SOFTWARE DEFINED NETWORKS TO BRING IN MUCH MORE INTELLIGENT CAPABILITIES EVEN FOR OLDER TELECOMMUNICATIONS INFRASTRUCTURES. THIS OPENS UP MANY POSSIBILITIES IN OVER-THE-TOP LUCRATIVE SERVICES FOR NETWORK PROVIDERS.
5. EXPERTISE IN SEMICONDUCTOR CHIP DESIGN FOR APPLICATIONS IN HIGH SPEED COMPUTING ARCHITECTURES AND APPLICATIONS IN AI/MACHINE LEARNING.
6. CONVERSION OF COMPLEX SOFTWARE PROGRAMS TO NEURAL NETWORK DESIGN.
7. DEEP UNDERSTANDING OF DATA STRUCTURES AND ALGORITHMS APPLIED TO LARGE DATABASES.
8. DEEP UNDERSTANDING OF VIRUS PATTERNS INSTANTIATED AS REGULAR EXPRESSIONS.

MY OP-ED ON INNOVATION AND ENTREPRENEURSHIP

MY VIEW ON INNOVATION AND ENTREPRENEURSHIP, IS THE RESULT OF MANY MEETINGS AND DISCUSSIONS WE'VE HAD AMONG ENTREPRENEURS, FRIENDS FROM VENTURE CAPITAL AND ENTREPRENEUR COMMUNITY IN SILICON VALLEY, AND STAKEHOLDERS FROM INDUSTRY AND ACADEME IN THE PHILIPPINES, THINKING ABOUT THE NEED FOR INNOVATION AND ENTREPRENEURSHIP AS THE NEW FOUNDATION FOR ECONOMIC DEVELOPMENT.

THESE DISCUSSIONS PRESENTED THE OPPORTUNITY FOR US TO TAKE ON THE MISSION OF THINKING ABOUT OUR COUNTRY'S FUTURE FROM THE POSSIBILITIES THAT INNOVATION AND ENTREPRENEURSHIP CAN BRING.

WE CONCLUDED THAT INNOVATION CREATES THE PATH TO WHAT IS NEW AND NECESSARY TO BECOME BETTER INTEGRATED INTO A WORLD OF ACCELERATED CHANGES THAT IS COMPLEX, COMPETITIVE, AND OPEN.

OUR THOUGHTS AND VIEWS TOOK INTO ACCOUNT THE TRENDS EVOLVING FROM THROUGHOUT THE WORLD, BECAUSE SOONER OR LATER THESE TEND TO IMPOSE THEMSELVES EVERYWHERE AS MAJOR DISRUPTIONS.

WE WERE AWARE OF CERTAIN DYNAMICS THAT MAY RADICALLY CHANGE OUR LIVES, PARTICULARLY, AN EXPANDING GLOBALIZATION, POPULATION GROWTH, AND OUR GROWING DEMAND FOR GREATER PRODUCTIVITY AND QUALITY OF LIFE.

WE ASKED OURSELVES WHY WE ARE CONCERNED WITH INNOVATION, HOW IT OCCURS, HOW WE SUSTAIN IT, AND HOW IT BECOMES PART OF OUR DAILY LIVES.

IS IT JUST SCIENCE AND TECHNOLOGY? WHAT IS THE ROLE OF CREATIVITY? HOW MUCH DEPENDS ON CULTURE, HISTORY OR ATTITUDES OF VARIOUS INDIVIDUALS AND GROUPS OR COUNTRIES? ARE THERE PLACES THAT ARE MORE FAVORABLE TO INNOVATION?

WE WERE AWARE OF WHAT HAPPENED WITH DEVELOPED COUNTRIES IN THE LAST TWO HUNDRED YEARS.

COUNTRIES WITH SIGNIFICANT ENRICHMENT OVER THAT SPAN OF TIME, ACCOMPLISHED IT NOT BECAUSE OF INSTITUTIONAL ACCUMULATION OF WEALTH.

IT WAS ACCOMPLISHED THROUGH ACCUMULATION OF IDEAS BY COMMON PEOPLE, MOST OF THEM WITHOUT MEANS OR CAPITAL BUT WERE LIBERATED FROM CONSTRAINTS OF SOCIETY, GOVERNMENT, OR RULERS. ESSENTIALLY, IT IS THE CONCEPT OF LIBERTY THAT ENABLED THEM TO THINK FREELY.

IN PRESENT DAY LANGUAGE, THEY ARE ENTREPRENEURS WITHOUT CAPITAL BUT RICH IN IDEAS AND ARE FREE TO INNOVATE.

ANOTHER GREAT CONCEPT ADDED TO LIBERTY IS EQUALITY. BOTH RICH AND POOR WERE GIVEN EQUAL RIGHTS TO FREELY PURSUE DEVELOPMENT OF THEIR IDEAS.

EARLY ON, COUNTRIES FROM THE WEST INSTITUTED THE RULE OF LAW, PROTECTION OF INTELLECTUAL PROPERTY RIGHTS, AND THE AVAILABILITY OF CAPITAL ENABLED ENTREPRENEURS TO TAKE RISKS RESULTING IN ECONOMIC GROWTH THAT HAS NOT BEEN SEEN BEFORE.

THE CAPITAL BECAME PRODUCTIVE BECAUSE OF IDEAS FOR BETTERMENT, IDEAS ENACTED BY ANY COMMON MAN OR AN ENGINEER WITH AN IDEA THAT A SEARCH ALGORITHM IS VALUABLE, OR THAT A TOOL FOR PEOPLE TO GET IN TOUCH WITH FRIENDS AND FAMILY WOULD BE USEFUL.

THE COUPLING OF IDEAS IN THE HEADS OF COMMON PEOPLE YIELDED AN EXPLOSION OF BETTERMENTS.

THE ENRICHMENT OF THE POOR SINCE ABOUT 200 YEARS AGO HAS COME NOT FROM CHARITY BUT FROM A MORE PRODUCTIVE ECONOMY. IT IS ALSO IMPORTANT TO KEEP IN MIND THAT A MORE PRODUCTIVE ECONOMY DOES NOT COME FROM POLITICIANS BUT FROM SCIENTISTS AND ENGINEERS.

AS IMPORTANT, WE MUST EMBRACE A CULTURE OF CHANGE AND SCIENTIFIC INQUIRY.

THESE WELL PROVEN SIMPLE CONCEPTS CONTINUE TO THRIVE IN DEVELOPED COUNTRIES TODAY. IN FULL IMPLEMENTATION, IT WILL ERADICATE POVERTY.

CONCLUSIVELY, ENRICHMENT OF THE POOR DID NOT COME FROM CHARITY, AND INSTEAD, FROM A PROGRESSIVE THRIVING ECONOMY.

THE BETTERMENT OF THE NEXT GENERATION WILL BE ENABLED NOT BY POLITICIANS BUT FROM ENGINEERS AND ENTREPRENEURS RICH IN IDEAS FOR INNOVATION AND BUSINESSMEN WHO UNDERSTAND THE DYNAMICS OF WEALTH ACCUMULATION.

IN OUR STRATEGIC PLANNING AT PHILDEV, WE DISCUSSED METHODS AND MODELS OF HOW WE USUALLY THINK OF INNOVATION AND ENTREPRENEURSHIP. IT TOOK US A WHILE, MULTIPLE STRATEGIC PLANNING SESSIONS, TO FINALLY BRING OUR CONCLUSIONS TO THIS LEVEL.

WE PERSEVERED, BECAUSE OUR COUNTRY DESERVES THE COMMITMENT OF TAKING RESPONSIBILITY TO WHAT IS ESSENTIAL TO OUR FUTURE, AND THAT IT SHOULD BE DONE AT AN APPROPRIATE PACE, AND NOT LIMITED BY SHORT TERM ISSUES, AND INSTEAD INSPIRED BY BROAD FOUNDATIONAL PRINCIPLES.

IN THIS CONTEXT, NO DEVELOPING COUNTRY'S FUTURE IS ASSURED. THE SUCCESSFUL ONES WILL BE THOSE ABLE TO DERIVE METHODS AND MODELS FROM SUCCESSFUL DEVELOPED COUNTRIES, HUMBLE AND REALISTIC ABOUT ITS CURRENT STATUS AND ABLE TO RALLY THE COLLECTIVE STRENGTH OF ITS GOVERNMENT, ACADEME, INDUSTRY

AND POPULATION TO DEAL WITH THE TRANSFORMATION THAT INNOVATION AND ENTREPRENEURSHIP BRING.

FROM THE BEGINNING, WE OBSERVED THAT IN SPITE OF ALL OUR EFFORT IN EXPOSING THE NEED USING EXAMPLES FROM DEVELOPED COUNTRIES, INNOVATION CONTINUES TO BE ABSENT FROM MAJOR DISCUSSIONS AND PLANNING ABOUT OUR COUNTRY'S FUTURE.

FOR MOST FILIPINOS, IT STILL APPEARS TO BE THE DISTANT DISCOURSE OF THE POLITICAL AND ECONOMIC ELITE, AND NOT A RESPONSE TO THEIR URGENT NEEDS.

ONCE AND FOR ALL, WE NEED TO DEAL WITH THIS INDIFFERENCE AND INACTION.

THIS IS WHY WE MUST EXPAND OUR COMPREHENSION OF THE INNOVATION AND ENTREPRENEURSHIP PHENOMENON, SPANNING BOTH THE HUMAN AND SOCIAL, AND OF COURSE, THE SCIENTIFIC-TECHNOLOGICAL AND ECONOMIC-ENTREPRENEURIAL SPACE.

ALSO, AND AS IMPORTANT, WE CONCLUDED THAT INNOVATION AND ENTREPRENEURSHIP ARE INSEPARABLE FROM AN ECONOMIC POINT OF VIEW.

WE MOVED AWAY FROM THE CLASSIC VIEW OF INNOVATION AS "SCIENCE + TECHNOLOGY + CREATIVITY = INNOVATION". INNOVATION IS NOT A MERE EQUATION. INNOVATION IS NOT INVENTION. INNOVATION IMPLIES INDUSTRY RISK TAKING AND ITS POSITIVE IMPACT ON ECONOMIC GROWTH.

INNOVATION IS CREATING AN IDEA, A PRODUCT OR SERVICE THAT HAS NEVER BEEN DONE BEFORE. WE BELIEVE IN THE DEFINITION OF INNOVATION IN THE CONTEXT OF ENTREPRENEURSHIP AS THE "UNION

OF TECHNOLOGY AND MARKET NEEDS RESULTING IN THE CREATION OF HIGH VALUE ADD PRODUCTS AND SERVICES”.

ENTREPRENEURSHIP IS GENERALLY UNDERSTOOD AS THE CREATION OF ENTERPRISES FROM THE GROUND UP AND IN MANY CASES, WHEN SUCCESSFUL, ENTREPRENEURIAL EQUITY ACCOMPLISHES ITS ROLE AS THE FASTEST DIFFUSION OF WEALTH TO THE POPULATION.

BUT, HOW DOES THIS HAPPEN?

IT HAPPENS WHEN IT IS DEFINED AS: “ENTREPRENEURIAL EQUITY IS THE FAIR DISTRIBUTION OF OWNERSHIP OF THE ENTERPRISE TO THE FOUNDERS OF THE ENTERPRISE, ALL EMPLOYEES, AND INVESTORS”. WHEN SUCCESSFUL, IT IS ONE OF THE BEST KNOWN DRIVERS FOR INDIVIDUAL WEALTH.

IT IS IMPORTANT TO NOTE THAT FAIR DISTRIBUTION OF OWNERSHIP MEANS FAIR DISTRIBUTION BASED ON RISK TAKING.

IN THIS PRACTICE OF ENTREPRENEURIAL EQUITY, THERE IS NO BETTER EXAMPLE THAN SILICON VALLEY.

INNOVATION AND ENTREPRENEURSHIP, IS SUCH A POWERFUL UNION ENABLED BY LEVERAGING THE TECHNICAL CAPABILITY OF HUMAN CAPITAL IN ALL ITS FORM OF KNOWLEDGE AND EXPERTISE IN TECHNOLOGY DEVELOPMENT, PRODUCT CREATION, ENTERPRISE BUILDING AND WEALTH CREATION.

IT IS THEREFORE THE BEST TOOL FOR INCLUSIVE INNOVATION WHERE TECHNICAL KNOWLEDGE, CREATIVITY, AND DESIGN ARE VALUED MORE THAN MONEY.

AS WE CONFRONT THE CHALLENGES OF THIS TRANSFORMATION TO ENRICHMENT, OUR COHESIVENESS, AND MORE IMPORTANTLY OUR CREATIVITY, ENERGY AND FORCEFULNESS IN THE IMPLEMENTATION OF MODELS AND METHOD WILL HAVE DIRECT IMPACT IN THE SUCCESS OR FAILURE OF THESE TRANSFORMATIONS.

THERE ARE MANY ASPECTS TO THIS TRANSFORMATION THAT WE ARE TO ACHIEVE. IN MY OWN OPINION, THE TOUGHEST ONE WE MUST DEAL WITH IN THIS CHANGE IS CULTURAL.

WE WILL BE CHALLENGED BY EXISTING ATTITUDES AND PRACTICES AROUND RISK TAKING.

WE NEED TO LEARN NEW PRACTICES IN STRATEGIC LONG RANGE PLANNING, AND IN THE FACE OF UNCERTAINTY, ALWAYS BELIEVING THAT INNOVATION AND ENTREPRENEURSHIP MUST BE THE FOUNDATION OF OUR COUNTRY'S SUSTAINABLE ECONOMIC GROWTH TO FULL DEVELOPMENT.

AS WE BEGIN TO FACE THESE CHALLENGES, OUR ABILITY TO CONTINUOUSLY CHALLENGE OURSELVES, OUR ACTIONS AND BELIEFS, FULFILLING COMMITMENTS, OUR TRUST IN EACH OTHER, AND ABOVE ALL OUR IMAGINATION AND CREATIVITY IN INNOVATING UNDER COMPETITIVE PRESSURES AND CONSTANT CHANGES WILL PLAY SIGNIFICANT ROLES.

IF WE AIM TO ACHIEVE A BETTER QUALITY OF LIFE AND GROWTH BASED ON THE CREATION OF NEW WEALTH,

IF WE WISH TO MOVE BEYOND THE EXPLOITATION OF NATURAL RESOURCES, COMBINING INTELLECTUAL WORK WITH SCIENTIFIC AND TECHNOLOGICAL TRAINING,

IT IS NECESSARY, NOT JUST SUFFICIENT, AND QUITE ESSENTIAL TO BUILD A FASTER AND SHORTER PATH TO ECONOMIC DEVELOPMENT, A PATH THAT REQUIRES COMMITMENT AND ABILITY TO IMPROVE OUR CONVERSATIONS AND TRANSFORMATIONS BASED ON INNOVATION AND ENTREPRENEURSHIP.