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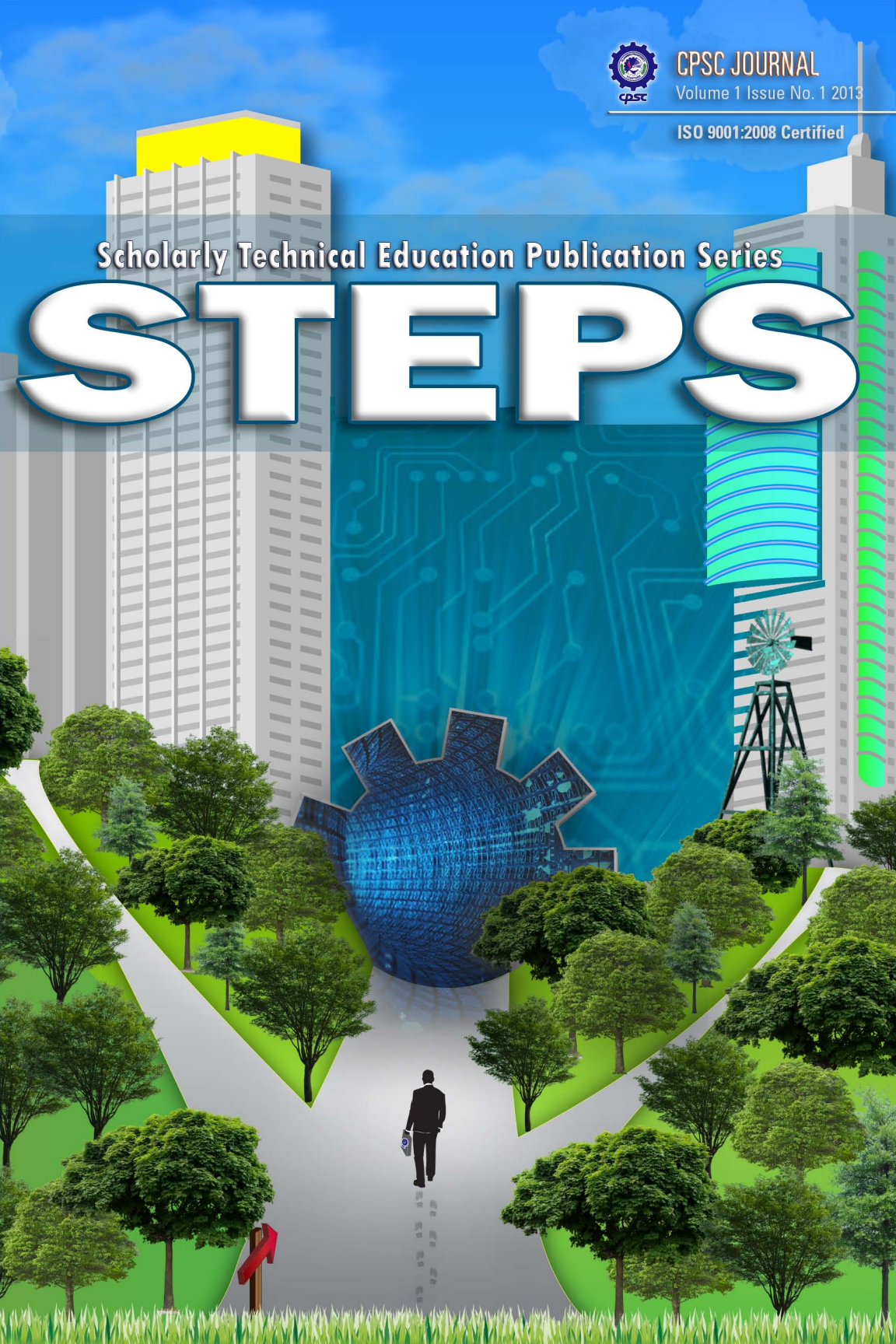

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Preface

Relevance, responsiveness and flexibility of TVET's delivery are among the pressing issues and concerns of the times vis-à-vis the backdrop of sustainable and inclusive development in the fast changing global market. The TVET community, thus, must come together to examine issues, gear up, undertake actions and move forward towards addressing the challenges of the globalized era.

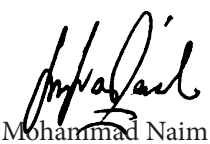
In our commitment to act as a clearinghouse of TVET information and in pursuit of our mandate of creating and providing a platform for exchange and convergence of TVET innovations, best practices and experiences, it is with immense pride and pleasure that CPSC releases the pioneer issue of the CPSC Journal on TVET which we shall call Scholarly Technical Education Publication Series or simply STEPS.

This journal is intended to generate current information, new findings, studies, strategies, innovations, or best practices on TVET and provide a launch pad for research-based papers or case studies, review or report articles, conference papers, or any original article covering issues, concerns, and developments pertinent to TVET in the Asia-Pacific Region in particular and the world at large.

The Editorial Team encourages more contributions from TVET policy makers, practitioners and stakeholders from CPSC member countries and as well from the international community. Please join us in making this collaborative undertaking of TVET professionals and enthusiasts a showcase of noteworthy academic papers, studies, and articles on technical education that provides recognition of experts and professionals in the field.

We hope that this maiden issue marks the beginning of a dynamic sharing and exchange of ideas, concepts, viewpoints and progress on technical education. Together, let us make this compendium of scholarly written articles on technical education a vibrant forum to inspire collective efforts to promote TVET, advocate and act for change, dynamism and enhancement of TVET systems in the Asia Pacific Region and the world.

Sincerest thanks is extended to the first batch of contributors to this maiden issue from countries namely, India, Indonesia, Malaysia, Myanmar, Nepal, Papua New Guinea and Singapore and to the editorial team for making this latest milestone of CPSC a reality.



Dr. Mohammad Naim Yaakub
Editor-in-Chief

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Regional Cooperation and Linkages for a Greener Economy and the Role of TVET

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Abstract

The negative impact of unsustainable development require governments and organizations to collectively respond with roadmaps in which cooperation is the key to faster integration and reinforcement of values, beliefs and strategies to create a better environment for everyone on this planet. This paper explores the different perspectives of international cooperation in transforming TVET to meet the challenges of the green economy in the region. The discussions tackle concepts and ideas suitable for the current scenario of the region, as well as suggested directions in greening TVET. Lastly, it provides a glimpse of regional and international initiatives that will serve as a stepping stone for a greener, environmentally sustainable economy through sound TVET operations and policies.

Keywords: green economy, regional cooperation, education for sustainable development in TVET

Introduction

Climate change and environmental degradation from human actions are largely controversial issues hounding the present policymakers, sparking innumerable conferences and talks to reverse the trends of environmental destruction. Efforts made so far seem insufficient in reversing this trend, as the world increases the consumption and degradation of its natural resources, as evidenced below.

1. The world's energy consumption increased by five percent in 2010 fueled by the demand from developing countries particularly China and India. Coal and Oil accounted for 33 and 27 percent of consumption respectively, with the latter posting a steady growth in the share of energy sources.
2. The proportion of urban population is dramatically increasing. The urban population in 1900 was 13 percent, it rose to 29 percent in 1950, 49 percent in 2005 and projected at 60 percent by 2030. Although this enables easier mobility of goods and services, and perceived better quality of life, ill effects like the urban heat island, a major contributor for global warming, is very imminent.
3. Rising carbon dioxide emission levels is directly contributing to global warming. Currently, there are no signs of slowing down as developing countries increase their consumption of fuel for their respective economies.

4. Poor countries are likely to bear the heaviest brunt in abrupt changes in climate, as it may alter agriculture-related activities and livelihoods, promoting widespread hunger and unrests. The increase in disasters poses a grave threat in reconstruction, rehabilitation and sustenance of the almost subsistence economies of these countries.

The realization of the imminent consequences that environmental problems may bring if not addressed in a long-term manner, unites all sectors in the society to formulate their ideas, researches and opinions in making a sustainable, environmentally-future a possible reality. TVET is no exemption on these initiatives, for its operations and by-products contribute largely to the environmental problems we have been seeing today. With this, the call for a Green TVET is growing in resonance as the administrators, organization and concerned TVET experts work hand-in-hand to streamline operations to accommodate the needs of the environment.

Education and TVET as a Key to Embrace Sustainable Development

The most common concept of sustainable development is defined by the Brundlandt Commission (as cited in Drexhage and Murphy, 2010) as "A development that meets the needs of the present without compromising the ability of the future generations to meet their own need. Sustainable development is increasingly being lobbied as a battle cry by development advocates as a suited policy direction for the world today, given its ills and problems, and education and training is key to an orchestrated effort towards achieving this, as highlighted by the 1987 Brundtland Commission.

The goal of achieving sustainable development practices gave rise to summits and meetings organized by the United Nations specifically convening countries towards the agreement of integrating sustainable development in their economic and social agenda. In response, the World Summit on Sustainable Development reaffirmed this commitment and recommended to the United Nations General Assembly the establishment of a United Nations Decade of Education for Sustainable Development (DESD, 2005-2014), which clearly recognizes the increased need to integrate sustainable development issues and principles into education and learning at all levels. Thus, while education clearly is not a sufficient condition in itself for achieving sustainable development, it is certainly a necessary condition.

Education for Sustainable Development (ESD) and TVET

The ESD approach was conceptualized by UNESCO as a way to integrate all the pillars of education with the promotion of sustainable development. Among other things, ESD promotes a sense of both local and global responsibility, encourages future-oriented, anticipatory thinking, builds recognition of global

interdependence and emphasizes cultural changes that embrace the values of sustainable development. Rather than remaining passive in the face of the above-mentioned challenges, ESD seeks to empower societies, communities and individuals everywhere to shape their future actively and responsibly. ESD raises interesting questions, for example, about learning how to generate creative solutions to current global challenges; about reflecting on new lifestyles which combine well-being, quality of life and respect for nature and other people; and about considering the viewpoints of people from different countries about what sustainability means in practice.

TVET for sustainable development seeks to provide a new image and direction for TVET besides from it being just a "mere supplier" of skilled labor to industry. In order to reconcile these two concepts, Majumdar (2009) suggests the need to reorient the TVET curriculum towards the "6R" principles namely: Reuse, Reduce, Renew, Recycle, Repair and Rethink; in order to say that TVET education is heading towards sustainability. Moreover, it has three pillars based on three concepts: (1) a change of the "business as usual" approach to "sustainable development approach" through the wise and practical usage of resources, (2) economic sustainability which requires a different and wider set of economically related knowledge skill and attitude for production, management and consumption of goods and services and (3) social sustainability, which involves ensuring that the basic needs of people regardless of classification are satisfied.

The United Nations Conference on Environment and Development (UNCED) summit held in Rio de Janeiro, Brazil from June 3-4, 1992 has pointed out the importance of a sustainable development practice in education and its integration at all levels, either formal or informal. This landmark recognition has started several campaigns to increase the awareness for adopting sustainable development at all levels, with the most important being the UN's establishment of the United Nations Decade of Education for Sustainable Development from 2005-2014 with the primary goal of making Sustainable Development a central policy for education and training for all sectors, an outcome of the World Summit on Sustainable Development held at Johannesburg, South Africa from August 26-September 2, 2002.

Regional Cooperation Initiatives for the Green Economy

The Asia-Pacific region, being the largest and one of the most economically diverse in the planet, has forwarded some important initiatives in sparking a collective action towards the reorientation of TVET towards the green economy.

Green Economy in the Asia-Pacific Region

The green economy is born out of multiple crises and accelerating resource scarcity through the creation of an economic paradigm that can drive growth

of income and jobs without creating environmental risks, and has strategies to end the persistence of poverty. It is based on the working definition of the United Nations Environment Program (UNEP) as the distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks and ecological scarcities.

The Asia-Pacific region is increasingly being looked at as a hub for research and development for green solutions. This is due to its innovation in technology, low-priced manufacturing and services, and traditional knowledge and processes. Today, the region has the world's third largest pool of scientists and engineers and has instilled confidence in the global market through its significant achievements in information technology, professional services and communications in the past decade. The past few years have seen a rise in green innovation and venture capital, with China, India, Malaysia and Korea being rated as among the most attractive countries for renewable energy investment.

If Asia-Pacific capitalizes upon the potential of green economy, not only would it promote a more sustainable and cleaner environment, but also the region's economy would see the generation of hundreds and thousands of downstream jobs. Asia-Pacific is in a unique position to create a low-carbon green economy. It is on a high path of growth. However, there is a lot to create more infrastructure, services and jobs. It is the TVET programs and support from industry that will shape the outlook of the region; if they choose to incorporate environmental sustainability into their business, although immediate costs may be higher in some instances, they will sustain their business economically.

Some of the initiatives and practices being adopted in the region in environmentally sound practices are presented Table 1.

Green Jobs

Green jobs, as defined by the International Labor Organization (2008) refer to employment in any industry that contributes to preserving or restoring environmental quality in that sector and allowing for sustainable development. Specifically, but not exclusively, this includes jobs that help protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize (or altogether avoid) generation of all forms of waste and pollution.

Green jobs encourage the following activities: (1) the adaptation and mitigation of resources, (2) contribution in preserving environmental quality, (3) promotion in protecting ecosystems and biodiversity, (4) leadership in reducing energy, materials and water consumption, (5) de-carbonization of the economy and encouragement of the reduction of pollution and wastes. On the other hand,

green employment practices encourages the use energy-efficient materials in building materials and maintenance, Proper solid waste management, controlled water supply and reduction of CO_2 and the use of green technology.

Table 1: Asian Initiatives Towards the Adoption of Clean and Green Technology

China	• Investments in renewable energy more than any other country • Creation of a National Policy that sees clean and green as a major market in the future
India	• Transition has already begun on adopting cleaner energy practices • Indian industries are looking on the corporate environmental impact to avoid pressures of unsound environmental practices, as well as their own policy for corporate social responsibility
Republic of Korea	• Adopted a national strategy and a five year plan for green growth • Share of green growth tool kits and experience • Leaderships in international efforts to help build physical infrastructures in developing countries
Nepal	• Community forest management intensified to generate employment and income from sustainable harvesting of forest products
Malaysia	• Establishing green economy through the adoption of low carbon emissions use, and a well-educated populace in the aim of attaining the status as a manufacturing hub in the region
Bangladesh	• Grameen Shakti (Grameen Energy) Program initiated as a way to finance households following clean energy solutions such as the installation of Solar House Systems

Source: Asia-Pacific Partnership on Green Development and Climate (2011)

The different organizations concerned with labor and employment have seen the adoption of green jobs as a sure direction towards addressing the issues brought by the recent challenges of economic development and its imminent halt due to climate change and environmental degradation. Thus, the International Labor Organization (2008) launched the Green Jobs Initiative as a way to promote green jobs as an alternative to address pressing issues like poverty, unemployment and economic disparity. Alongside organizations such as the United Nations Environment Program (UNEP), the International Employers Organization (IOE) and the International Trade Union Confederation (ITUC), this initiative was created as a way to encourage government action in the mobilization of stakeholders to come up with effective programs that will lead to the green economy. The program concentrates on six priorities such as (1) Analysis of the employment and labor market conditions, (2) practical approaches to greening enterprises, (3) Green jobs in waste management and recycling, (4) renewable energy and energy efficiency, (5) a just transition towards a green economy and a sustainable society and (6) adaptation to climate change.

ILO has pointed out that the creation of green jobs will spark the initiatives for a green economy. Its conclusions on the 2008 meeting was that the green economy should feature the following:

1. Meet new skill needs as part of mitigation and adaptation efforts
2. Support a fair transition to more sustainable production, and
3. Sustain a dynamic development process through: adjusting training supply to demands of new technologies, products, energy efficiency, etc.

So far, this ILO initiative has already assisted India, Nepal, China, Laos, Vietnam, Indonesia, Thailand, Fiji and the Philippines in sectors that have a high impact and contribution to the local economy. This ranges from green jobs creation for energy and heavy industry in China and Sri Lanka to the green enterprise development in Thailand and India.

The research conference on Niigata, Japan held on April 21-23, 2011 served as an initial outcome of this initiative in the region. It attempted to explore the new concepts and approaches being done in the region in terms of the promotion of green jobs. The conference provided inputs to the ILO contribution to the 2008 G8 Ministers Meeting hosted by Japan. Some of the important policy messages that were provided are:

1. The inter-relationship between the environmental, economic and social dimensions of climate change and other policies is needed to be put on a political map
2. New opportunities for employment and social well-being can be obtained through green growth and mitigating the effects of climate change
3. Arresting the drastic effects of climate change and green growth depends on the creation of enterprises and jobs that promote environmental well-being
4. The labor markets and the institutions in the region should always be prepared for these changes
5. Attention must be given for the "clean development" through social and economic equity
6. Coherent policies should be promoted to engage and empower actions.

Recently, a conference serving as a platform to initiate a healthy discussion and information exchange on the green jobs opportunity was held in the Philippines in line with the ILO's initiative. With the theme of "promoting green jobs and decent work through exclusive growth", the first Philippine Green Jobs Conference held in Manila last August 15-16, 2011 convened more than 300 participants who discussed about the climate change effects, the world of work and the identification of new jobs, skills and competencies that will ensure change from the conventional employment practices to a more environmentally

stable approach. This session resulted in a collective call for action to pursue the green jobs initiative not only in the Philippines but also in the regional and international scope.

Inter-Regional Initiatives

The Rio Declaration on the Environment and Development, or the 1992 Rio Declaration, has indicated in one of its 27 principles that "The right to development must be fulfilled so as to equitably meet developmental and environmental needs of the present and future generations". This has sparked the creation of the Commission on Sustainable Development to ensure the effective implementation of this agreement at all levels. It also led to the agreement of the Climate Change Convention, which in effect led to the creation the Kyoto Protocol.

Throughout the years after this summit, the world has seen several conferences on climate changes that have promised landmark developments in guaranteeing a sustainable future. The Kyoto Protocol agreed in 1997, for example, has imposed a mandatory reduction of greenhouse gas emissions to 37 developed countries by 5.2 percent from the 1992 level.

The idea has been met with mixed results. Developed countries in the region have managed a 4% reduction in the emission of greenhouse gases (GHG) as compared with the 1990 levels. This is due to the efforts placed by these countries on the creation of emission schemes such as the following:

Table 2: Implementation of the Emissions Trading Program

Country	Implementation	Year Implemented
Japan	Tokyo Metropolitan Government- responsible for Emissions Trading in Tokyo	2010
Norway	Norwegian Government, which is a participant to the EU Emissions Trading System	2005
Switzerland	Swiss ETC, planned to coincide with the Kyoto Protocol's first commitment period	2008-2012
United Kingdom	UK Emissions Trading Scheme CRC Energy Efficient Scheme, ran by the UK government	2002-2006 2010
Canada	Emissions trading started in Alberta, and scheme run by the government of Alberta	2007
United States	Regional Greenhouse Gas Initiative- plans to put a cap on power generation emissions in ten north-eastern US states	2009
Australia	New South Wales Greenhouse Gas Reduction Scheme (NSW) ran by the state of New South Wales	2003
New Zealand	New Zealand Emissions Trading Schemes	2002

Source: United Nations Framework on Climate Change (2011)

Some critics argue that the emissions trading scheme is not a radical solution to an increasing climate change problem since it requires nothing less than the "reorganization of the society and technology that will leave most of the remaining fossil fuels underground". Weak points such as "perverse incentives" or incentives that will actually cause the reverse of what is targeted to be achieved are also included in the criticisms.

The Asia-Pacific Partnership on Clean Development and Climate, also known as the APP, was formed by Australia, Canada, India, Japan, China, South Korea and the United States on July 28, 2005. The basis of this formation was through a shared vision of "advancing clean development and climate objectives" through the building of existing bilateral and multilateral initiatives to increase cooperation in terms of meeting needs and challenges associated with growing energy demands in accordance with national objectives.

This partnership brings an alternative to the Kyoto Protocol, which imposes mandatory limits on greenhouse gas emissions. This partnership encourages member countries to accelerate the development and deployment of technologies promoting clean and green procurement of energy without mandatory enforcements. Although supporters have hailed the partnership as "overcoming the impasse between developed and developing countries", environmentalists criticized it as a mere" public relations ploy" (Rustin, 2011). This is due to the non-imposition of mandatory targets and incentives as presented in the Kyoto protocol. The criticism was again highlighted on the fact that none of the signatories have lowered greenhouse gas emissions. Despite these, proponents have lauded a record of promoting collaboration with the governments and private sector in key collaborative projects on developing the key energy sectors and activities.

Key Points and Lessons from the Copenhagen Accord

The Copenhagen Accord of 2009, in continuance to the Kyoto Protocol, has recognized the different hazards posed by the climate change and has reiterated the call for increased support of the developed countries to Least Developed Countries (LDCs) and Small Island Developing States (SIDS); both groups severely affected by changes in climate.

It specifically targets to forward initiatives such as the developed countries' allocation of almost 30 Billion USD for the new and additional resources in establishing the Copenhagen Green Climate Fund to support the projects, programs and other activities placed by the developing countries to limit carbon emissions. In turn, plans for the restructured multilateral funding, with the structure towards good governance and management, will be delivered.

Several critics have labeled the Copenhagen Accord as "serving the interests of the few economies, particularly the US and China". Similarly some accusations that there are still no decisions for the creation of a legally binding successor to the Kyoto Protocol and the lack of an international approach to technology have hounded the conference.

The failure of the Copenhagen accord brings a new perspective on the responsibility of preventing the ill effects of climate change. Many critics say that the emissions of developed countries are still lopsided and the Copenhagen Accord will bring a more "unfair" sharing of the carbon budget. It also encourages countries to resume negotiations in agreeing to a multilateral track without any motive for political or economic self-gain.

Transforming TVET for a Greener Economy

TVET influences policy shifts towards sustainable development since it plays a major role in the development of the workforce that utilizes resources. This forges the role of TVET in upholding the recommendations of the United Nations in terms of developing a green economy as a future direction.

The examples above show that that governments and organizations in the Asia-Pacific region are taking massive steps in achieving a green economy through stronger ties and wider understanding on its scope and strategies. However, TVET has to have a major involvement in this initiative, being a major supplier of skills and training initiatives to the emerging workforce.

The International Forum on Vocational-Technical Education held on November 17-19, 2008 at Hangzhou, China recognized the "paramount necessity" of TVET improvement and has called several measures to make TVET a catalyst to transform the vast potential of human resources in the region. It has forwarded the following recommendations in view of this call:

1. TVET should encourage and implement political will and commitment of national governments so it can assume a unique and key role in ensuring the provision of education.
2. The image, values and attitude towards TVET must continually be enhanced.
3. Reform TVET based on the recommendations from the UN Millennium Development Goals and Education for Sustainable Development Concepts.
4. TVET should strive to provide lifelong learning and a lifetime upgrade of knowledge in the age of rapid technological advancement.
5. Closer international partnership and linkages between TVET and the industry must be pursued, as well as the public-private cooperation and initiatives.

6. Competency-based TVET should be emphasized as a clear need to develop individual learning, relevance and efficient use of resources.
7. Entrepreneurship and entrepreneurship training must be promoted to facilitate the development of knowledge.
8. Networking between TVET institutions and other countries across the region should be greatly encouraged to facilitate institutional development.
9. The assistance of organizations such as the UNESCO-UNEVOC will play a key role in providing the needs for TVET reform and expansion.

Although this is one of the important regional responses to make TVET practices sustainable, there is still a need to reinvent it towards the greener direction. Thus, the Colombo Plan Staff College, an inter-regional organization for human resource development in the Asia-Pacific region, has continuously spearheaded ways to serve as a model of greening TVET through the launch of the "Green CPSC Program". The college aims to serve as a model towards the green campus approach based from the five pillars of greening TVET.

Figure 2: The Five Pillars of Greening TVET
Source: Majumdar (2009)

In connection with this initiative, a conference on Education for Sustainable Development in TVET was held in Manila from November 2-3, 2010 organized by CPSC and its international partners IVETA and InWEnt (currently GIZ) from Germany. This initiative has recognized the need for TVET to pursue an environmentally sound direction through the inclusion of economic, cultural and social considerations to drive a more sustainable human resource path in its contribution to the green economy. In conclusion, the delegates representing 39 countries across the world, called to implement the following green TVET practices through the following recommendations:

1. Recommend to integrate ESD in TVET as high in the international agenda

2. Develop policies and strategies to integrate ESD in TVET system
3. Mobilize a green TVET Framework to support socio-economic aspects in sustainable development
4. Promote capacity building to integrate ESD in TVET systems
5. Re-orient TVET curriculum and teacher education to integrate ESD at all levels of education
6. Increase public awareness through seminars, conferences and workshops to promote ESD as an advocacy
7. Strengthen networking and linkages to enhance multi-stakeholder partnership for evolving green TVET
8. Promote evidence-based research, monitoring and evaluation strategies for ESD in TVET
9. Develop clean and green technology programs to address the needs of the green economy
10. Prioritize capacity building of trainers to increase investments in education for the youth in creating a strong foundation of society for sustainable development.

Challenges to Transform TVET for a Greener Economy

Despite the relevance of TVET in forwarding the cause of SD, it still remains locked up to the role of being a mere supplier of skilled labor to industry and is thereby unable to respond effectively to the needs of the sustainable development strategies (Majumdar, 2009). Thus, the challenges emerge centering on how professionals should transform TVET towards green economy while maintaining the principles of 6R: Reduce Reuse, Renew, Recycle, Repair and Rethink.

As the modern world evolves and adapts to the constant changes in lifestyle and perspectives, TVET is reinforced with the urgent need to invent and re-invent ways in infusing the concepts of green economy for sustainable development into the curriculum or diffusing GE principles from specific technical subject domains. As per Rosalyn McKeown of the Heinrich Boll Foundation (2002) some of the challenges and Barriers to SD are:

- Increasing awareness: green economy is essential
- Structuring and placing SD in TVET curriculum
- Facing the complexity of sustainable development concept
- Developing international and regional cooperation and networking in SD
- Engaging traditional disciplines in a trans-disciplinary framework
- Building teacher educator's capacity
- Developing instructional materials and resources

- Developing TVET policy
- Developing a creative, innovative and risk-taking climate in TVET institutions
- Promoting sustainability as a popular culture in TVET schools

Future Directions for the Green Economy, TVET and Fostering International Cooperation

The cornerstone for a change in economic perspective is the shift in the reorientation of accustomed values, beliefs and evidence in finding the link between the multiple crises to unsustainable economic activities. This has to translate to all the stakeholders in the world's economy, from the micro (individual) to the macro (policy makers and multinational corporations) levels.

There is also the need for the world's most powerful economies like the members of the G8 and the G20 to support those developing countries that will be affected significantly by the changes in climate and its related effects through policies that can generate long-term solutions such as augmented balance-of-payments support, trade finance, lending by multilateral banks, and concessional finance to those countries that are really in need of economic intervention. Fiscal reforms, equitable distribution of resources and revitalized trade using environmentally sound technologies are some of the suggestions to bring a permanent, if not a long-term solution. These are the core requirements in establishing a green economy.

The report of the United Nations Environmental Program (2011) states that the shift towards the direction towards green economy requires education for sustainable development complemented by the provision of adequate health systems. It encourages governments to provide training on a range of skills for gainful jobs that can provide security and income stability to the world's population. Furthermore, a focus must be given to underprivileged sectors like the children, women and the elderly, in integrating green economy for formal and informal education systems. This is the role that TVET policymakers should ponder in implementing their systems in their respective countries.

The first inter-sessional meeting for the 2012 UN Conference on Sustainable Development Meeting has set some landmark agreements for the formulation of sound policies to foster green growth with the nations. However, the reactions show that some countries see that their embarkation on the green economy perspectives is not feasible since they are still unfamiliar with the concepts and the activities that will fall under it. This position was then counteracted by Germany in saying that there is no mandatory path for the fulfillment of the green economy and an implementing mechanism will be a missing phase.

Some reassurances towards "green protectionism" have been forwarded with pledges that the adoption of the green economy will not mean the imposition of

the barriers to trade and development. This has been some of the major concerns of developing countries since they may lack the necessary resources to meet the standards.

It has been suggested that promotion and development of green jobs can serve as a link between the green economy and economic development, poverty alleviation, and sound institutional framework. This has been suggested in the said conference, whereas these green jobs could serve as a proof that the green economy is a success. There still remains to be hope, as more substantive discussions on the implementation and financing of institutions that will develop the green economy, as well as proposals on structural matters were still in the working tables. This has been likened to an Indian parable about the blind men and the elephant, where the men-the different government policymakers, touch the elephant to see what it is like, they have a different perception about it. This perception is the green economy, and hopefully this will translate to greater consensus on its real form and purpose in championing sustainable development.

TVET, being a link between the present and the future workforce to skills and training, must continually reinvent itself as the green TVET. The first step towards this is the adaptation of a green index scheme that will set standards towards the acceptable criteria for determining green TVET operations. Ensuring a green TVET will translate to major efforts such as:

1. Skilling and re-educating the workforce towards the green TVET
2. Adoption of green practices in institutional operation and development
3. Integration of ESD principles in the training curriculum
4. Encouragement of public-private linkages towards green innovations
5. Continuous support for individuals and groups that will forward green TVET innovations

Conclusion

The key towards finding a link between TVET and the international agreements is the encouragement of the green jobs to replace the losses stemming from the "brown jobs". The successes and failures of governments to agree to decisions that will have a major impact to the future should be supported by sound actions and hard evidences. This has been proven to be a tough direction, especially that interests between the developing and developed countries should be considered.

TVET, being the proponent of skills development, should adopt the green jobs initiative towards the creation of skilled workforce to fuel the economy. So far, considerable efforts have been done especially in the Asia-Pacific region. This translates to major and bigger responsibilities to the TVET implementing bodies, policymakers and funding organizations to sustain, if not exceed the expectations towards the adaptation of the green economy.

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Innovative Initiatives for Sustainable Development

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Abstract

Education in the 21st century should focus on the development of skills, attitudes and understanding which are necessary for occupations and life in the fast changing world. Vocational education and training programs are, therefore, vital in order to increase the workforce in various fields and to improve skills to meet the dynamic demands. It must be recognized, that TVET is a complex differentiated socio-economic system by itself, which is influenced by involved individuals, state and companies/economy which have partly different interests.

A precondition for TVET to fulfill a role in contributing to Sustainable Development is the identification of sustainable development and action processes in the world of work. Based on identified sustainable action processes in companies, it is possible to create suitable contribution of TVET to support these processes. Sustainable Development in the end is to be achieved only in a global framework – by acting regionally and locally.

Keywords: sustainable development, labor market, action process, global framework, social equity

Introduction

In December 2002, Resolution 57/254 on the United Nations Decade of Education for Sustainable Development 2005-2014 (DESD) was adopted by the United Nations General Assembly and UNESCO was designated as lead agency for the promotion of the decade. The decade pursues a global vision of a world where everyone has the opportunity to benefit from quality education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation.

The overall goal of the DESD is to integrate the principles, values, and practices of sustainable development into all aspects of education and learning. This educational effort will encourage changes in behaviour that will create a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations (UNESCO, 2005).

Education for Sustainable Development

Technical and Vocational Education and Training (TVET) has a substantial role in realizing and advancing sustainable development. In this era of the world

becoming a global village, it is imperative that TVET brings out a workforce that is not only committed and motivated but also skilled enough to understand the global changes affecting local opportunities for business and employment. The sphere of work in borderless economies has gone through a sea of change, especially due to the information and communication revolution. These changes have signficant impact upon the quality of local socio-economic and environmental conditions. TVET institutions are sizable provider of workforce who will be in the forefront in dealing directly with sustainability issues. To ensure a sustainable future, it is important for TVET to ascertain that every employee balances his role between the place of work and the community in which he lives and serves, thereby contributing to social, economic and environmental sustainability.

There are a number of key themes in Education for Sustainable Development (ESD) and while the dominant focus is on environmental concerns, it also addresses themes such as poverty alleviation, citizenship, peace, ethics, responsibility in local and global contexts, democracy and governance, justice, human rights, gender equality, corporate responsibility, natural resource management and biological diversity (UNESCO, 2012).

It is generally accepted that certain characteristics are important for the successful implementation of ESD, reflecting the equal importance of both the learning process and the outcomes of the education process. Thus, in the concept of sustainable development three principal dimensions (Holmberg J. ed., 1992; Reed D. ed., 1996; Rio Declaration on Environment and Development, 1992) are combined:

i. Economic Dimension:

An economically sustainable system that is able to produce goods and services on a continuing basis.

ii. Environmental Dimension:

An environmentally sustainable system that is able to maintain a stable resource base, avoiding over-exploitation of renewable resource systems, and depleting non-renewable resources, maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinarily classed as economic resources.

iii. Social Dimension:

A socially sustainable system that is able to achieve distributional equity, adequate provision of social services including health and education, gender equity, and political accountability and participation.

In view of the fact that sustainable development stands on three pillars namely, economic, environmental and socio-cultural, it is paramount that TVET policies

and practices be deliberated taking a holistic viewpoint and addressing each pillar as a central area for development. If economic development is ignored, it may dissuade funding from prospective sponsors or investors. Disregarding the environmental sustainability issue would project TVET as seeking short term gains with a poor social and ethical image. Indifference to the socio-cultural development would go in the direction of losing local identity due to lack of interest of the local populace.

To incorporate the three pillars, TVET should embrace the green technology that is economically feasible and environmentally-friendly. If TVET cannot create the new green technology, at least it should be able to support and adopt the technology by preparing the future workforce with high awareness and capability in handling the technology (Paryono, 2010).

Ideas such as: curricular sensitivities, learning resources, teaching-learning and evaluation processes, research, consultancy and extension should be integrated into the broader TVET agenda and should also be reflected in institutional governance and leadership. TVET institutions and stakeholders appropriately create awareness and be the driving force that promotes sustainable development in its day to day approach. Thus, TVET does not only play the role of teaching education for sustainable development but also practicing it through its policies and practices.

Education and training are the primary agents of transformation towards sustainable development by increasing people's capacities to transform their visions for society into reality. When re-oriented towards sustainable development, TVET not only provides appropriate scientific and technical skills, it can also provide the understanding, motivation and support needed for applying them in the interest of helping create a sustainable future (International Centre for Technical and Vocational Education, 2006).

Education for Sustainable Development is an internationally recognized educational approach that moves beyond educating about sustainability to educating for sustainability. Thus, it focuses on engaging people to help create a better future by building people's capacity for transformational change instead of just imparting knowledge about the environment (The Australian Research Institute for Environment and Sustainablity, n.d.).

Principles of Education for Sustainable Development (ESD)

The following are principles and foundation proposed for governing ESD:

1. Envisioning

Envisioning a better future creates a link between where we are now and where we want to be in the future, so we can plan a series of steps to get us there.

2. Systems Thinking

Systems thinking can help us to understand the big picture we are working within, and to create solutions that go beyond just addressing the isolated symptoms of a larger problem.

3. Critical Thinking

Critical thinking and reflection challenges us to examine and question the underlying assumptions that affect the way we interpret the world.

4. Participation

Participation goes beyond consultation, to empower people by directly involving them in the decision-making process to create a greater sense of commitment and action.

5. Partnerships

Creating partnerships for change strengthens ownership of a problem and a commitment to sustainability amongst diverse stakeholders.

Holistic Approach Regarding TVET and Education for Sustainable Development:

A holistic approach to sustainable development has always been emphasized but always come short to be realized. In spite of this, Education for Sustainable Development has permeated in the agenda of many countries since the UN Education for All (EFA) and the UN Decade of Education for Sustainable Development (ESD) have been set as international agenda. The development of skills to support this realization has similarly generated high interest from many players (Majumdar, 2011).

In 2004, the Bonn Declaration on Learning for Work, Citizenship and Sustainability became instrumental in defining the role of TVET to sustainable development, emphasizing that: "Preparation for work should equip people with the knowledge, competencies, skills, values and attitudes to become productive and responsible citizens who appreciate the dignity of work and contribute to sustainable societies (UNESCO, 2004a)." The figure below shows the relationship between TVET and the labor market.

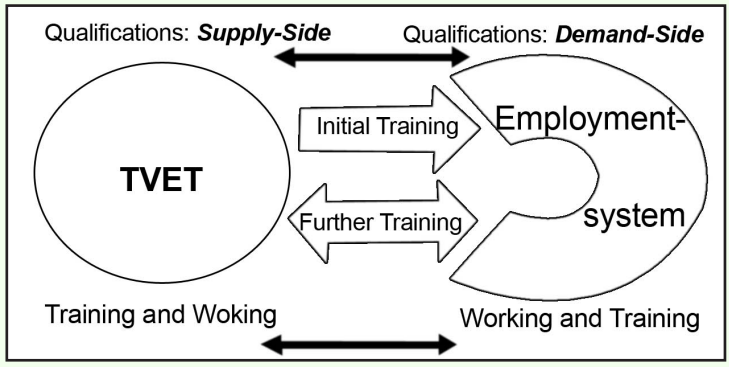

Figure 1: Interaction between TVET and the Labor Market

TVET for the world of work has been identified by UNESCO Member States as a priority area within UNESCO's range of program activities. This is to be expected since there is overwhelming evidence to demonstrate that TVET can play an essential role in promoting economic growth and the socio-economic development of countries, with benefits for individuals, their families, local communities and society in general. Improving education for the world of work can help improve the incomes of poverty stricken farmers, provide citizens with more choices in their lives, help alleviate poverty and empower individuals who would otherwise be marginalized (Maclean, 2005, p. 269).

In recognition of the service function of TVET regarding the labor market and its development there should exist relevant elements in TVET, which can address specific questions and demands. Figure 2 provides areas of action in TVET in relation with the labor market requirements.

TVET	areas of action	Labor market
• TVET-System/ - policy (Arrangements, Institutions, Financing, Organization)		• Gateways between Training and Employment
• TVET Reasearch		• Occupational orientation
• Occupational - and Qualification Development		• Early diagnosis of development of demand on qualification (qualitative and quantitative)
• Teaching & Learning, Didactics & Methodics (Curricula, Learning Methods, Media, Quality, Certification)		• Analysis of imbalances on occupational and regional Sub-Labor-markets
• Qualification of TVET-personnel		• Prognosis of Sub-Labor-markets
• Sector- / technology- related Qualification (Occupational/ Compentency Standards)		• Labor or market and occupational statistics
• Organisational-/School-Development		• Labor market policy (Re-Training)
• Target Groups (Youth, Adolescent, Adult)		• Special Target Groups (e.g. Vulnerable/Disadvantaged)
• Knowledge-management		

Figure 2. Areas of Action
Source: Stolte, H. (2011)

Most work opportunities in the 21st century are likely to be centred on new processes and services with regard to specialized knowledge and skills which are not yet available in general education institutions. In the least developed countries, more effective TVET skills are particularly needed to best cope with the demands of the informal sector, integrating education and training for decent work, empowerment and citizenship (Singh, 2005).

Focal areas for inputs and contributions of TVET regarding the realization of changes in processes have to start from motivation and understanding of sustainability as a critical success factor leading to identification of related challenges. In view of these, appropriate strategy development has to follow which is directed towards the implementation phase for needed capabilities and competencies. Continuous monitoring and evaluation is required for effective long term outcomes as shown below:

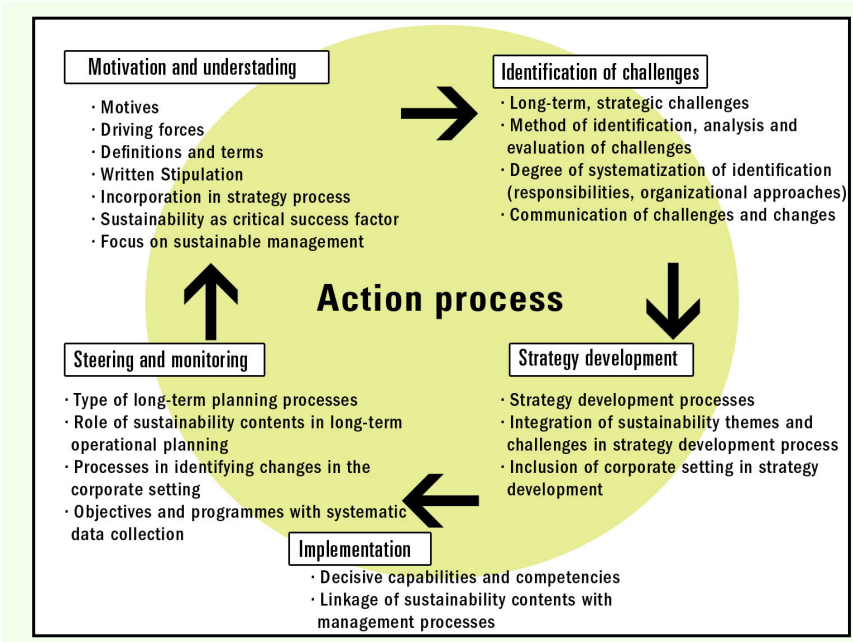

Figure 3. Action Process
Source: Stolte, H. (2011)

In view of the objective of identifying strategies and approaches for curriculum changes and integration of sustainable development in TVET curricula, ESD should:

- be embedded in the curriculum in an interdisciplinary and holistic manner, allowing for a whole-institution approach to policy making;
- share the values and principles that underpin sustainable development;

- promote critical thinking, problem solving and action, all of which develop confidence in addressing the challenges to sustainable development;
- employ a variety of educational methods, such as literature, art, drama and debate to illustrate the processes;
- allow learners to participate in decision-making on the design and content of educational programs;
- address local as well as global issues, and avoid jargon-ridden language and terms and;
- look towards the future, ensuring that the content has a long-term perspective and uses medium and long-term planning.

Sustainable Development in the end is to be achieved only in a global framework focusing on action areas at the regional and local level. However, to achieve the results of TVET for sustainable development requires proactive cooperation and systematic linkages in an international framework with this purpose.

In the "Bonn Declaration" on Learning for Work, Citizenship and Sustainability by UNESCO-UNEVOC , the following range of activities have been elaborated for Action Plan for TVET and Sustainable Development during the United Nations Decade of Education for Sustainable Development (2005-2014) (UNESCO, 20004a; UNESCO, 2004b).

- Advocacy and vision building
- Support for the review and development of national TVET policies
- Guidelines for planning and implementation
- Capacity building and training programs
- Learning support materials, resources and equipment
- Networking and partnership in TVET
- Ongoing monitoring, evaluation and research

Indian Context

As India's economy grows, there is an urgent need to produce skilled manpower of international standard to meet the industry's rising demand. However, the vocational education stream in India is quite small, enrolling less than 3 percent of students at the upper secondary level. Analysis also shows that the Vocational Education and Training (VET) system is not responding to the needs of the labor market. Less than 40 percent of its graduates find employment. Industry's limited involvement in the management of vocational training is a key constraint to matching skills between demand and supply. Public training institutions also need to be given incentives to improve their performance.

In improving social equity for TVET the following should be considered:

1. The scheme should target the poor and deprived sections of society in both urban and rural areas specifically, women, SCs/STs/minorities, school dropouts, street children and physically handicapped.
2. A micro survey for identification of priority needs for training programs of few villages clustered or isolated must be done. NGOs, voluntary organizations, village panchayats, retired teachers, engineers and other target groups should be involved in the process.
3. The programs may be flexible and informal accessible to all without any precondition of age, sex and educational qualification.
4. Emphasis should be made for multi-disciplinary skills training to facilitate self employment in the service sector. While for employment in production centers, training may be given either on specialized designated skills or multi trade skills depending on the needs and requirements.
5. Recognition through issuing certificates, indicating level of proficiency the beneficiary has attained through participation in the programs, may be given by concerned institutes for reference of the employing agencies
6. Sharing of financial/technical skill resources, available with different institutions/agencies may be availed.
7. Vocational schools wherever available may be utilized for skill development/ training programs using them as extension centers.
8. Development of competency-based curricula.
9. Proper mechanism to know the post training status of the trainees specifically with regard to their self/wage employment.

Issues and Challenges

More vocational education is required to adequately prepare youth for current jobs. This requires:

- Expanding vocational education
- Setting common standards for training
- Defining goals that ensure learning in fields where there is demand for jobs
- Ensuring accountability and good use of resources

The objectives of manpower development programs are broadly classified as follows:

1. Providing basic skills, knowledge and attitudes for self/wage employment in their own village or nearby areas

2. Imparting entrepreneur skills for initiating small/tiny enterprises with specially designed programs for the rural youth and community
3. Offering programs for upgrading of skills on their specialized fields, or for adoption of appropriate technologies for enhancing their employment prospects e.g., a mason can be trained for construction of bio gas plants; a black smith can be trained in welding or fabrication, etc
4. Identifying and conducting special training program for women, SCs/SCs, minorities, school dropouts, street children and the physically handicapped
5. Training for effective maintenance and operation for promoting developmental activities in the villages
6. Creating special training programs on hygiene, sanitation and mechanical means for cleaning for creation of awareness and liberation and rehabilitation of scavengers

The National Knowledge Commission of India has made the following recommendations:

- Increase flexibility of VET within the mainstream education system
- Quantify and monitor the impact of vocational education
- Increase resource allocation to vocational education
- Expand capacity through innovative delivery models
- Enhance the training options available for the unorganized and informal sector
- Ensure a robust regulatory and accreditation framework
- Undertake a re-branding exercise
- Compile best practices in TVET for poverty reduction

The Government of India are making every possible effort to reduce the poverty and to improve the lifestyle of the people. A need-based training must be developed to provide the upcoming members of the labor force with the skills necessary for a gainful employment. There should be an emphasis on the conpetency-based approach and should incorporate monitoring and evaluation mechanisms such as graded exercises, keeping in view the market requirement for various trades. Short-term non-formal, modular courses lasting for 3-6 months duration, depending on the local needs should be established and should commensurate with available local resources with proper structures. It should have the flexibility to offer a self-paced open learning mode (OLM)for the benefit of including people that have the least of skills but would want an increase in living standards through employment. In most cases, the multi skill training may be offered to make self employment viable in the rural economy. Preferences may be given to the training courses with technical leanings.

Conclusion

An important dimension of India's rapidly growing economy is the development of a skilled and educated workforce keeping in view its current demographic advantage. For the system to become more relevant in the changing context and to leverage this demographic advantage in the future, there is a need to create a model of imparting vocational education that is flexible, sustainable, inclusive and creative.

The introduction of new technologies necessarily creates new types of jobs at different levels. Hence, the skills requirements of occupations also change continually in response to technological changes. This necessitates change in curriculum and training programs in order to make education relevant to man new jobs. Linkages should always remain established with trade and industry and support services in designing curriculum and on the-job-training facilities. Vocational education and training therefore needs concerted re-branding to increase its value.

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Myanmar Perspectives on Transforming Education and Training in Support of the Green Economy

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Abstract

Green economy is defined based on six sectors. They are: (a) Renewable Energy (b) Green building (c) Clean transportation (d) Water management (e) Waste management and (f) Land management. Green economy is anchored on green energy generation in which the source of energy is from renewables instead of fossil fuel.[1] Renewable energy reduces the environmental risks because it is emission-free. Along with this, Myanmar which is rich in natural resources is exploring programs to make the most of its natural wealth that is why it needs human resources who are skilled technocrats, researchers and engineers.

It is a fact that human resources development (HRD) is as important as capital investment for the economic development of a nation. Technical and Vocational Education and Training (TVET), in this aspect, plays an important role. For this reason, Myanmar is giving high priority to TVET for its sustainable human resource development. In particular, the Ministry of Science and Technology (MOST) and the Department of Technical and Vocational Education (DTVE) laid down many policies and principal objectives to achieve the sustainable development of TVET sectors.

The government's top priority is on strengthening, upgrading, expanding and opening new technological universities, Colleges, institutes, technical training schools, and opening special training courses for the skilled workers and highly qualified human resources. Competency-based curricula, new courses and researches in line with the green economy are also introduced in TVET programs.

Key words: green economy, renewable energy, biotechnology, poverty alleviation, rural development

Background

The world is facing many challenges such as financial crisis, climatic change, food security and the rising demand for energy. For an agro-based country like Myanmar, the development of the agricultural and livestock breeding sector of the rural areas, climatic change and food security, higher income for the rural people and poverty alleviation are key issues that need to be addressed with all

seriousness. Today, industry and economic sectors of the world are changing rapidly due to the advances in science and technology, especially in the field of engineering. As a result, there are corresponding transformations in the patterns of occupation and qualifications of job.

In Myanmar, 70% of the population lives in rural areas and is considered as the main work force of the country. They are responsible for boosting the production of goods and economic development of the rural area as well as serving as the driving force of national economic development.

Being a developing country, Myanmar has plans to formulate policies, guidelines and strategies not only to meet the current manpower needs but also to address the human resources requirements of the future trends in industry and economy by: (a) introducing competency-based curricula and new courses in line with the green economy (b) introducing entrepreneurial training to promote self-employment (c) establishing more training institutions, and (d) promoting advanced technological training, research and development.[2]

The development of the human resource is as important as capital investment for the economic development of a nation. For the sake of human resource development, Myanmar has always given high priority on education with the vision "to create an education system that will generate a learning society capable of facing the challenges of the Knowledge Age". In line with its vision, the government has directed MOST to focus on restructuring and enhancing the quality and quantity of teachers, and establishing new infrastructures. Along with this, TVET will continue to be a high priority in Myanmar for sustainable HRD. Many engineering professionals, technicians and trained persons have been produced by technological universities, Colleges, institutes and training under the TVET system.

In Myanmar, TVET is being expanded significantly to meet the requirements for skilled manpower. In this context, government's technical institutes are the backbone for producing skilled manpower in the field of engineering for the government sector and private sector. Therefore, the government, specifically MOST is paying attention to the development and performances of technical institutes to meet current requirements of the country.

Principal Objectives and Function of the Department of Technical and Vocational Education

The principal objectives of the DTVE are stated as follows:[3]

(a) to train technicians, skilled and semi-skilled workers,

(b) to formulate the programs to link teaching with on-the-job experience,

(c) to set priorities for occupations and skills which are most useful in practical fields,

(d) organizing training programs in vocational subjects for dropped out students in various levels of the formal education system,

(e) to train and nurture skilled technicians and experts who are imbued with a sense of conscientiousness and convictions to cherish the state.

Moreover, the functions of DTVE may be enumerated as follows:

(a) to implement policies and guidelines laid down by the Ministry of Science and Technology,

(b) to plan for the expansion of technical and vocational schools, institutes, and Colleges,

(c) to plan for the attainment of highly qualified and proficient teaching staff, and

(d) to be responsible for matters relating to budget allotment, purchase of tools, equipment, and other teaching aids.

In building a modern developed nation, the State is encouraging development of human resources, advanced technology such as Information Technology, Biotechnology, and Nuclear Technology and research work. Myanmar is rich in both the underground and aboveground natural resources. In order to tap such resources, the important thing is to have enough human resources such as skilled technocrats, researchers and engineers. Moreover, in nurturing human resources, MOST is turning out engineering diploma and doctorate holders, computer experts and those skilled in applied science by opening technological universities and universities of computer studies. All in all, technologists, computer technicians, engineers and biotechnologists are to work for the emergence of a modern developed nation being a foundation of the green economy.

Development of Government Technical Institution in Myanmar

The government is making all efforts to enable the nation to keep abreast with the globalized world. HRD is the key to a country's progress and development that prompted the government in strengthening, upgrading, expanding and opening new technological universities, Colleges, institutes, technical training schools and offering special training courses in order to produce highly qualified human resources.

Before 1988, there were only 11 government technical institutes, computer College and 16 technical high schools in Myanmar with a limited number of students in few universities and Colleges. Only those residing in some major cities, including Yangon and Mandalay, were able to attend the Colleges where majority of those institutions are localized. However, accessibility to professional education was a concern for those who are from the states and divisions with

limited access that resulted to limited technicians in the states and divisions. However, after 1988, programs for HRD had been laid down and implemented. In this regard, 24 special development regions were designated in the states and divisions to bring about equal learning opportunities. One university, one government technical College and one computer College each were opened in every special development region along with a 100-bed hospital each. Since 19th January 2007, 26 government technological Colleges have been upgraded to the status of technological universities and 4 government technical institutes to the status of government technological Colleges. Currently, a total of 27 technological universities, 5 government technological Colleges, 7 government technical institutes, 2 technical training school and 24 universities of computer studies, have been opened in special development regions. With those professional institutions, local national races are able to pursue professional education, thereby, widely contributing to the development of human resources. As a result, the development gap narrowed in all parts of the nation.

Sustainable Development of Vocational and Technical Education and Training

In the sector of nurturing technological human resources, it is of paramount importance to link the acquired technologies with practical work. To upgrade technological universities, government technological Colleges, government technical institutes, universities of computer studies and government computer Colleges in Myanmar, modern teaching aids, laboratory equipment and machineries such as Computer Numerical Control (CNC), including Lathes, CNC Milling Machines, and CNC Machine Centers have been installed to fulfill the needs and to link the acquired technologies with practical work. Moreover, for subject-wise references, digital e-library system and internet facilities for collection of data and references have been established in all universities and Colleges under MOST.

To meet the required amount of qualified teachers for technological universities, teachers' training programs were started at Yangon Technological University (YTU) and Mandalay Technological University (MTU) since 1997. YTU is the most senior university in Myanmar for engineering studies which was set up in 1924 as a Department of Yangon University and was upgraded to the level of the Faculty of Engineering in 1946. In 1964, YTU became a separate university while MTU was established on 1st October 1991. YTU, MTU, and a computer university, which were previously under the Ministry of Education, have been transferred to MOST since January 1, 1997. YTU and MTU became the training centers for producing highly qualified and proficient teaching staff to fulfill the requirements of the technological universities and research departments under the said Ministry. In order to properly manage these two senior universities and the technological universities, 13 technological universities from Upper

Myanmar became affiliated with MTU and 13 technological universities from lower Myanmar became affiliated with YTU. The Board of Technology Promotion under the Ministry including the professors from YTU and MTU reformulated the development of the syllabus and curriculum for technological universities and government technical Colleges based on the curricula and syllabus of well-known engineering universities from abroad. Teachers are trained to keep abreast with the new curriculum to sustain its quality. Therefore, professors from YTU and MTU provide the refresher courses in the respective fields of engineering studies to the teaching staff from technological universities during vacation periods. Moreover, teachers from YTU and MTU gave lectures to the students who are attending the technological universities by using video-conferencing facilities.

In addition, due to various developments in each and every sector, engineering technicians are now improving their competency as well. Myanmar is now working together with ASEAN countries according to regional development programs. In line with these programs, MOST through DTVE is undertaking cooperative actions with some institutions from ASEAN countries.

Policy Support to Transform TVET for Green Economy

The core idea of a green economy must be poverty alleviation, environmental sustainability through maintaining biodiversity, and the well-being of all the people.[4] The population of a country is the working force of the nation. In Myanmar, rural people who make up about 70% of the population are the main working force, and most of them are engaged in agricultural and livestock farming which are responsible for boosting the production of goods and economic development of rural areas being the main engine of national economic development.

In the time of State Peace and Development Council, the government adopted the five rural development programs, which are fundamental for rural development and alleviation of poverty. Myanmar's Third Short-Term Five Year Plan (2001-2002 to 2005-2006) includes: ensuring smooth transport; supplying sufficient water; promoting education; enhancing health care; and ensuring economic development. As a result, peasants can boost the production of not only rice but also cash crops such as beans and pulses which are expected to produce higher income. According to the data and statistics about Millennium Development Goals realized by the UNDP and other relevant departments, the indexes of poverty were declining in Myanmar. Rural areas enjoyed development. This was due to the projects for improvement in the agricultural and livestock breeding sector and the five rural development programs. However, many of rural people still live in poverty because of the high production costs, unsatisfactory profit due to low productivity and poor quality, growing population, and rising cost of living. Therefore, in the time of the Union Government, through the National

Level Workshop on Rural Development and Poverty Alleviation, more effective programs are adopted as follows: [5]

1. to widely encourage the choice of better grains as vertical extension is more effective than horizontal extension,
2. to encourage all farmers to use marketable and high-yield grains of paddy as they can get handsome profits if they can double their outputs and their highly saleable produces,
3. to seek means for cost reduction to remedy the issue of low profits due to high cost of production,
4. for departments and villages to work together for the practice of collective purchase and ploughing fields alternately as many farmers do not get prices as high as it should be due to the fact that after reaping paddy, they pile it on the embankments of the field and then pay attention to ploughing fields to grow peas. This has adverse effect on paddy quality and causes more loss and wastage. Moreover, they need to use more combined harvesters and farm machines to remedy delay of thrashing paddy and ploughing fields,
5. to distribute agricultural inputs such as seeds of crops, fertilizers, pesticides, ploughing equipment and farm subsidies to every farmer, and to work with the team system to improve quality and reduce costs,
6. to make microfinance more effective for those programs,
7. to form teams to have educational forum on agricultural methods for groups of farmers,
8. to reduce cost of production in the livestock breeding sector, to raise the incomes by improving quality; to encourage working collectively for greater market share; and to encourage manageable-scale breeding of poultry, pigs and cattle for secondary incomes, and integrated farming if under favourable conditions, as farmers can get primary incomes by exercising double and triple-cropping patterns to grow rice, bean and pulses, and seasonal crops,
9. to transform from individual into commercial production, then into One Village One Product (OVOP) system for alternative means of secondary income, and
10. in the exercise of OVOP system, to encourage not only production of agricultural produce but also other products such as handicrafts, arts items, household utensils, and cottage industries such as lacquer-ware, glazed pots, silk-wares, silverware, bronze works, looming, tailoring, and micro industries.

In relation to the ten programs, previous government encouraged agricultural and livestock farming, but could not integrate individuals, investments, methods

and produce for sales in markets. Therefore, the 10 programs were planned by the Union Government to encourage establishment of rural level cooperative societies.

In order to meet the green development, the objectives of the Ministry of Science and Technology are as follows:[3]

1. to keep carrying out research and development tasks for national economy development,
2. to utilize the national resources so as to develop the national economy, and raise the living standard of the people,
3. to disseminate the technical know-how achieved from the research and development tasks to the industrial and agricultural sectors in order to enhance the production,
4. to plan and carry out human resource development programs so as to obtain specialists and professionals in Science and Technology,
5. to analyze and test raw materials and finished products and to implement quality control and standardization of industrial products,
6. to nurture and produce skillful workers and technicians by means of advanced science and technology,

All researches are carried out in all technological universities, and research centers under MOST are laid down in the following guidelines as supporting program to develop the national economy. The guidelines are to (a) substitute the imported goods, (b) support national defense, (c) promote new and renewable energy sectors, (d) develop the rural area for poverty alleviation, (e) support health services, (f) upgrade the national industrial sector, and (g) turn up waste to value-added materials. The above mentioned programs and guidelines are the major supporting policies to transform TVET for green economy.

Renewable Energy and Rural area Development in Myanmar

Renewable energy is necessary for reducing poverty and promoting economic growth in rural areas by providing basic energy need for rural households, processing agricultural commodities and to support general rural electrification programs. As a step towards energy sector reform, the Ministry of Energy, Ministry of Electrical Power, and Ministry of Science and Technology undertake a joint effort to evaluate the current state of using renewable energy and manpower training in the country and to formulate sector development strategies and action programs.[6]

Solar Energy

As electrification employing solar energy is renewable and environmentally friendly in nature, top consideration has been given to utilize solar energy as an

option to be used in the rural area. Presently, solar energy is being introduced in rural area and is using through photovoltaic cells to generate electricity for charging battery and driving motors to pump water for irrigation.

Myanmar has potentially available solar energy in around 51973.[8] terra watt hours per year. Solar energy is abundantly available in Central Dry Zone Area of Myanmar. Solar Power Village Electrification Scheme was implemented and research and development (R&D) works on prototypes of solar equipment were performed by Myanma Scientific and Technological Research Department (MSTRD) and Department of Physics of the Yangon Technological University (YTU). The Department of Engineering Physics and Electrical and Electronic Research Center of Mandalay Technological University (MTU) jointly implemented installation of 3 KW photovoltaic power systems in a remote classroom of technical schools and institutes under MOST which are located in remote areas that cannot access to the national grid line.[7]

In order to minimize the gaps in educational facilities between the city and the rural areas and to catch up with the developing world, MOST has laid down a plan to electrify those schools and institutes by using solar energy. Conversion efficiency 14%, 16 x 160 W solar modules were used to supply 10 computers, one overhead projector and IP Star internet equipment and 10 fluorescent lamps in each school. Twenty-four (24) V-nominal voltage systems were applied in order to save valuable energy. The team has carefully designed and tested the solar system to be applicable anywhere in the country at a minimum cost.

Most materials are designed and constructed by MTU and all of them are in compliance with international codes of practices. Both poly-crystalline and amorphous solar panels were used in order to evaluate their performance and application in real life. As a result, two sets of 3 KW solar energy systems were installed at the Government Technical High School (THS) at Putao and Kamtee (both of them are located northern- most part of the country and having harsh weather conditions).

The sunshine availability in both townships is 4 hours per day. Up to now, there is no indication of malfunctioning of the systems while utilizing it in full load. The students who are attending at government THS can access the internet up to 4 hours per days by using solar power. The only problem with this project is that Myanmar enables to fabricate solar cells which used state-of-the-art technology. However, the Ministry planned to install such system in most of the technical schools operating all over the country to boost the education status of the rural area.[8]

Hydro Power

Investigative studies for hydropower potential have already been conducted in 268 locations, resulting in an available total capacity of 39720 MW. At present,

753 MW capacity of Hydropower potential has been exploited. Thirty six (36) projects are set up and 14 projects are under construction and another 29 projects are under plan.[8]

Village-scale hydropower application of primitive wooden wheel type to variety of small modern turbine system exists in mountainous regions at local commercial scale. Private entrepreneurs are trying to promote their products and several commercial scale activities appear in Myanmar. Ongoing research in mini-hydro plants under MOST are the design and construction of different types of turbines, micro-hydropower system and synchronous generator for micro-hydropower plant.

Tidal Energy

Myanmar has more than 2800 km of coastline with numerous small creeks suitable for harnessing the tidal energy (1m–6m difference) with the application of appropriate technology which is available for electrification of rural remote villages, which are far from the national grid and situated in areas along the coast of Myanmar. By providing the above projects, the remote rural villages will have electricity which will greatly improve their knowledge through exposure to media like the television, hence, will create an impact on their social, economic and cultural life.

Wind Energy

Myanmar has potentially available Wind Energy of 360.1 (Terra Watt hours) TWh per year (NEDO 1997). Promising areas to harness wind energy are in three regions, namely Hilly Regions of Chin and Shan States, Coastal Regions in the South and Western part and Central Myanmar. On going to academic research are design and construction of wind turbine, house-hold wind generator, modeling and simulation of self-exciting induction generator, development of wind resources map of Myanmar and study on the use of evaluated windmill tower.

The Wind Turbine Project had been constructed by the Department of Renewable Energy in the Technological University (KyaukSe) under MOST.[7] The aim of the project is to support the lighting in rural and remote areas in Myanmar where there is no electricity. Furthermore, it is also to develop the economics and living standard of the people in this area.

The 10 ft-Wind Turbine (1.8kW) installation and testing have been done at the Shwetharlyoug Mountain in KyaukSe Township. This research is designed for small wind energy unit for battery charging system. The turbine type is a three-blade system in horizontal type. This wind turbine consists of five portions. They are blades, permanent magnet generator (axial flux type generator), metal works, charger and charge controller and inverter. A 10-ft Wind Turbine was successfully

completed and it was established at Government Technical High School (Ahmar) in Ayeyarwady Division, and a 1.2 KW wind turbine was also installed at Dattaw Mountain in KyaukSe Township. The installations of the wind turbines perfectly serve the lighting purpose in the monastery there. At present, upgrading of the 3 KW wind turbine are being done for Nargis area and other remote areas in Myanmar especially in places where there are no electricity. This is to show the government's genuine effort in successfully implementing the project.

If the 3 KW wind turbine project will be successfully finished, wind energy will be a good support to obtain electricity for rural and remote areas in Myanmar. In the future, research is recommended to focus on wind turbine which can achieve power rating from KW to MW for a more reliable and economical design of wind turbine for these areas in Myanmar.

Biogas Energy for Rural Development

In Myanmar, nearly 52.8% of the total land area is covered with forest. Out of which 30.5% are reserved forests and 69.5% are unreserved ones. Almost 64% of primary energy is being supplied in the form of Biomass. Thus, consumption of biomass in the form of fuel-wood, charcoal, agriculture residue and animal waste has been exclusive.[6] In promoting the government's drive against deforestation, it encourages the application of Biomass Biological Energy and Biomass Thermo-chemical Energy from animal waste and agricultural waste. In Myanmar, millions of tons of various crops are sown annually. Based on the crop production, many tons of crop residues can be increasingly available. In the central region, there are so many cattle farms especially in Mandalay, Sagaing and Magway Division. The availability of animal excreta in Myanmar is more than 32 million tons per year.[9]

For the development of the rural areas, economical biogas digesters need to be constructed there (i) to get biogas for cooking and generating electricity, (ii) to get a wood-substituted fuel, and (iii) to improve the rural environment in agricultural sector and in livestock sector.

Since 2002, 151 of 100, 50, 25 cubic meter in size, fixed dome type electricity producing biogas plants, using anaerobic fermentation process in which cow dung is used as a raw material, have been constructed and utilized in Mandalay, Sagaing, Magway Division and Northern Shan State. They can drive a 25 HP gas engine and 15 KVA generator, using biogas produced from cow dung.[7] All houses, monasteries and streets in these villages have been provided lighting powered by biogas for two hours in the early mornings and four hours in the evenings.

In 2008, a 100-cubic meters in size, fixed dome type biogas plant was constructed at dairy cow breeding farm in Mandalay Division. It can produce biogas for cooking, chopping the forage for cows and producing electricity to provide light

to the whole farm. At the same time, twenty five cubic meter in size, fixed dome type biogas plant using human wastes as a raw material was constructed at the Sinmin cement factory. Biogas from that plant can be utilized for cooking and the effluent from biogas plant is used as organic fertilizer for plant growth. In 2009, the project of 6 cubic meters to 12 cubic meters family-sized, fixed dome type biogas digester has been started by biogas research group under MOST to disseminate information on multi-utilization of biogas which provide beneficial support for rural area development. The biogas research department coordinates with the people in the rural areas to promote plans for biogas production and utilization in cooking, lighting by gas lamp, and producing electricity driven by 2 HP engine. In 2009, about 23 family-sized, fixed dome type biogas plants have been constructed and utilized in Nay Pyi Taw, Mandalay, Ayeyarwady Division and Eastern Shan State. From one family-sized biogas digester, 30 gals per day to 50 gals per day of effluent slurry as organic fertilizer can be obtained and it can be used in soaking seeds for germination, spraying on the plant for growth, feeding to pigs and fishes, keeping as value-added organic fertilizer.[7]

Replacement with the LED bulbs which are electricity-saving bulbs is going to be carried out in place of 20 watt-fluorescent lamp in the existing biogas plants constructed by MOST. Replacement with 5 watt-LED lamp consumes 3-4 times less energy than 20 watt fluorescent lamps.

Biomass Thermo-chemical Energy

In the case of Biomass Thermo-chemical Energy Sector, Biomass resources utilized for power generation in Myanmar are paddy husk and bagasse. In SME sector application, some private rice mills have been using rice husk as permanent fuel in driving steam turbine many years ago. Currently, these systems can be improved commercially. More than 1000 KW capacity of electricity can be produced from gas for private sectors. Some private companies in Myanmar exported their Biomass Gasification Systems to the neighboring country and some are being tried to produce the Biomass gasifier by means of joint venture system with neighboring country.

Under MOST's governance, a woodchip down draft gasifier had been constructed at the Technological University *(KyaukSe)*. This project is aimed to support lighting for under-developed villages. In this system, tar was removed by mechanical treatment or physical treatment. Many problems were observed in down-draft gasifier. But it still required technological and financial support from the developed countries.

An ongoing project is being undertaken on design and construction of small-scale fluidized bed gasifier. In this project, appropriate technology and some facilities are needed to measure sand and fuel ratio, air flow rate, diameter and

number of air nozzles concerning power output and others. Therefore, small-scale fluidized bed model gasifier will be constructed and will be focused on large-scale design of gasifier.

Biofuel

Bioethanol produced from molasses and starchy materials such as broken rice and corn are used as transportation fuel to substitute for gasoline. Thus, five hundred (500) gals per day, two 3000 gals per day and 15,000 gals per day in capacity of 99.5% ethanol plants have been constructed by Myanmar Chemical Engineers Groups (MCEG) in Myanmar.[4]

Various oil products such as biodiesel using crude palm oil, used cooking oil, waste from rice bran oil factory and especially Jatropha curcas oil as raw materials, are also going to be sampled for the research program to substitute for the petrol diesel.[7] In addition, pilot plant scales of biodiesel plants in some of the regions in Myanmar have been installed to be utilized in driving agricultural machineries.

R & D activities in biofuels are as follows:

- Production of bioethanol from lignocelluloses by enzymatic technique
- Preparation of bioethanol sieve for dehydration of ethanol
- Biodiesel production by enzymatic technique
- Preparation of biodiesel by methanol bubble method
- Acid/ Base catalyzed esterification reaction for preparation of biodiesel from high free fatty acid oil.
- Exploration of liquid rich microalgae for biodiesel production
- Pyrolysis of waste plastics using synthesized catalysts for production of fuel oil.
- Study on low temperature types fuel cells.

Organic Farming and Biofertilizer for Agricultural Development

Farmers who have already had considerable experience of coping with adverse climatic events will have to adapt even more in the future. They will need to consider, for example, different crop varieties. Some plants have a natural adaptive capacity, such as certain rice cultivars that bloom early in the morning, enabling them to avoid the damaging effects of higher temperatures later in the day. Farmers will also want to consider adopting varieties that are tolerant of extreme conditions – drought, or deep water, or salt, or new fast-maturing rice varieties that are suitable for a shorter wet season. They will also need to look at ways of increasing the amount of organic matter in the soil so as to help it retain water – by using more natural fertilizers. One of the main advantages of

using biofertilizer and organic farming is that it is less dependent on water than farming that uses the thirsty hybrid seed varieties. And when the soil is fertilized with organic manure rather than chemical fertilizer, it tends to have a better structure and be more resilient to dry condition.

Under the close guidance of the Minister, of MOST, the following research activity for rural area development are being conducted at the Department of Biotechnology.[8]

Research on Production of Natural Fertilizer, Biofertilizer, Biopesticide, and Natural liquid Fertilizer:

1. The biofertilizer with seven kinds of effective microbes are produced, packed into bag of 50 kilogram per bag and distributed for cheap, reasonable prices. By using the biofertilizer and chemical ones alternatively, the use of chemical fertilizer can be reduced to 35%. The ongoing research is being carried out in order to produce more effective bio-fertilizer.
2. The research on the production of natural fertilizer solution which enforces the plant growth and consists of various nutrient elements extracted from unmarketable fish and fish waste specially needed for plants is continuously conducted.
3. The bamboo vinegar extracted from bamboo, which protects plants from harmful pests, and the diseases caused by fungus and bacteria is used as a type of liquid pesticide. As a liquid fertilizer, it also contains various different nutrient compounds and helps root growth as well.
4. The production of natural plant growth stimulant using chitosan produced scientifically from waste of shrimp-shells, which helps all kinds of plants strengthen, grow rapidly and yield well. This include demonstration of how to use natural plant growth stimulant in villages.
5. Natural liquid fertilizer containing organic liquid fertilizer from fish, chitosan and bamboo vinegar, which makes plants yield well and protects them from pesticides, and helps them grow rapidly, is produced and applied with budding plants.

Future Strategy and Key TVET Challenges for Promoting Green Jobs

Myanmar has abundant renewable energy sources such as wind, solar, geothermal, biomass energy and biofuel. However, they are at the initial stages and presently studies, research and experimental works can be performed. More development works together with appropriate technologies are required to be made in order to utilize wind, solar, geothermal, biomass energy and biofuel as future sources of energy of the country. Key issues were identified as follows:

1. electricity in rural regions

2. lack of appropriate technology in agriculture, land use, livestock and forest sector, energy, waste management, transport and industrial sector
3. lack of sufficient financial, technical and human capital, needed to transform the national economy
4. making sound policies and incentives can stimulate private sector in the development program
5. enhancing access to external sources of finance to achieve a green economy, through both public funds and private funds
6. to have adequate information on each and every type of renewable energy sources of the country.
7. to encourage more inter-ministries and inter-departmental interaction and cooperation.
8. to promote private participation in the development program.
9. to define and specify energy policy incorporating renewable energy.
10. to infuse the technology in order to implement the family size biogas digester and mini-hydropower plant for rural area development.

Conclusion

The government of Myanmar is endeavoring for the suitable economic development of the country and the fruits of economic development to be equally enjoyed by its entire people. MOST is undertaking the ten programs which are aimed to reduce poverty in the rural areas through policy implementation on transforming TVET for the green economy. In line with the objectives of the green economy, the strengthening, upgrading, expanding and opening of new technological universities, colleges, institutes, technical training schools and opening of special training courses in order to produce highly qualified human resources are among top priorities of the ministry. In addition, competency-based curricula, new courses and researches related to the green economy are introduced in TVET programs.

At the beginning of the transformation stage, whereby green TVET program has been slowly introduced to the traditional TVET program, so many problems have been encountered including shortage of qualified teachers, lack of laboratory facilities, insufficient research grants, inadequate technology transfer and many others. Apart from giving best efforts in trying to overcome all these difficulties, Myanmar is fortunate enough to have a wealth of natural resources and broad spectrum of biodiversity to be able to succeed. Such efforts had born into fruition with the poverty rate in Myanmar dropping from 32% to 26% of basic needs of households based on the statistics collected jointly by UNDP and Ministry of National Planning and Economic Development. In addition, Myanmar has proven to be more than being a carbon sink nation, with a net value of 67863 Gg

CO_2e in the year 2000, which had been made possible by the vast forest resources.[10] Services of the social scientists, in addition to engineers, scientists/technologist, are therefore, essentially required not only to provide local development but also to enhance local prosperity. Therefore, the government's efforts and endeavors through programs on green skill research projects are vital in transforming TVET in support of the green economy program to address poverty reduction which is visualized to turn remote villages to modern cities of Myanmar in the future.

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Gearing an Institution Towards the Green TVET Initiative: The CPSC Experience

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Abstract

Climate change is a global phenomenon and every sector is increasingly affected by it. It is generally caused by carbon-intensive world economic development and in turn, creates adverse impact on sustainable development due to increased climate risks.

This article seeks to present discourse on the CPSC advocacy of Greening TVET and transforming this advocacy into actual implementation of green and clean technology. It further seeks to present how the green and clean concept be integrated in the different aspects of operating Technical and Vocational Education and Training (TVET) institutions. It will further discuss the existing practices and future directions of implementing Green CPSC.

The suggested CPSC framework for Greening TVET has been built upon the five dimensions anchored on sustainable development principles. The five dimensions are Green Campus for effective management of resources, Green Technology Program for green and clean jobs, Green Community for extending sustainable development practices, and Green Research to foster development and promote Green Culture.

Keywords: sustainable development, green TVET institution

Introduction

The Colombo Plan Staff College for Technician Education (CPSC), an inter-governmental international organization of 17 member countries in the Asia-Pacific region explores a potential model for promoting sustainable development in TVET institutions.

CPSC has adopted a philosophy that cuts across asserting its institutional responsibility to serve as a hub of best practices in TVET and at the same time, facilitates a positive change within the organization as its contribution to reduce energy consumption and CO_2 emission. These tasks form part of an integrated idea for Greening TVET which basically enhances the drive of institutions engaged in delivering TVET to rethink and revisit existing systems in the context of sustainable development that is now being espoused as a serious agenda that needs an urgent attention.

The ultimate objective is to come up with practical models that adopt climate-friendly operations and facilitate adaptation of pedagogical approaches that are oriented to environmental sustainability. The CPSC sees this as an opportunity to set new directions to enhance its response to the needs of the future generation using education and training as an effective platform.

TVET and Sustainable Development

On environmental and pollution issues, TVET has a significant role to play in planning for sustainable development. A Green TVET approach to sustainable development can be pursued by institutions in partnership with policy enablers, industries and stakeholders with clear cut policy of green and clean directions (Sustainable Campus Information Center, 2006).

Greening TVET has a crucial role to play in the new knowledge era. Its role can focus on the development of new generation of individuals who could face the challenges for sustainable development-linking economic growth, social development and environmental protection which should be addressed in a holistic manner.

Integrating Sustainability to TVET

In the past it was observed that carbon-intensive world economic development put the fragile life on earth in constant climate risks. In the near future it is predicted that climate change could affect many countries to go underwater, experience extreme droughts as the number of climate refugees increases around the world. In effect of this climate change phenomenon, rainforests are threatened, disease is exacerbated, and it hardly hit on the poor populations worldwide. Climate change adaption and using of technology that will reduce global warming are crucial for sustainable development (Alam, 2010).

Technology is a double-edged sword. It is both a cause of many environmental problems and a key to solving them (Stolte, 2011). Mankind has to realize that technology advancement has depreciated habitability of the earth when it does not consider its impact on the well-being of the earth. It is now without doubt that technologies should be "green and clean". With rising energy costs, climate change and the threat of global warming and energy crisis, the society is now recognizing the benefits of using green and clean technology to reduce carbon footprint, minimize waste and recycling, harness solar energy from sun, wind power from wind, bio-fuel from bio-plant & biomass, geothermal energy from the earth, small hydro power from water current, rain water harvesting etc which are never exhausted in the universe. Thus, the field of green and clean technology encompasses a continuously evolving group of methods, researches and materials, from techniques for generating energy to environmentally responsible disposal of waste.

The term sustainability is used to describe how the needs of the present are met without compromising the future generations. TVET programs can be integrated as part and parcel of the effort for sustainability with reference to three principal aspects of development (UNESCO-UNEVOC, 2006).

- Economically Sustainable Development – TVET must be able to produce goods and services on a continuing basis and at the same time avoid sector's imbalances such as the production between agricultural and industrial sectors.
- Environmentally Sustainable Development – TVET must maintain a stable resource base and avoid excessive utilization of non-renewable resource systems and encouraging the use of renewable resources by applying the green and clean technology.
- Socially Sustainable Development –TVET must provide equal distribution of social services including health and education, gender equity, as well as political accountability and participation to promote active citizenship.

Values, attitudes, policies and practices of TVET should be anchored to the direction of promoting sustainable practices for the benefit of future stakeholders. Sustainability concepts mentioned above can be integrated into the daily operations of TVET institutions and agencies to further enhance their effectiveness while giving utmost consideration to its impact on social, operational and environmental aspects.

Focus for Green TVET: the Green CPSC Movement

Having found the close links of TVET and sustainable development and understood the discourse on where TVET sector stands in the process of inculcating skills, knowledge, philosophy and culture to create environmentally-

conforming workforce, CPSC is adopting a framework that emphasizes the vital role it plays in extending the advocacy not only to the learning groups, but also to the communities that make up a system, with a potential to create a multiplier effect. CPSC further identifies four major phases of the Greening CPSC movement, namely:

- Phase 1 - Getting acquainted with the Green CPSC Philosophy;
- Phase 2 - Getting involved in the Green CPSC drive;
- Phase 3 - Infusing Green CPSC; and
- Phase 4 - Transforming lives through Green CPSC movement.

CPSC embarked on this green initiative with a clear Green Philosophy stating that:

"CPSC shall position itself to be a well-spring of knowledge and best practices with the ability to promote sustainable practices and principles in the field of Technical and Vocational Education and Training (TVET). Towards this end, CPSC champions the cause of integrating sustainable and 'green' principles in CPSC policies, practices and program offerings, in every possible opportunity."

The project has the following objectives:

1. Promote the highest objectives of mitigation and adaptation to climate change;
2. Implement practices and lifestyle oriented to sustainable development at institutional level within the CPSC community;
3. Increase awareness and deepen understanding among all staff and clientele of the inherent responsibilities in and benefits of energy conservation, waste management and reduction and resource management;
4. Explore new ideas and sustainable creative solutions in making CPSC's day-to-day operations aligned with sustainable practices; and
5. Achieve a sustainable TVET model and green education program.

The Greening CPSC is an initiative of the College started during the second year of implementation of the CPSC Corporate Plan. The project is anchored on the 2018 shared vision of CPSC which states that CPSC should be a "The lead HRD intergovernmental organization for sustainable TVET that is inclusive, responsive and innovative to address global change".

Figure 1: Four Phases of Greening CPSC Movement for SD (Majumdar, 2010)

In the initial stage of implementation, CPSC adopted a community-wide philosophy and commitment to start a process that best situates CPSC as an exemplar of best practices in integrating Education for Sustainable Development (ESD) and thereby practice what it preaches. All members of the CPSC community pledged its commitment for greening TVET. Developing ownership for such project undertaking was effectively done through massive consultation discussions, insight building and cross-sharing of green practices. Project identification using a bottom-up approach is part of CPSC's way of initiating greening TVET.

A demonstration of commitment to the movement was exhibited by the CPSC staff on the agreement signed by all CPSC faculty and staff on July 9, 2010. This agreement emphasizes the commitment of CPSC in the establishment of the Green CPSC movement and adherence towards the green CPSC movement.

The staff affixed their signatures on the binding agreement to implement and uphold the CPSC Green Movement which served as a role model for TVET institutions in the region. As such, it also laid out the frameworks and requirements for greening CPSC, as discussed in the succeeding sections.

Dimensions of Greening CPSC Framework

Greening TVET is considered as an ideal approach for sustainable and low-carbon world among TVET institutions. CPSC identified five dimensions to anchor sustainable development principles among TVET institutions. These are

Green Campus; Green Technology Program; Green Community; Green Research and Green Culture.

a. Green Campus –based on the philosophy of practicing what is being preached in managing campus resources such as energy, water and waste resources. This dimension intends to reduce the carbon footprint of students, teachers and staff within the TVET institutions.
b. Green Technology - to meet upcoming skills for clean and green jobs. The third dimension has a major consideration on the need to build a green community.
c. Green Community- to extend sustainable development practice at the community level so that the movement of TVET institutions is extended to the society at large.
d. Green Research- to foster the development of a research culture in relevant areas of sustainable development.
e. Green Culture- is intended to focus on strengthening values education, ethical standards, attitudes and behavior that respects ecological resources and values the future requirements of the future generation.

CPSC believes that a vibrant integration of sustainability into TVET is most effective having both enablers and drivers working in synergy. Institutional value statements, penetration of sustainability principles in administrative and pedagogical systems, community involvement, participation and ownership lead to clear educational content restructuring and transition to a sustainable world.

CPSC as a Green TVET Campus

The concept of a Green TVET campus is anchored on the premise that the issue of sustainable development can be effectively integrated in the existing operational systems of TVET institutions. Various aspects of the improvement of its operation may include: (1) effective management of energy resources, (2) management of water resources, (3) waste management and (4) pollution control. Lessons learned from these experiences can be shared to partner industries and TVET institutions especially in developing tools such that institutions may be familiar with calculating their own carbon emissions, energy consumption, resource use and generation to be in a better position to harness its own initiatives to address environmental issues and concerns.

A sustainable campus program, as explained by a US-based information resource center addresses the need for improving economic efficiency, protecting and restoring ecological systems and enhancing the well-being of its people.

Three projects has been initiated addressing critical areas in CPSC's day-to-day operations under the second phase which is the – Establishment of a Green Campus. The following are small projects under this phase:

a. Energy- Saving Project - energy-saving practices that combine mitigation and adaptation approaches to climate change;
b. Green Dining Project – sustainable waste-disposal, food procurement, dining and facility practices are envisaged to serve as enabler of sustainable consumption and waste reduction;
c. Green for Gold - conscious effort to apply 5R principles and purchase products and services that are cost-effective and with less harmful effect on the environment.

Goals of a Green Campus

As it has been initiated last July 2010, based on the analysis of the College's first green accounts, the CPSC personnel commit to work towards the following goals of creating a Green Campus and thereby become a more sustainable organization:

a. The CPSC personnel commit to help reduce energy consumption level per man year of all faculty and staff;
b. The CPSC personnel to help reduce CO_2 emissions from energy consumption to a lower level per man year of all faculty and staff;
c. CPSC will develop green guidelines for physical planning and will account for the sustainability of all physical plans and projects;
d. CPSC will communicate initiatives and experiences to the partner institutions; and
e. CPSC will participate in networks and enter into cooperation agreements with partner institutions that can inspire and contribute to the College's realization of higher goals set for Green Campus.

The Green Campus project will strengthen its focus over the next few years. Developing new goals is always important in an evolving TVET institution.

CPSC Green Technology Program

CPSC embarks on integrating green principles to the courses offered as part of the academic component of promoting green TVET. The establishment of an innovative Green TVET laboratory is in the pipeline with the aim to provide a demonstration facility of advanced technologies oriented to sustainable development. The incorporation of sustainability in TVET curriculum, courses and activities would be served by making available an interactive and informative facility that can create a training ecosystem and learning environment that adheres to sustainability.

This project also aims to promote opportunities and synergy between TVET institutions and industries on the innovations of products.

CPSC Green Research Initiative

Researches for green initiatives and innovation will become part of future research undertaking of CPSC. Research outputs will be complied and published to serve as reference guide for those with similar interest in TVET sector. Research on the integration of sustainable development to TVET and research on development of curriculum using infusion and diffusion models and establish a prototype model that can be institutionalized as part of CPSC's academic offering.

Other possible green researches for TVET institutions can be focused on:

a. Improvement of the climate screen-research can be done by improving the existing buildings through better insulation, replacement of windows, securing windows that tightly close, etc.;

b. Energy smart installations-research on energy smart installation can be done on the improvements of building and facilities thru installations of efficient ventilation, lighting-systems resulting to savings in energy consumption;

c. Energy efficient operation- research that may lead to improvement of ventilation and lighting especially on mechanism to be efficient when in use, and should reduce capacity or turn off completely when no longer in use;

d. Energy smart conduct-research to improve energy smart conduct of personnel like the simple gestures of closing all windows and turning off lights, equipment, and facilities when leaving a room can also be a good idea to determine the green culture.

CPSC Green Community Program

CPSC advocates green education and thru outreach programs, community of practices allow an open interaction and exchange of ideas, concepts and practices for sustaining a green movement. Initial activities have been focused on the facilitation of regular meetings for awareness, exchanges and green campaign as part of building CPSC's green team. Outreach activities will be identified in the next phase.

CPSC Green Culture

The CPSC's Greening TVET project will take advantage of the College's role to "practice what it preaches" in inculcating green lifestyle. It will seek to educate and build the capacity of others on various ways and approaches to use resources wisely and preserve the environment dutifully, in the most cost-effective manner.

The College will give special attention in ensuring rationalized decreasing energy consumption and the CO_2 emissions in its day-to-day operations. The parameters for sustainability must be one of the central considerations to promote efficiency, economy and quality in deciding all vital issues in the College. Inculcating the

value for the use of green and clean technology can ensure that sustainability principles are more frequently considered and valued by the personnel and clients of the College.

Implementation

Now on its third year, the CPSC Green Program is already set to be on its fourth phase of implementation. Some of the landmark initiatives done by CPSC are the following:

Phase Two: Getting Involved

CPSC has done the following alignments in its internal operations to the green TVET direction. This is to set an example to other institutions in internalizing the ways to build a green Corporate Culture.

a. Establishment of the Green CPSC Policy and Building Awareness

To solidify the green CPSC commitment among all its staff members, CPSC mandated all faculty and staff to participate in an awareness seminar and campaign on July 9, 2010. The staff laid their signatures pledging to adhere to the CPSC Green Policy, followed by the planting of the santol tree (Sandoricum koetjape) symbolizing resilience in weathering challenges and commitment towards the green philosophy.

b. Alignment of Internal Operations to the Green Advocacy

Taking the Green Advocacy to the next level, the College revamped some of its daily operations to make it more environmentally friendly. Some of these are indicated below.

c. Segregation of Wastes

Segregation of ordinary office wastes by its type (non-biodegradable or biodegradable) will make waste collection more efficient. For its part, CPSC has created prominent signs on its garbage cans to encourage the staff to properly differentiate their office wastes. These will then go to the correct way of disposal.

Those materials placed in the trash can labelled "non-biodegradable" will be further sorted to separate the recyclable from the non-recyclable. The

recyclable materials such as newspapers, glass bottles, aluminum cans and discarded metal parts from vehicle repairs are sent to junkshops and recycling facilities, giving approximately P3,000-P8,000 additional revenue per month to the College.

This demonstrates that an institution can effectively utilize waste materials into an activity that can generate additional income. This activity also helped CPSC reduce the wastes going to dumpsites, thereby reducing the overall impact of CPSC in polluting the environment.

d. Green Dining: Composting Kitchen and Biodegradable Wastes

CPSC maintains a kitchen where the staff takes their lunch, and the wastes it generates comprise a significant portion of CPSC's trash. In order to reduce the portion of biodegradable wastes, the College practiced biodegradable composting.

Composting provided the College with two benefits. First, it reduced the amount of biodegradable wastes generated by the kitchen and second, it provided CPSC with a healthy soil for the College's garden.

e. Paper Recycling

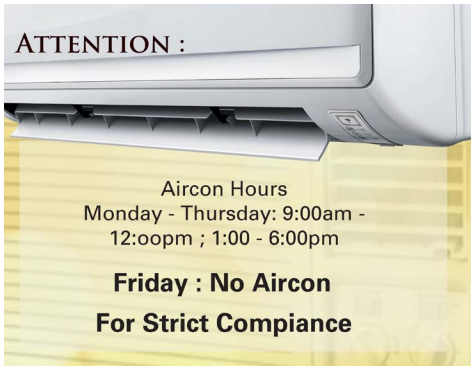
As estimated by the US Environmental Protection Agency (2008), paper generates as much as 90 percent of all total office wastes. A green institution must be able to tackle the problem of paper wastes effectively in order to be effective in its campaign.

CPSC, on its part, implemented a policy of double-sided printing of all its non-official documents and drafts. It also sold high quality used bond paper and newspaper to recycling centers. The sale of these materials contributed to CPSC's coffers and at the same time encouraged the staff to use paper efficiently.

CPSC is also gearing towards the implementation of a paperless CPSC by putting its internal forms in Google Drive and making these forms available online. As of date, CPSC has already completed the process of converting all its forms (e.g. transportation requests, leave forms, job request forms). This enabled the staff to utilize online resources efficiently without having to resort to paper.

To effectively utilize discarded paper products, CPSC tapped the help of a local company to convert them into other useful office products. These are given to visiting guests as corporate souvenirs and gifts, as well as to the staff to aid their daily tasks.

f. No Aircon Fridays and Regulated Aircon Hours



Aircon usage comprised around 50-80% of the total electricity consumption in an office. To rationalize its usage, the aircon is turned on only at specified office hours and turned off whenever it is operated on the off-peak hours.

CPSC strictly implements this policy during Fridays on cool months (August to February) to further cut back on electricity consumption. Computed trends show that these policies reduced electricity consumption (as measured by kilowatt hours) by as much as 20%, generating savings that can be used to fund other development initiatives.

g. Preference on Digital Displays instead of Tarpaulins

The use of tarpaulins when welcoming special guests in the College requires the use of non-biodegradable and non-recyclable materials, thereby contributing to the wastes generated. To provide sustainable solutions to the problem, CPSC has opted to install digital display monitors to replace tarpaulin displays whenever it welcomes guests to its office.

The use of digital display monitors saves the office approximately P5,000 for every tarpaulin display. Also, digital displays can be changed accordingly, thereby giving more space for flexibility without entailing additional costs. It also reduced the non-recyclable items generated by the College, thus helping the office reduce its waste output.

Phase Three: Infusing Green

a. Alignment of Services to Clients

The Green TVET advocacy of CPSC will not be complete without the in-country and regional programs aligned towards the propagation of Green TVET practices. These are shown in Table 1.

In its line-up of four Customized Programs benefitting the Korean students from the Korea University of Technology (KUT) from 2011-2013, all of them have included the topic on solar and other renewable energy sources as presented by the CPSC Faculty and Staff. Overall, these Customized Programs have benefited 73 KUT Students.

Table 1: Green TVET Programs Conducted by CPSC

Name and Venue of the Program	Number of Participants
In-country Program on Clean and Green Technology for TVET, Colombo, Sri Lanka December 6-11, 2010	33
Regional Program on Transforming TVET for Meeting the Challenges of the Green Economy Bonn, Germany October 27-30,2011	48
Regional Program on TVET for Sustainable and Inclusive Development, Chandigarh, India May 27-June 1, 2013	17
Total Participants	**98**

For the past three years of implementation, CPSC has gathered a total of 171 participants from all the member countries to subscribe in its line-up of activities geared towards the promotion of green TVET and sustainable TVET practices. These numbers are also the reflection of CPSC's commitment to pursue a more economically and environmentally viable approach towards the improvement of the nation's workforce by employing practices that are both environment and future -friendly.

b. Facilitating Internal Monitoring and Evaluation

One of the requirements of the CPSC Green Advocacy is to ensure that the policies implemented are well-understood and accepted by all the CPSC employees. A survey was conducted to gauge the effectiveness of this advocacy as evaluated by the staff. To facilitate understanding, the ratings are interpreted according to the standards as shown in Table 2:

Table 2: Parameters to Measure the Effectiveness of the CPSC Green Initiative

Rating	Interpretation	Range
Very Effective	The CPSC Green Advocacy was very successful in achieving its objectives and no major changes in the implementation is required	100.00%-75.00%
Effective	The CPSC Green Advocacy was successful in achieving its objectives. However, there are minor avenues for improvement recommended to further enhance its implementation	74.99%-50.00%
Slightly Effective	The CPSC Green Advocacy partly fulfilled its objectives and major steps are recommended to make it more effective	49.99%-25.00%
Not Effective	The CPSC Green Advocacy is not successful and achieving its objectives	24.99%-0.00%

The survey solicited the responses of all the CPSC staff representing all divisions (Office of the Director General, General Services, Research and Publication, Training, Projects and ICT). The results of the survey are elaborated in the table below:

Table 3: Effectiveness of the Green CPSC Initiative

Parameters	Average Grade	Interpretation
Internalization and understanding of the CPSC Green Advocacy	81.25%	Very effective
Effectiveness of CPSC in the enforcement of this advocacy to the staff	68.75%	Effective
Effectiveness of the waste segregation and recycling policy	72.92%	Effective
Effectiveness of the rationalized aircon usage	79.17%	Very effective
Effectiveness of composting of kitchen wastes	85.42%	Very effective
Success of CPSC in promoting this advocacy to its stakeholders	70.83%	Effective
Average	**76.39%**	**Very effective**

As shown from the data in the table above, CPSC has been very effective in its enforcement of the CPSC Green Advocacy as perceived by its staff. The strongest point of its implementation is CPSC's effectiveness in turning its kitchen wastes into compost. This is supported by a healthy garden constantly maintained by CPSC using the soil made from its own compost.

The weak aspect of the Green CPSC Advocacy is the internal enforcement among the staff. In this case, CPSC has to revisit the guidelines on how the CPSC Green Advocacy is implemented and improve its monitoring and evaluation mechanisms to address this problem.

The feedback from the CPSC staff demonstrates the sustainable and viable impact of turning a green institution into a realizable project. The high ratings also demonstrates the commitment of the staff in upholding the corporate values instilled by the organization, and it also shows that these concepts are well-received and are practiced with utmost understanding.

Phase Four: Transforming Lives

Provided that all the systems on monitoring and evaluation, and the internal alignment of operations were already in place, CPSC deems that it is their responsibility to spread this culture to other institution in the hopes of making this advocacy a stunning testament of TVET's commitment towards a sustainable future.

a. Greening Carlos Hilado Memorial State College (CHMSC)

The green CPSC advocacy has found support with an institution in the Philippines, which patterned its Green Institution initiative with the one currently implemented in CPSC.

The Carlos Hilado Memorial State College (CHMSC) is an arts and trades school located in Talisay City, Negros Occidental Provice in the Philippines. CHMSC was founded on July 1, 1954 originally known as the Negros Occidental School of Arts and Trades. CHMSC aims for Excellence, Competence, and Educational Leadership in Science and Technology. It has four campuses with specific fields of expertise and remains steadfast to uphold its mandate by providing higher technological, professional, and vocational instruction and training in science, agricultural and industrial fields. The institution was headed by Dr. Renato Sorolla, a former CPSC faculty member.

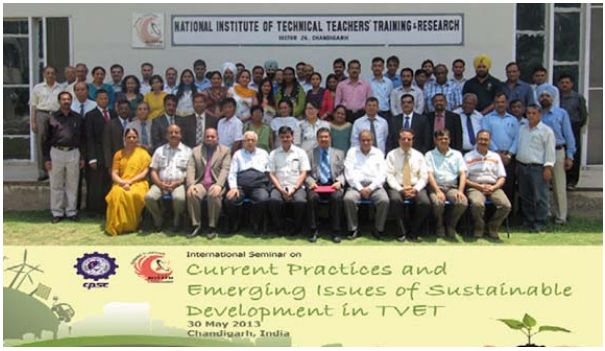
Dr. Mohammad Naim Yaakub, the current CPSC Director General, stressed in his speech the need for better education that fosters the knowledge, skills and attitudes to shape a future in line with the demands of sustainable development. To achieve this, he proposed three solutions; first is to integrate sustainable development into the curricula; second is to initiate green research; and lastly, prepare CHMSC and convert it into a green campus. The Green CHMSI Movement was the testament of the CPSC's effort in spreading the need towards a more sustainable and environment-friendly campus to other TVET institutions in the region.

b. Spreading the Need for a Sustainable TVET to all the CPSC Member Countries

An International Seminar themed "Current Practices and Emerging Issues of Sustainable Development in TVET" was jointly organized by the Colombo Plan Staff College for Technician Education (CPSC) and the National Institute of Technical Teachers' Training and Research (NITTTR), Chandigarh on May 31, 2013 at NITTTR Chandigarh. A total of 81 international participants attended

the program. The participants came from countries such as Afghanistan, Bangladesh, Fiji, India, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Papua New Guinea, Philippines, and Sri Lanka.

The landmark achievement of this program is the adoption of the 12-point recommendations in making TVET more responsive to the demands of a more sustainable future. These major recommendations highlighted the following key points such as: furthering the cause of sustainable development (SD) in terms of social, economic and environment through international and regional cooperation; integration of SD concepts and practices in TVET curriculum operations and processes within TVET systems; SD implementation awareness through training of teachers and policy makers; strengthening TVET-industry linkages on sustainable development; SD advocacy through skill development policies; green campus promotion; skilled manpower training on SD concepts, practices with social entrepreneurship development initiatives; technology innovation for SD integrated with awareness on ecological balance, environment, social equity and safety standards; research and development on SD; SD advocacy for lifelong learning; and stronger integration of SD aspects into TVET teachers' education through innovative approaches.



Conclusion

Up-skilling the workforce according to the patterns of environmental changes that are taking place allows for opportunities to up-scale the level of responsiveness by those within the system. The experiences shared by CPSC is but a practical approach that may inspire to launch a few steps, small as they may be, in making TVET focus on most urgent requirements under its purview. Education for Sustainable Development strengthens the paradigm that TVET must work upon (NCVER, 2007), hinting that it can never remain stagnant, defocused and unresponsive when the changes that are taking place today urgently require direct implementation of skills training that changes not only hand and head skills,

but also sharpen the habits and the culture to live and work within sustainable development principles.

Engagement and collaboration, with both internal and external partners are the strategic cornerstones of the CPSC work to achieve the Greening TVET concept. The close partnership with other international TVET institutions and industries in the Asia-Pacific region could pave the way for thinking up ways and evolving models that can be adapted by institutions, for creating tremendous impact to institute a green culture and for effectively contributing to the reduction of CO_2 in the region while in the process of building the capacity of the workforce for the new and emerging jobs dictated by the climate change patterns.

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Performance of Vocational High School Headmasters in Terms of School Atmosphere, Managerial, Supervisory and Entrepreneurship Competencies in North Sumatra Province

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Abstract

The purpose of the research was to discuss and describe whether (1) partially or as a whole, managerial, supervisory and entrepreneurship competencies of Vocation High School (VHS/TVET) have direct impact on school atmosphere, (2) partially and as a whole, managerial, supervisory and entrepreneurship competencies as well as school atmosphere directly influence the performance of headmasters, and (3) partially or altogether; managerial, supervisory and entrepreneurship competencies indirectly influence the performance of headmasters through school atmosphere.

The research was carried out through quantitative method, i.e. descriptive and associative research. The data were collected through questionnaires and hypotheses were examined through descriptive technique and path analysis.

From the findings, it may be concluded that (1) managerial, supervisory and entrepreneurship competencies of VHS/TVET headmasters partially or altogether directly influence VHS atmosphere in North Sumatra; (2) managerial, supervisory and entrepreneurship competencies and school atmosphere partially or altogether directly influence the performance of VHS headmasters in North Sumatra; and (3) managerial, supervisory and entrepreneurship competencies partially or altogether indirectly influence the performance of VHS headmasters in North Sumatra through school atmosphere.

Key words: managerial, supervisory, entrepreneurship and school atmosphere

Introduction

Background

A determining factor in the development of a nation is the quality of human resources. The capacity and progress of a nation are not contingent upon the dominance of comparative advantages but are based more on competitive advantages. In this regard, activities to develop human resources through education development are required. Education is expected to be the forum for developing readily available workforce, particularly graduates from Vocational High School (VHS/TVET).

In order to improve school quality, School Based Management is one of the manifestations of educational reform that provides autonomy (decentralization) to the schools to organize their programs and development in line with their potentials, requirements and needs. Schools require professional headmasters to be able to realize the decentralized functions.

The findings from a study by the Ministry of Education indicate that around 70% out of 250,000 headmasters in Indonesia are not competent (Susanti, 2008). As a follow up, the Directorate of PMPTK (Developing Teachers and Education Personnels) carried out competency tests for 400 headmasters from 5 provinces and the results were that the competencies of headmasters were 67.3% in personal competency, 64.2% in social competency, 40.4% in supervisory competency, 47.1% in managerial competency and 55.3% in entrepreneurship competency (Directorate PMPTK, 2010).

By 2010, it was highly ironic and heartbreaking to see that the percentage of unemployment among VHS graduates remained high. According to the Central Bureau of Statistics (CBS, 2011), the total workforce in North Sumatra was 6,314,239 out of 13.2 million population, with rising unemployment of 402,125 or a total of 6.37 percents. The data indicate that the percentage of unemployed VHS graduates in North Sumatra at 14.25%. The VHSs in North Sumatra have not yet been able to show outstanding performance and remain to be below VHS quality in Java. The innovation and creativity of VHS in North Sumatra have not been as recognized as those from Java and this fact could not be separated from the factor of headmaster's leadership. The achievements have been made possible by the leadership of the headmasters that were able to develop synergy toward empowerment of the available resources, both human resources and the available facilities and funding.

Realities in the field indicated that there were gaps between VHS supply and demand from the business sector (Provincial Bureau of Statistics, North Sumatra, 2011). In addition, VHS in North Sumatra did not have significant competitiveness at the national level. This was closely related to the performance level of VHS headmasters in North Sumatra. Although there were a number of interrelated factors that may be suspected of influencing the situation, such as planning, funding, educational human resources, awareness of business sector and the public, one factor that influenced the quality of VHS was the quality of the headmaster's performance.

Based on the above background, the writer feels it necessary to study further the performance level of VHS headmasters in North Sumatra from the perspectives of school atmosphere, managerial, supervisory and entrepreneurship competencies.

Formulation of Issues

The issues of this research were:

a. Did managerial, supervisory and entrepreneurship competencies of headmasters, partially or altogether, have a direct influence towards the school atmosphere?

b. Did managerial, supervisory and entrepreneurship competencies of headmasters and school atmosphere partially or altogether directly influence the performance of the headmasters?

Did managerial, supervisory and entrepreneurship competencies of headmasters, partially influence the performance of the headmasters indirectly through the school atmosphere?

Literature Review

Evan (2005; 209) claims that "performance simply means the extent to which an individual contributes to achieving the goals and objectives of an organization". Quite similarly, Lindsay et al (1997:172), wrote that "performance is the contribution both individuals and system make to the accomplishment of the objectives of the organization". Both opinions emphasize that organizational performance is an accumulation of individual performance of organization members. So important is individual performance in achieving organizational goals that discussion on organizational performance must begin with individual performance.

Gatewood & Co. (2011:73) say that management is "a series of activities designed to reach organizational goals by utilizing resources effectively and efficiently". As a manager, a headmaster should be required to have the capacity in school management to be able to achieve the objectives of teaching and learning process as a whole. According to Katz and Payol (Robbins, 2007:7), in performing managerial tasks, at least three skills are required, i.e. technical skill, human skill and conceptual skill.

Robert D. Krey & Peter J Burke (2005) defines "Supervision is instructional leadership that relates perspectives to behavior, clarifies purpose, contributes to and supports organizational actions, coordinates interactions, provide for maintenance and improvement of the instructional program and assesses goal achievements". Therefore, a headmaster's supervision is the effort of a headmaster towards guiding the teachers to improve their teaching quality through the actual steps in planning, teaching appearance and creating rational change in order to improve the outcome of students learning.

Drucker (1996:27-30) interprets entrepreneurship as spirit, capacity, individual behavior in carrying out an activity directing toward efforts to discover, create,

applying work system, new technology and product by improving efficiency in order to provide better services and/or gain higher profit. Entrepreneurship of a headmaster is therefore aimed at achieving certain goals and expectation that are formulated into realistic vision, mission and strategic plan, meaning that the goals are adjusted to support resources available.

McBrien and Brandt (1997) state that "organizational climate, the sum of value, culture, safety practices and organizational structures within an organizational that cause it to function and react in particular ways". School atmosphere may develop into specific characteristics that differs a school from other schools. Good school atmosphere will certainly create favorable condition for school inhabitants in performing their activities and in turn will influence the level of educational outcome.

A combination of a headmaster's competency and a good school atmosphere will certainly improve the results achieved by the school through improved process. A headmaster's competency will determine the quality of the program, process, supervision and evaluation of the overall school activities. The roles of headmaster's competency will be better in improving results if supported by the good school atmosphere. Good atmosphere means that all school populations work together to achieve the goals through activities.

Methodology

The research was carried out through quantitative method, i.e. descriptive and associative research. The population of the research was 855 VHS headmasters in North Sumatra covering 33 districts/cities, both public schools and private schools. Ninety-two (92) samples were selected through proportional random sampling with 0.10 margin error and 90% reliability. Based on the analysis and data category, the research is a quantitative research and based on its explanation, the type is associative.

Research hypotheses were analyzed with Parametric Statistics, i.e. using Path Analysis. The level of direct influence of exogenous variable in certain endogenous variable is reflected by path coefficient and Path Analysis is used to explain the direct and indirect results of the variables of managerial, supervisory and entrepreneurship competencies of headmasters as the causal variable of school atmosphere and headmaster's performance as the result variables.

Research Outcome and Analysis

Description of data variables on headmaster's performance has an average value of 204.81 or 85.33% of the maximum theoretical score (240). Variable for school atmosphere is 134.20 or 83.88% of the maximum theoretical score of 160. Score variable for headmaster's managerial competency is 206.60 or 82.64% of the maximum theoretical score of 250. Variable for headmaster's supervisory

competency is 122.97 or 81.98% of the maximum theoretical score of 150. A variable for entrepreneurship competency is 123.63 or 79.76% of the maximum theoretical score of 155. All variables above are relatively high as they are close to the maximum theoretical scores.

Hypothesis examination used path analysis after fulfilling all analysis requirements, i.e. based on the estimate of a normally distributed population, homogeneous data variables and the relation between variables in the model should be significant and linear. There were two analysis stages in hypothesis examination through path analysis i.e.: Determining and testing path coefficient and research hypothesis testing. Causal influence among variables in Substructure-1 consisting of endogenous variables, i.e. X4 and three exogenous variables, i.e. X1, X2 and X3.

After correlation matrix among variables under substructure-1, each coefficient of path (ρji) could be calculated. The resulting coefficient of substructure-1 is presented in Table 1.

Table 1. Coefficient Values under Substructure-1 Coefficients[a]

Model	Non-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	5.861	9.170	.332	.639	.524
Managerial Competency	.239	.056		4.277	.000
Supervisory Competency	.448	.070	.468	6.391	.000
Entrepreneurship Competency	.193	.078	.186	2.467	.016

a. Dependent Variable: School Atmosphere

Afterwards, calculation of determinant coefficient under Substructure-1 resulted in R2 = 0.708. It means that the headmaster's managerial competency (X1), Supervisory competency (X2) and Entrepreneurship competency (X3) as a whole can explain 0.708 of school atmosphere variable (X4).

Causal influence variables under Substructure-2 on consist of an endogenous variable Y and four exogenous variables (X1, X2, X3 and X4). After obtaining the matrix correlation under Substructure-2, each coefficient (ρji) could be calculated. The result is presented in Table 2. Afterwards, determinant coefficient under Substructure-2 from the calculation is R2 = 0.870, meaning that change variables on X1, X2, X3 and X4 altogether can explain 0.870 of change variables under Headmaster Performance (Y).

Table 2. Path Coefficient Values under Substructure-2

Coefficient					
Model	Non-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	20.844	7.907		2.636	.010
Managerial Competency	.227	.053	.246	4.297	.000
Supervisory Competency	.268	.073	.218	3.674	.000
Entrepreneurship Competency	.270	.070	.203	3.880	.000
School Atmosphere	.527	.092	.410	5.742	.000

b. Dependent Variable: Headmaster's performance

Calculation result by using Lisrel 9.1 (Student Edition) indicates that the path coefficient for Managerial Competency (X1) against Headmaster's Performance (Y) under School Atmosphere (X4) is 0.126 (significant), meaning that Headmaster's Competency indirectly influences Headmaster's Competency by 0.0158 or 1.58%. The path coefficient of X2 towards Y under School Atmosphere (X4) is 0.236 (significant). It means that Headmaster's Supervisory Competency indirectly influences Performance under School Atmosphere by 0.0557 or 5.57%. Coefficient of Entrepreneurship Competency (X3) on Headmaster's Performance (Y) under School Atmosphere (X4) is 0.102 (significant). It means that Headmaster's Entrepreneurship Competency indirectly influences Headmaster's Performance under School Atmosphere by 0.0104 or 1.04%.

Competencies play major roles in work habits and performance of headmasters. In order to be able to perform their main duties, a headmaster is required to possess a number of competencies. Education Ministerial Decree No. 13/2007 on Headmaster Standards stipulates five dimensions of obligatory competencies, i.e. (a) personal, (b) managerial, (c) entrepreneurship, (d) supervisory and (e) social.

The assertion indicates that competency is an important factor for creating a conducive work environment that will in turn improve performance. Researches have proven that school atmosphere has a relatively strong influence on the performance of its headmaster. To improve performance, a VHS headmaster needs to pay attention to the improvement of the school atmosphere. Freiberg (2002:1) emphasizes that school atmosphere may positively influence learning environmental health or creates significant obstacles to learning. School atmosphere is something that a headmaster needs to pay attention to as it will also influence the behaviors of the teaching staff, administration staff and

more importantly the students. Therefore, schools should improve the school atmosphere in order to create positive impact for the benefit of the school. Peaceful and convenient school conditions that are suitable for teaching and learning are the form of school atmosphere that is conducive to achieve better education outcome.

Conclusion

Based on analysis results and research data on VHS headmasters in North Sumatra, it may be concluded that:

A direct positive influence toward school atmospheres from headmaster's managerial competency is 11.02%, from supervisory competency is 21.90% and from entrepreneurship competency is 3.45%. Direct positive influence towards headmaster's performance from managerial competency is 6.05% and from supervisory competency is 4.75%. A direct positive influence from entrepreneurship competency towards headmaster's performance is 4.12% while direct positive influence from school atmosphere towards headmaster's performance is 16.81%.

Furthermore, the indirect positive influence of headmaster's managerial competency toward performance through school atmosphere is 1.58%, indirect positive influence from supervisory competency is 5.57% and from entrepreneurship competency is 1.4%. Altogether, managerial, supervisory and entrepreneurship competencies directly influence the school atmosphere by 70.8% while the direct influence toward headmaster's performance is 80.7%.

Recommendations

There are a number of recommendations for improving vocational education i.e. through improvement of VHS headmasters' performance, such as (a) head of North Sumatra provincial education office needs to consider managerial, supervisory and entrepreneurship competencies of headmasters as well as school atmosphere by conducting intensive, planned and sustainable development and guidance; (b) school inspectors should play their roles in the form of guidance and supervision and focus more on managerial, supervisory and entrepreneurship competencies of headmasters and school atmosphere; (c) headmasters should develop cooperation with school citizens to create favorable school atmosphere that will drive school members to perform their individual roles appropriately; (d) the roles of teachers are very dominant in improving education quality, therefore teachers should be oriented to improvement of learning quality. One of the efforts that could be carried out by teachers in helping the headmaster to make it come true is by creating a favorable school atmosphere. Teachers should provide inputs to the headmasters in relation to the issues that are useful for improving the quality of vocational education through improved learning

process. Similarly, teachers should support headmaster's programs related to the improvement of performance and work wholeheartedly and earnestly.

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Determinant Factors of Entrepreneurial Intention Among Students in Kolej Komuniti Kok Lanas

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Abstract

This research aims to establish the factors that would likely influence the entrepreneurial intention of the students of the Kolej Komuniti Kok Lanas Kelantan (KKKLK), which is one of the Higher Education Colleges in Malaysia established for community residents to improve their knowledge and diversified skills. The study involved the participation of 151 students from the different courses offered and are only limited on the students of KKKLK enrolled in the current fiscal year. The research findings are intended to aid policy makers in promoting and developing future entrepreneurs in Community Colleges in social and educational areas through strengthening institutional support in subject areas deemed to significantly affect entrepreneurship intentions among the students.

Findings suggest that institutional support is perceived to have a more significant influence in shaping entrepreneurial intention compared to subjective norms and attitude. This finding is in line with the Theory of Planned Behavior suggesting that the determinant factors for influencing entrepreneurship decisions were: subjective norms, attitude and entrepreneurial intention.

Keywords: theory of planned behavior, entrepreneurship intention, institutional support

Introduction

Community Colleges are established to provide alternative routes or other viable options for post-secondary students through the instruction of skills, training and education. It also provides training and skills to the underprivileged members of the society by encouraging a quality learning environment and using tools such as up-skilling training, re-skilling and multi-skilling to local workforce needs and a strategic network for the purpose of strengthening the socio-economic activities and well-being of local communities.

Community Colleges pioneered change by strengthening the Community College program launched on July 14, 2011, in accordance with the New

Economic Policy initiated by Dato 'Seri Mohd Najibbin Tun Abdul Razak at the Invest 2010 conference in Kuala Lumpur.

School programs have been implemented using a modular approach that is related to opportunities to enhance skills to students in technical and vocational fields. This program offers 135 different courses by 2012 compared with 52 programs in 2010. This program is in line with government's desire to develop world class human capital.

Pelan Pengukuhan Keusahawanan Kolej Komuniti, Jabatan Pengajian Kolej Komuniti (JPKK or the Entrepreneurial Reinforcement Plan of Community Colleges, Department of Community Colleges) focuses on the development of Community College students that they may possess entrepreneurial characteristics and competencies, be competitive and with high self-esteem in line with the *Dasar Pembangunan Keusahawanan Institusi Pengajian Tinggi* (Entrepreneurial Development Policy of Higher Education Institutions). The main goal of this plan is to provide guidelines in implementing entrepreneurship programs at Community Colleges in order to encourage the development of the human capital through imbibing the values and ideals of entrepreneurship.

In an effort to achieve the above goals, the government has developed the Pelan Strategik Pengukuhan Keusahawanan Kolej Komuniti based on the six core areas of Dasar Pembangunan Keusahawanan:

1. Establishing a center for entrepreneurship at JPKK and a Community College;
2. Providing education and entrepreneurship programs that are planned and holistic;
3. Strengthening entrepreneurship development programs and creating an effective measurement mechanism;
4. Providing a conducive environment and ecosystem for entrepreneurship development; and
5. Strengthening competency of entrepreneurship coordinator.

This study realizes the need for Community Colleges to integrate entrepreneurship into the curriculum. Thus, it concentrates on the three main factors in influencing entrepreneurship intention namely: (1) attitude, (2) subjective norms and (3) institutional support in evaluating the students' intention to pursue entrepreneurship activities after graduation.

The study aims to answer the following research questions:

1. What is the perception towards attitude, subjective norms and institutional support as factors in influencing entrepreneurial intention among the students in KKKLK?

2. Is there a significant difference between the perception towards attitude, subjective norms and institutional support as factors in influencing entrepreneurial intention among the students in KKKLK?

Hypothesis Statement

Null Hypothesis: Attitude, subjective norms and institutional support have no significant difference in influencing the intention of the students to pursue entrepreneurship.

Alternative Hypothesis: Attitude, subjective norms and institutional support have significant difference in influencing the intention of the students to pursue entrepreneurship.

Conceptual and Theoretical Framework

The study refers to theories formulated by Thomas (2006), where he asserted that the person's skill depended on his ability to search for knowledge and his willingness to learn entrepreneurship, and it is related to his intention in developing his interest in entrepreneurship and all aspects related to it. This is further supported by David (2004), where he identified that entrepreneurship education using effective learning models is very instrumental in providing and building knowledge to potential entrepreneurs.

Another theory from Ajzen (1991) used an intention-based model and approach to explain an individual's intention to perform in a given behavior. Intention indicates how hard people are willing to try, and how much effort they are planning to exert in order to perform the behavior. This theory was used in the study to validate its ability to explain intention in performing a particular behavior (Bidin et al., 2012). This conceptual research will be using the theory of planned behavior (TBP) to explain the intention among students of KKKLK in venturing to entrepreneurial activity in the future. According to the theory there are three conceptually independent determinants of intention towards behavior, namely: attitudes towards the behavior, subjective norm, and perceived behavior control (Ajzen, 1991).

Referring from Ajzen (1991)'s theory of planned behavior, attitudes towards performing a behavior refers to perceptions of personal desirability to perform the said behavior. Further explanations from Riani et al. (2012) emphasized the attitude exhibited by students in entrepreneurship are influenced by attitudes towards entrepreneurial intentions. Attitudes are defined as the beliefs and perceptions about the willingness to personal behavior, which in turn related to expectation about the impact of personal decisions (Mokhtar and Zainuddin, 2010).

Ajzen (1991) also explained the importance of perceived behavioral control (PBC) in relating to an individual's perception on the degree of easiness and

difficulties in performing such behavior. It is assumed to reflect past experience as well as anticipated obstacles. Bidin et al. (2012), said intentions are affected by perceptions of access to necessary skills, resources and opportunities to perform a behavior.

Referring from the previous researches, it has shown that environmental barriers and institutional support have shown control over the behavior of the entrepreneurship intention (Schwarz et al. 2009). Environmental support can be exhibited in banking services and ease of obtaining the capital for these initiatives to materialize.

The modified TPB models are based on the theories of Schwarz et al, (2009), Riani et al, (2012), Bidin et al, (2012) and Mokhtar and Zainuddin, (2010) and are arranged on the framework as suggested in Figure 1. This figure illustrates that subjective norms, attitude entrepreneurship and institutional support from the KKKLK has a direct effect on the entrepreneurship intention of the students.

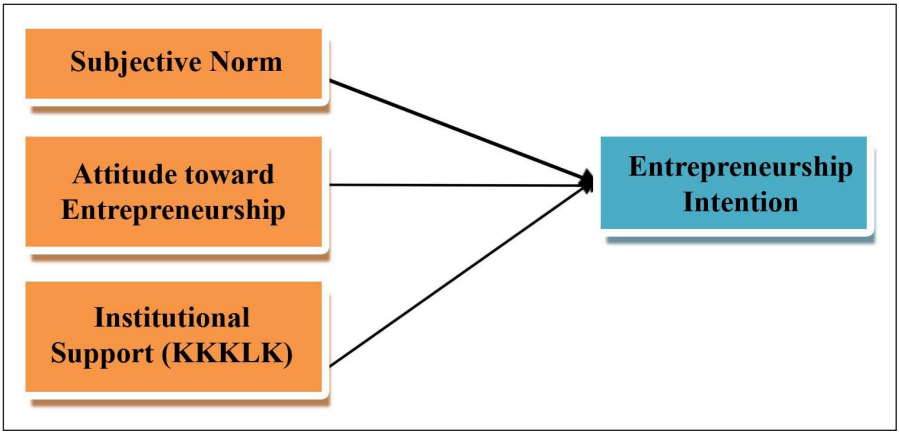

Figure 1: Conceptual Framework

Research Methodology

To obtain data on the variables identified in this study, questionnaires were used and randomly distributed. A total of 200 questionnaires were distributed randomly to selected students. Out of these, 151 questionnaires representing 76% of the total were deemed to be usable in the study. Out of 151 samples, 30% was male and 70% was female. The breakdown of the respondents who have taken a course or training on entrepreneurship and who will be entrepreneurs eventually is further explained in Table 1.

Table 1 : Sample of Respondents

No.	Courses	Total of students
1.	Photography (SMK)	15
2.	Make-up (SMK)	45
3.	Hair and Saloon (SMK)	24
4.	Creative Multimedia (Advertising) (Full time)	44
5.	Beauty (Full time)	23
	Grand Total	**151**

The questionnaires contained items that measure the key variable of attitudes, subjective norms; perceived behavioral control and intention were adapted from Riani et al, (2012). All items were measured on five-point Likert scale, ranging from '1' "strongly disagree" to '5' "strongly agree." The research instrument consists of questionnaire items that meet the objectives of this study.

Results and Discussions

To determine the factors of entrepreneurial intention, a basic descriptive analysis was performed using the average score and the distribution of score for the attitude, subjective norms, institutional support and entrepreneurial intention. The results are shown in Table 2. As indicated in the table, the mean score of attitude is 16.90, which means that the respondent had moderately favorable attitude towards entrepreneurship. The mean scores for subjective norms and institutional support were moderately low (mean of 16.79, and 16.33, respectively).

Table 2: Perception towards Subjective Norms, Attitude, Institutional Support and Intention (n=151)

No.	Variables	Mean	Standard Deviation
1.	Attitude	16.90	2.70
2.	Subjective norms	16.79	2.65
3.	Institutional support	16.33	2.86

ANOVA is used to test the difference between two sample means to assess the competing claims of both hypothesis. Table 3 shows the results.

Referring from the data in Table 3, the implied results from ANOVA were:

i. Accept the null hypothesis stating that attitude has no significant difference between entrepreneurial intention. This implies that regardless of attitude between the courses, entrepreneurial intention still remains the same.

ii. Accept the null hypothesis stating that subjective norms has no significant difference on entrepreneurial intention. This implies that the subjective norms implemented has little or no impact in changing entrepreneurial intention.

Table 3: One Way ANOVA

Variables	Sum of Squares	df	Mean Square	F	Sig.
Attitude	1.318 39.357 40.675	4 146 150	.330 .270	1.222	.304
Subjective norms	2.123 38.552 40.675 39.357	4 146 150	.531 .264	2.010	.096
Institutional support	3.989 36.687 40.675 40.675	4 146 150	.997 .251	3.968	.004

iii. Reject the null hypothesis stating that institutional support has no significant difference on entrepreneurial intention. This implies that the provision of institutional support has a significant impact in influencing the degree of entrepreneurial intention.

Based from the findings, the emphasis of the Community Colleges on integrating entrepreneurship principles is important in transforming the direction of TVET programs being offered. Students who were exposed to entrepreneurship through entrepreneurship modules and inclusion of entrepreneurship in the curriculum are likely to exhibit an efficient understanding on the concept, therefore enabling them to pursue entrepreneurship education and careers in the future. It also shows that the institution has provided important avenues in encouraging them to undergo entrepreneurship studies.

TVET can contribute a lot more for the students in the technical aspect as well as in improving the image and status of skills and vocational education particularly on entrepreneurial education and training. Students from Community Colleges may not be eligible to enter the academic pathway but they can still be productive and efficient through entrepreneurship, therefore, increasing their chances towards gainful employment.

Conclusions and Recommendations

Based on the analysis and testing conducted in this study, the study concludes that:

1. The institutional support is perceived to influence the intentions of the students from Kolej Komuniti Kok Lanas to pursue entrepreneurship the most other than attitude and institutional support. This finding supports the findings of Shwarz et al (2009) stating that environmental factors are a significant factor in influencing entrepreneurship decisions.
2. The ANOVA shows that the provision of institutional support significantly affects the decisions of the students to pursue entrepreneurship, supporting

the finding of Shwarz et al (2009) that stresses the importance of institutional factors in influencing decisions pertaining to entrepreneurship pursuits.

Based from the findings, the study recommends the following measures for the institutions to consider:

1. To transform the TVET system, program offers must be monitored and adapted to the constantly changing business environment and curriculum designs for techvoc education must be attuned to current trends in the business environment. In relation to this professional accreditation bodies must also look into these concerns and must gain consensus in addressing such issues.
2. To improve students' entrepreneurship intentions in Higher Education especially in Community Colleges more entrepreneurial training and opportunities for business training motivation may be designed.
3. Students be provided with more opportunities to participate in internships, cooperative efforts and business opportunities.
4. The curiculum on entrepreneurship education must be improved in such a way that it is geared towards enhancing awareness and positive attitude of students of Community Colleges on becoming an entreprenuer or having their own businesses. Incentives and appropriate facilities for students who strive to be young entrepreneurs must also be provided, whereby private companies may be engaged in developing a business center unit on campus.
5. To further improve the study, future researchers can look further into the effects of attitude, personal background and other norms in influencing entrepreneurship decisions among incoming students and graduating students.

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Innovative Authentic Learning Practices for Technical Education

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Abstract

Globalization and rapid advances in technology have direct implications on the pedagogy we use to train the new generation of knowledge workers and prepare them for employability and lifelong learning. In the past, students only need to learn about the technical knowledge and then apply their knowledge by learning to do through practice, typically in the classrooms, workshops or laboratories. The authentic learning pedagogy takes this further by enabling the students to learn to be a professional in their trade through applying their knowledge and skills in an integrated manner in environments that are either real world or simulated. To achieve this outcome, schools across Institute of Technical Education (ITE) are encouraged to design their curriculum, learning activities and learning spaces to support technology enabled, project-based and team-based learning. This paper shares two such projects to illustrate what it takes to achieve the desired outcomes of authentic learning.

Keywords: authentic learning, workplace task performance, project-based and team-based learning

Background Information on ITE

As the principal provider of technical education in Singapore, ITE is responsible for developing national-level certification and standards to ensure that Singapore's workforce is competitive locally and globally. It was also established as a post-secondary institution under the Ministry of Education (MOE) in 1992, and hence, caters to 25% of the secondary school leavers.

ITE's mission is to create opportunities for school leavers and adult learners to acquire skills, knowledge and values for employability and lifelong learning in a global economy with a vision to be a global leader in innovations in technical education.

To achieve this mission, ITE adopts the "One ITE System, Three Colleges" governance and education model, for policy consistency and quality assurance while empowering the three colleges, namely, ITE College Central, ITE College East and ITE College West, to have autonomy in implementing programs that support their respective niche areas of excellence.

The various program options offered by the Colleges are:

- Full time programs offer National ITE Certification (NITEC) and Higher NITEC certification.
- Part-time programs will lead to a Master NITEC, Higher NITEC, Post-NITEC or NITEC qualification. These are in addition to short courses for skills acquisition and upgrade.

Industry-based Training (IBT) is provided by ITE Approved Training Centers (ATC), Approved Training Providers (ATP) and Certified On-the-Job Training Centers (COJTC). International programs at Higher NITEC and NITEC international certification and customized programs are also offered with overseas partners.

The Pedagogy of Authentic Learning

Authentic learning is a means to connect classroom learning to workplace task performance. In this pedagogy, lecturers have to facilitate various stages of "learning to be" so that students can be transformed from amateurs to professionals.

To design quality authentic learning experiences for students, lecturers should consider the following nine design elements that can provide (Herrington & Oliver, 2000):

1. Authentic tasks as they occur in real life that are ill-structured and encourage a multitude of solutions
2. Authentic contexts that reflect real workplace operations
3. Access to professionals who can demonstrate expert performances and model the right processes
4. Interactions with others for multiple perspectives
5. Collaborative activities to construct knowledge with peers
6. Timely coaching and scaffolding by the lecturer
7. Opportunities for reflection to consolidate learning
8. Opportunities to articulate what they have learned
9. Authentic assessment of competencies based on evidences of task performance

Educational Policy Measures in Place to Support Authentic Learning

The traditional method of training delivery has many limitations that constrain learning outcomes. For example, the layout of training facilities may not align with industry practices. Moreover, students lack the exposure to acquire life skills

necessary to respond to dynamic circumstances in a real world environment. For industrial attachment, there are difficulties getting sufficient meaningful placements for all students. For these reasons, ITE Colleges have decided on a paradigm shift to the authentic learning pedagogy.

To embark on this new initiative, the ITE Authentic Learning Framework depicted in Figure 1, was conceived to guide all stakeholders including management, specialists and lecturers in their implementations. Workplace requirements dictate the design of the curriculum, training environment and assessment strategy. When these foundational elements have been set up, the lecturer can then proceed to design a learner engagement plan that will help students to progress from the basic stage of "learning about" to the next stage of "learning to do", and eventually to the final stage of "learning to be" the professionals in their trade (Drake, 2007).

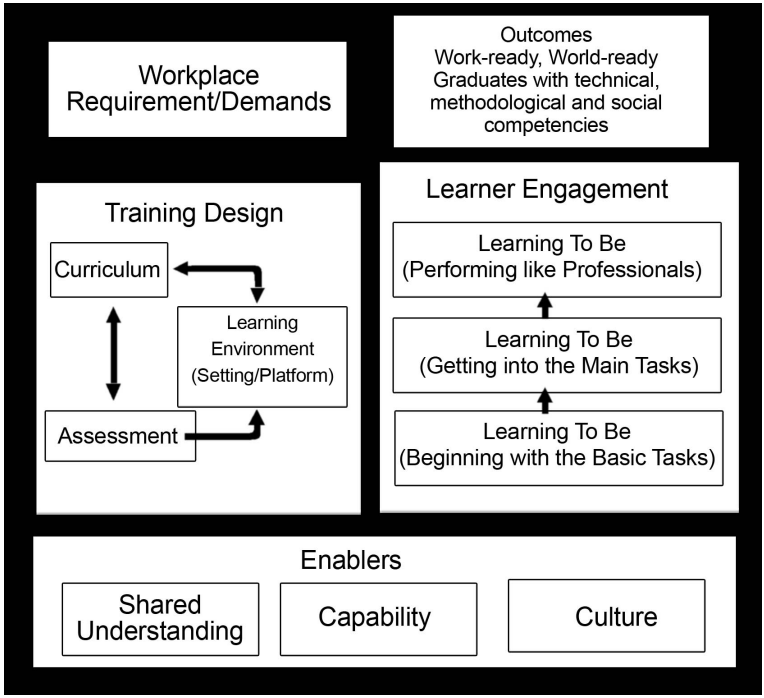


Figure 1: Authentic Learning Framework

For authentic learning practices to become pervasive throughout ITE, a shared understanding can be reached through lecturer capability development and proactive discussions with the lecturers at various communication platforms so that it can become part of ITE's culture. Current practices are being reviewed and new authentic learning approaches are recommended so that innovations continue to drive excellence in the design, development and delivery of ITE courses.

Initiatives in Capability Development of Teaching Staff

The Total System Capability (TSC) initiative provides an integrated approach to develop ITE's human capital through industry projects or consultancy work (Grant, Malloy, Murphy, Foreman, & Robinson, 2010). Under the TSC scheme, there are three levels of competencies:

- Level 1 (Know): Lecturers have the knowledge and skills to fulfil their roles in the organization;
- Level 2 (Do): Lecturers have the capability to apply their knowledge and skills in industry projects or consultancy work;
- Level (Lead): Lecturers have the capability to lead others in industry projects or consultancy work.

The case studies below illustrate the TSC in implementation.

Case Study 1: Idealab

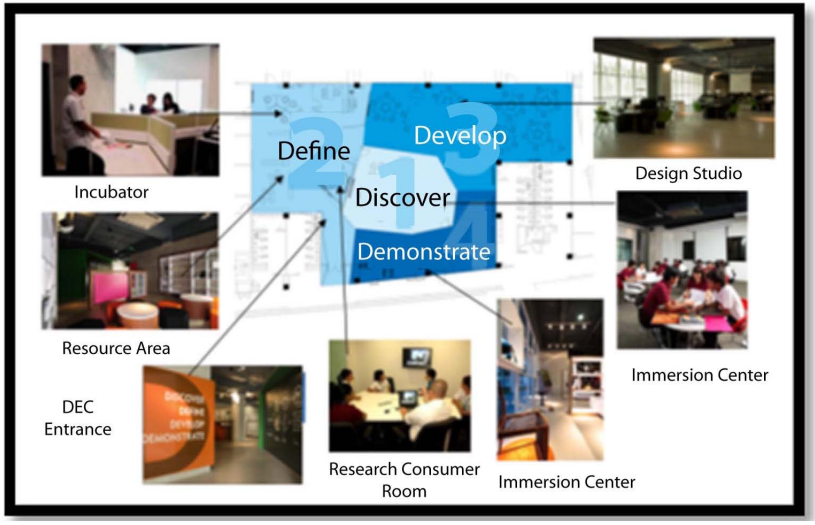
The School of Design & Media (SDM) at ITE College Central, set up the IDEAlab within the Design Excellence Center to develop lecturer capability and a student portfolio by immersing them in real-world projects (Tan & Teo, 2011). "IDEAlab" is the acronym for "Innovation & Design for Enterprise Applications" and "lab" represents the authentic learning environment of the Design Studio in which interdisciplinary teams collaborate on industry assignments. This authentic learning approach fosters the design thinking process (Discover Opportunities, Define Outcome, Develop Ideas and Demonstrate Solutions) as it seeks to develop in students the ability to systematically arrive at solutions to meet client requirements.

The rationale for IDEAlab is to immerse students into the authentic workflow of industry practices, giving them an experiential understanding of the real workplaces and the opportunities to develop industry relevant portfolios (Cambridge, 2010). By working alongside their students, lecturers also have to deal with the complexities of real world problems such as deadlines and resource constraints. This process will develop in them technical competencies that will keep them updated with current industry practices and standard, as well as pedagogical competencies that will enhance their effectiveness in curriculum delivery.

On the other hand, the physical layout of the Design Excellence Center was designed in such a way that the Design Thinking Pedagogy of "Discover, Define, Develop and Demonstrate" is reflected. The following are the different areas of the Center (See Picture 1):

1. Discover Area is a Resource Space with books, materials for design works and computers for online research.

2. Define Area has three unique spaces:
    - Design Pods for students to brainstorm for ideas and discuss design trends, etc.
    - Immersion Studio for Interdisciplinary Design and Business Programs
    - Consumer Research Room with a two way mirror to observe how consumers interact with the prototypes
3. Develop Area is dedicated for commercial design and media production works for external companies.
4. Demonstrate Area consists of Galleries to showcase high quality projects from Foundation Studies, Final Year projects and Design Thinking for Innovation. It has both permanent and seasonal exhibits (e.g. Campaign-based exhibition, product designs)



Picture1: Design Excellence Center at the Tampines Campus, College Central

Pictures 2 to 5 show the respective learning spaces that have been specially laid out and equipped to support the entire authentic learning workflow in Design Thinking.

Picture 2: Discover Area

Picture 3: Define Area

Picture 4: Develop Area

Picture 5: Demonstrate Area

Key features in the curriculum include group and project assignments to create end products that are needed by real clients (Soares, 2010). These features mirror how design teams work in the industry and help students to hone their research, communication and interpersonal skills as well as commitment to create quality products. Projects undertaken by DEC include logo and collateral designs, illustrations, website development as well as prototypes of conceptual designs for lifestyle products or services. Besides providing meaningful context for learning, such industry partnerships also provide suitable resources for innovative curriculum design and open doors to internships and placements.

IDEAlab started in 2011 with projects that aim to build lecturer capability in the following four Capability Clusters: Product and Industrial Design, Architecture and Space Design, Communication and Interaction Design, and Media and Broadcast Design. The current focus is on three growth areas, namely, Urban Solutions, Health and Wellness and Lifestyle Product and Services.

An example of such industry collaboration is the Pink Ribbon Experience at the Breast Cancer Center at Kandang Kerbau Hospital. Six lecturers, together with 41 students, are commissioned to develop the conceptual designs in the redesign of the treatment center to aid patients' recovery. The design was satisfactory and the team was further commissioned to design the center's website and launch video for an opening ceremony. Lecturers from the Interactive Media Design department set the design direction and led the student teams to complete the design work for the website. Lecturers from the Visual Effects department led student teams to create the scripts and storyboards for the launch video. The development work is then passed on to third party vendors.

Case Study 2: Mobile Device Technology Center (MDTC)

Authentic learning within an authentic context brings with it the complexity and unpredictability of the real workplace. Hence, traditional assessment methods are no longer suitable to equitably assess the competences of students. With this realization, lecturers in the NITEC in Electronics (Mobile Devices) department have developed a World-ready Authentic Assessment Methodology (WAM) framework that incorporates peer assessment and real customer feedback as part of the overall assessment of every student (Ng, 2011).

The WAM framework is applied to two specialization modules conducted within the Mobile Device Technology Center (MDTC), namely, Mobile Devices Technology Module (MDT) and Mobile Devices Management Module (MDM). The MDTC, residing in the School of Electronics and Info-Comm Technology at ITE College East, was set up based on ITE's training specifications and incorporated the new authentic assessment metrics. See Pictures 6 and 7 for the layout of MDTC.

Picture 6: Entrance to Mobile Device Technology Center

Picture 7: MDTC set up that resembles a commercial service center

Each of the two modules has 15 hours for mini projects that will be replaced with WAM (Technical Excellence) and WAM (Customer Excellence), respectively. This 30-hour experience at MDTC is equally distributed among four zones (see Table 1) and every student has to take turns to apply their knowledge and skills in each zone to fulfil the WAM assessment requirements.

Table 1: Experience Distribution by Zone

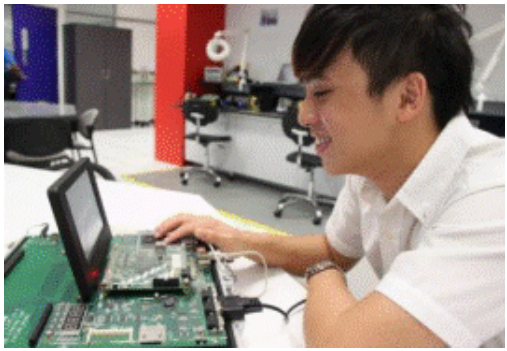
Module	Zone
MDM	Entrepreneurship Capability Building
MDM	Supervisory & CRM Capability Building
MDT	Mobile Device Servicing Capability Building
MDT	Repair and Test & Measurement Capability Building

Before students proceed to the MDTC, they would have covered foundational knowledge through classroom-based activities. At the MDTC, students are exposed to authentic practices with real customers and more complex tasks. Hence, they have to think on their feet, work well with other teammates, and be effective in their communication. Students are given opportunities to reflect on

Picture 8: Supervisory & CRM Capability Building

their performance based on peer and supervisor feedback. (See Pictures 8 and 9 for training in progress)

To ensure valid, fair and reliable authentic assessment, appropriate instruments with clearly defined performance criteria must be communicated to the students and applied consistently. Table 2 compares the instruments used in traditional assessment strategy and world-ready authentic assessment methodology.



Picture 9: Mobile Device Servicing Capability Building

Table 2: Traditional Assessment Strategy vs. World-Ready Authentic Assessment

Academic Assessment (Learning about / Learning to do)Theory & Practical Assessment	WAM Competencies Components (Learning to be) Authentic Assessment
1. Assignments	1. Constructivist Assessments
2. Class Test	2. Peer Assessments
3. Phase Test	3. Report Writing
4. Examination	4. Performance-based Evaluation

The WAM framework consists of the following components:

1. Constructivist Assessments: Clearly defined taxonomic levels and rubrics are used to grade student's ability to select an appropriate solution and complete the necessary tasks in order to resolve the problems presented by the customer (Dannelle & Antonia, 2005).

2. Peer Assessments: Peer evaluation encourages active discussion among a community of learners and can be a powerful social motivator for students to perform well (Roberts, 2006).

3. Report Writing: Evaluation is based on how well the student has thought through his/her choice of solution to a problem by carefully considering the various options available to him/her. Students are encouraged to reflect and make recommendation for improvement where applicable.

4. Performance-based Evaluation for Self-directed learning: Evaluation is based on observations that include a student's commitment to the group goals, participation in discussions, meeting deadlines, providing and receiving feedback, quality of work and the number of complaints received (Burke, 2005).

Initial feedback from students who have undergone training at the MDTC was encouraging. Students who were surveyed agreed that WAM has benefited them because the assessment design and criteria actually gave them a clear understanding of the learning objectives and in turn determined their performance at the center. They also felt that they were better prepared for the workplace than before and appreciated the opportunities for reflections, feedback and recommendations for areas for improvement.

Major Challenges in Adapting Authentic Learning Practices and How ITE Addresses them

Several challenges confront the implementation of authentic learning practices, one of which is changed mindset, especially among older lecturers who are used to the traditional mode of training delivery. Another is the huge investment in overhauling existing training facilities, so utmost care has to be taken when conceptualizing the design for the set up to ensure positive learning outcomes. Lastly, for real changes to take place, specialists from cross-functional divisions, namely, curriculum, assessment, educational development and learning technology support, must take up the challenge of working hand in hand to provide a holistic and systemic solution.

To address these challenges, a cross-functional committee comprising of representatives across academic divisions conduct periodic reviews of ongoing authentic learning projects. These reviews provide critical learning points on the effectiveness of particular authentic learning approaches and the relevance of particular authentic learning environments. The critical success attributes of exemplary projects are highlighted so that academic departments in the Colleges will gain insights and possess the know-how to further extend authentic learning practices to other courses.

Furthermore, review exercises when conducted with external experts; provide opportunities for lecturers to keep abreast with the latest development and requirements in their respective industry. An example is the case for nursing where METI mannequins provide simulations that require nursing trainees to respond appropriately to the different medical conditions of their "patients". Doctors from Changi General Hospital participated in the peer reviews of all the scenarios developed for the training sessions for validity and clinical accuracy. The doctors' feedback is a form of knowledge transfer to ITE lecturers.

Besides building up their domain capability, lecturers also have to consider how authentic learning pedagogic approaches can be better organized to achieve optimal learning outcome. Examples of good practices implemented as a result of such consideration include the reflective learning approach adopted by the nursing and aerospace courses to support deep learning and authentic assessment.

Future Plans

The journey of implementing authentic learning practices in ITE has only just started. There are variations in the quality and scope of current implementations. It is instructive for ITE to continually document and share best practices learned from successful projects to inculcate shared understanding and promote a culture that can sustain the application of the authentic learning pedagogy.

Future plans include formalizing the Authentic Learning Framework as ITE's unique pedagogy that guides all academic processes. A support system consisting of professional development courses, consultancy, help resources and evaluation tools will be set up to assist academic departments in designing and implementing authentic learning in their courses. Concurrently, specialists from the curriculum and assessment divisions will review existing curriculum and assessment strategy for better alignment to the new pedagogy.

Sharing sessions on best practices and knowledge transfer will be promoted by a community of advocates at various platforms such as ITE's Annual Teachers' Conference and International VTE Conferences. Training courses with authentic environments can also be showcased to the public, starting with the new HQ and College Central campus by 2013. Such showcases can inspire both lecturers and students to be engaged in this innovative method of teaching and learning.

Conclusion

ITE believes that the authentic learning pedagogy not only motivates students to learn but also provides a way to adequately prepare them for their industrial attachment. When interns are ready and can contribute right away, this creates a positive impression of ITE students and paves the way for future placements.

Authentic learning approaches are more holistic, enabling students to gain technical, methodological, social and personal competences. These competences will help ITE students to graduate successfully and be assured of employment and subsequent career upgrades through lifelong learning.

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Humanistic Skills Training and Job Opportunities in Small and Medium Industries for National Dual Training System Trainees

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Abstract

The National Dual Training System (NDTS) is a dual training apprenticeship system which involves skills training in a company and a training center. The NDTS was introduced to produce workers based on industry demand, thus reducing the problem of mismatch. NDTS uses self-reliant learning and action-oriented approach to develop apprentices with knowledgeworker occupational competences comprising of technical competences, social and human competences, and learning and methodological competences. Malaysia has been implementing the NDTS since 2005, but the types of skills provided by industries especially in manufacturing sectors were not identified. Therefore, this research was conducted in order to identify the most important elements of humanistic skills training and job opportunities which have been provided by Small and Medium Industries (SMI) for NDTS trainees which will consequently produce knowledge-workers (k-workers).

A quantitative research methodology had been used for this study in collecting and analyzing the data. The data was collected through a set of questionnaire and all of the 50 trainees comprising the first batch were taken as respondents. The reliability of the questionnaire had been tested using an Alpha Cronbach set to 0.904 values. The humanistic skills identified by the students were personal leadership, personality development, social integration, work management, and self-discipline. The personality development and work management revealed the highest mean (4.34) while the social integration showed the lowest mean of 3.74. The highest mean accounts for the reason that SMI's workers give priority to knowledge in work management and personality development as well but giving less importance to social activities. SMI had provided four levels of job opportunities offered namely, engineers, technicians, production operators and general workers. Based on the findings, it is recommended that future research on humanistic skills be conducted

such as humanistic skills for the novice technician and the type of skills for different workers in the SMI.

Keywords: National Dual Training System (NDTS), humanistic skills training, job opportunity, trainees

Introduction

In tandem with the fast global development, the country must prepare itself by making sure that the number of workers is sufficient to meet the needs of industries. It is important to have knowledgeable workers in order to enhance knowledge-based-economy as advised by the government (Ministry of Human Resource, 2006). To meet such demand, the government has planned several strategies and allocated 20.6% of development budget in the 8th Malaysia Plan (RMK8) for education and training (Ramli Rashidi, 2008a). In the 9th Malaysia Plan (RMK9), the government has given out RM 45.1 million for education and training especially for skills training which was first introduced in Malaysia in 2005 known as the National Dual Training System (NDTS). The word 'Dual' in the training context means participants will go through industrial training and at the same time will learn the theories at training institutions (Loose, et al. 2008a; Deisseinger, 2001 and Walter and Schmidt, 1998). The learning process that occurs through dual system approach requires the participants to be present at both institutional and industry by the turn. NDTS is a system that can provide skills training in order to produce workers with advanced skills.

In addition, the implementation of NDTS can also help in preparing skillful workers in the country, that is, knowledge-worker (k-worker). In producing a k-worker, NDTS is the most recent and comprehensive system which meets the current industrial needs. The NDTS approach can reduce the problem of producing skillful workers who do not meet the current needs of industries and can give exposure about real job situations in industries (George, 2007a; Wan Seman Wan Ahmad, 2007; Rahim M. Sail, et al. 2007a and Department of Skill Development, 2006). In addition, it can also help to overcome unemployment (Loose, 2008b and Yogessvaran, 2005a) as industries nowadays require workers who have advanced skills in handling operations especially in the SMI.

The SMI is an important industry that makes up 84% of the manufacturing sector in Malaysia and plays a crucial role towards the country's economic development and enhancement (Mustaffa Kamal Mohd Nor, et al.2005) that leads the country to become an industrial country (Mohd Yusof et, al. 2002). Fast development in the manufacturing sector since 1980s has put SMI as the main runner in conducting various manufacturing activities (Mohd Asri Abdullah, 1995a). Therefore, with the country's accelerating economic development, more contribution from SMI in terms of skill training preparation and employability opportunities is very much needed.

Recently, the contribution and role of the SMI are significant to a number of fields, namely, the industry organization, total number of employment and production values. Besides, the most common view about the SMI is that it opens more job opportunities to the public together with skills training provision. This is because the SMI is capable of using human resource intensively in their production technique if compared to bigger firms (Mohd Asri Abdullah, 1995b). This, directly, provides job opportunities in production function and the SMI operations. According to SMIDEC 2004 report, it was found that the SMI covers 92% of the total number of companies registered in Malaysia, that is, 689. 160 and provide one third of total employment in Malaysia.

Background of Problem

Technological change in both the global and national level has affected the country's need for skilled workers and recent skill training system that produces a k-worker. Nevertheless, the implementation of NDTS by private companies was found to be not so encouraging among industries, especially in the SMI (Najib Razak, 2007). In addition, those incentives must be reviewed and improvized. It is clear, then, the issue of skill training in order to secure a job and meet the employer's expectation is not an easy task. To ensure the success of such implementation requires cooperation from all parties in the country.

Skill training program provision is to establish skills by giving basic knowledge regarding the real working condition (Ferguson, 2007a). However, this program cannot be put under the government's responsibility, it is the industry itself which can detect the changes in the demand for workforce (Shackleton, 1997). The effect of these changes have caused the training centers to be outdated in the technology development. One question remains unanswered, thus, to what extent the training provided is capable of enhancing the organization's production performance? (Rahmah Ismail, et al. 2006a). So, there is a need to bring forward a training system that involves both the government and industries (Fong Chan Onn, 2000). To realize that intention, Malaysia must introduce a skill training system that involves industry and can produce skilled workers.

Industry nowadays not only requires workers who have skill in technical field, but also other areas including workability skill (Wan Seman Wan Ahmad, 2007 and Yahaya Buntat, 2004). This skill includes being knowledgeable, having technical, humanistic and collaborative skills (Fong Chan Onn, 2007; George, 2007b). However, mismatch between graduates' skills and job opportunity being offered by industry is also a problematic issue in the SMI (West, 2008a; Jackson, 2008a and Kraemer, 1993a). Some industries complain that many job applicants do not possess skills that are parallel to the industry's need. Yogeesvaran (2005b) found that 40% of graduates who qualified did not meet the industry's expectation and need.

According to Ramli Rashidi (2008b), the industry's need in Malaysia has changed over the years. Nowadays, its industry needs many skilled workers, with advanced and expert skills in a job area. Because of that, Malaysia must prepare a systematic training that can fulfill the industry's need (Ramli Rashidi, 2008c; George, 2007c and Rahmah Ismail, et al. 2006b). The role of the industry must widen since only they know the real situation in terms of specific skills for a certain job (Ramli Rashidi, 2008c and Fong Chan Onn, 2007b). Moreover, training facilities and expertise at industry must be fully utilized to produce k-worker.

Findings from a research by Rahmah Ismail, et al. (2006c) show that there are several causes that lead to problems in workforce source particularly in the manufacturing sector. The most common concern is the lack of skilled workers in operating industries especially in SMI. Such phenomenon illustrates that the lack of skillful workers creates problems in the SMI development (Pukkinen, et al. 2001). Apart from that, Wan Liz Osman and Sulzari Muhamad, (2002a) claimed that the SMI's involvement in providing skill training was disappointing, which shows that there is a problem in developing workforce resource (Ramlah Ismail,et al. 2006d). Therefore, the Malaysian government must double its effort to produce a good quality workforce and fulfill the industry's expectation. K-worker refers to a worker who possesses a variety of skills. Due to that, the researchers of this paper carried out a research to identify types of skill training preparation at SMI to NDTS trainees based on the questions a.) what elements of humanistic skills training does the SMI provide to NDTS trainees?; and b.) what are the job opportunities provided by the SMI to NDTS trainees?

Literature Review

Industrialization is a platform of economic strength and considered as the main force for the country's development. The process goes through certain levels which are agricultural base before the 1960s, to intensive labor and export in the 1970s. Industry needs large capitals, advanced technology and requires many skilled workforces. Industry or industrialization can be defined as a process that enhances the industry's contribution and roles. The manufacturing sector is believed to have contributed additional necessities to the country, thus, many companies have been involved. This means industrialization in a factory or manufacturing sectors play important roles in uplifting the economy especially in SMI. The three most important skills are knowledge skill, technical and humanistic skills. However, the problematic issue for the industry is the mismatch between knowledge, technical and humanities skills that a person has with the job being offered (West, 2008b; Jackson, 2008b; Yogeesvaran, 2005c and Kraemer, 1993b). Ferguson (2007b) mentioned that the mastery of these skills could be overcome through skill training program. Nevertheless, such program is few in number especially at the SMI (Ramlah Ismail, et al. 2006e), and even if there is, the involvement of SMI is frustrating (Wan Liz Ozman and Zulhari

Muhamad, 2002b). Literature review shows a gap in which there is no research conducted to study types of preparation for SMI training program to NDTS trainees in Malaysia.

The SMI plays important roles in the country's economy. Among them is the absorption of less-skilled human resource. SMI is established as one of the strategies to support existing flow of labors. This is because many SMIs are labour intensive and as such could provide more job opportunities (Mohd Asri Abdullah, 1999 and Malaysia Planning Report (2006-2010). SMI is also the foundation for the new industry growth and encourage entrepreneurship culture. Pukkinen, et al. (2001) claimed that SMI's role as a skills training place for workers and producers cannot be denied. The three crucial aspects that cover capital investment were formal education level and workers' skills. SMI provide skill training to those who are less-privileged and do not have opportunities for other training (Rahmah Ismail, et al. 2006f). Indeed, by developing SMI training, it helps to intensify local entrepreneurs' involvement in industrial field (RMK-9, 2006-2010), particularly by participating in NDTS.

The word 'Dual' in this training context means carrying out activity at industry and at the same time to learn theoretical part at training institution (Loose, et al. 2008). At training institution, students are not exposed to only the theoretical aspects of the job scope, but also taught general knowledge such as trade and current issues. NDTS is introduced for the purpose of preparing the country's workforce (k-worker) through a comprehensive and updated training which fulfill the current demand of the industry. NDTS targets and encourages school leavers, together with industrial workers from company who are interested to participate in this program. NDTS involvement is mostly from the SMI or Multinational Company (MNC). In implementing this system, 500 apprentice began their training in 2005 and this number doubled every year until it reaches 16,000 by the year 2020.

Methodology

A quantitive reseach methodology had been used because of the sample and the objective of study. Gay (1996) stated that the purpose of descriptive study is to get information about the current and ongoing activities. Researchers also believed that descriptive study is the accurate design and in order to explain the skills training provided by the SMI to NDTS trainees. All the data had been gathered from respondents through a set of questionnaire which had been tested properly. Factor Analysis Test Method had been used in identifying the type of skill training provided by the SMI to NDTS trainees. Therefore, only meaningful variables were searched and selected. Researchers had shortlisted according to their creativity. Therefore, it is clear that factor analysis could be summarized and could validate the data. Researchers also had used the factor analysis because the

total number of items for each skills training provided was different. Each element of skill training was different. "Principal Axis factoring" method with round "Varian with Kaiser Normalization" and Eigen values exceeding 1.0 were used. For the reasons, researchers had used the quantitative research methodology and descriptive study for collecting and analyzing our data for this research.

Findings and Discussions

Humanistic Skills Training Provided by SMI to NDTS Trainees

Humanistic skills were related as socialization skill, leadership, and self-adaptation to culture and environment. Basically, the elements of humanistic skills were self-leadership, personality development, social integration, self-discipline, and problem management. There is a big gap in fulfilling humanities skill (Siti, Z. Omel, et al. 2007), which means the worker has still not achieved the humanistic skill level as required by the companies. Since it is the most difficult to master, the company provides humanistic skill training for NDTS trainees. Rahim M. Sail, et al. (2007b) says that skill in a leadership can motivate, lead and support in accomplishing a task. His research is in accordance to this particular study which showed that self-leadership was important to ensure self-discipline and has positive attitude towards changes. The company encourages the trainees to work independently and to be responsible towards their action. The elements of humanistic skills are shown below.

Table 1: Elements of Humanistic Skills Training

Elements	Num.
Self-leadership	6
Personality development	3
Social integration	3
Work management	4
Self-Discipline	2
Total	**18**

Table 1 shows the total of elements for humanistic skills training. The elements are self-leadership, personality development, social integration, work management and discipline. The element of self-leadership is the highest and discipline is the lowest of elements. Personality development is the highest level of humanistic skill training provided by company if compared to other types of skills. In this element, teamwork and learning from mistakes are much emphasized by the company. In addition, self-confidence which is based from previous successful achievement and positive self-value is also provided in the training (Yahaya, 2002 and Zainudin, et al. 2001). Trainees who have self-discipline are able to motivate, initiate and have self-confidence. The first elements of self-leadership had been analyzed and are shown in Table 2.

Table 2: Elements of Self-leadership

Num.	Elements	Mean
1.	Company provides training on self-discipline	4.16
2.	Company provides training on positive manner towards change	4.36
3.	Company provides training to act independently	4.02
4.	Company provides training on sincerity	4.48
5.	Company provides training on being responsible to any action taken	4.38
6.	Company provides training on cooperation	4.42
	Average of mean	**4.30**

Table 2 shows the six elements of self-leadership. The elements include self-discipline, positive manner toward change, acting independently, sincerity, being responsible to any action taken and cooperation. The table also shows that "sincerity" is the highest mean where the company had provided more training in sincerity compared with others elements especially the elements of "act independently". Working in a group is important in the training in order to prepare them to work effectively. It involves generating ideas and solving problem as well as respecting the opinion of others in a group. The training had been provided for them in order to be honest at work, and improve on self-management and time management. These elements will instill positive attitudes in themselves. The second element of humanistic skill training was personality development. All the elements had been analyzed and are shown below.

Table 3: Elements of Personality Development

Num.	Elements	Mean
1.	Company provides training on learning from mistake	4.48
2.	Company provides training on self-confidence	4.02
3.	Company provides training on team work	4.52
	Average of mean	**4.34**

Table 3 shows the three elements of personality development that had been provided by the company to the trainees. The elements are learning from mistake, portraying self-confidence and team work. The table also shows that the elements of "team work" got the highest in training which was provided by the company and the lowest is "self-confidence". The third element of humanistic skill training is social integration. All the elements had been analyzed and are shownin Table 4.

Table 4 shows the three elements of social integration. The elements include "making consultation with others", "mixing with others and a course on overcoming disciplinary problem". The average of mean was not high (only 3.74). The table also shows that the element of "mixing with others" is the highest training provided by the company and the lowest was "disciplinary problem". For

Table 4: Elements of Social Integration

Num.	Elements	Mean
1.	Company provides training on making consultation with others	4.10
2.	Company provides training on mixing with others	4.18
3.	Company sends trainee with disciplinary problem on a course to overcome it	2.94
	Average of mean	**3.74**

this reason, the company should be aligning the training in some elements of the social integration skills. The third element of humanistic skill training was "work management". All the elements had been analyzed and are shown in Table 5.

Table 5: Elements of Work Management

Num.	Elements	Mean
1.	Company provides training on being sincere in work	4.56
2.	Company provides training on self-discipline	4.40
3.	Company provides training on self-management	4.20
4.	Company provides training on time management	4.20
	Average of mean	**4.34**

Table 5 shows the four elements of self-discipline. The elements include being "sincere in work", "self-discipline", "self-management" and "time management". The average of mean was high where the company had provided the best training to the trainees. The table also shows that the element of "being sincere" in work is the highest (4.56) and the two lowest elements were self-management and time management. The fourth element of humanistic skill training is self-discipline. All the elements had been analyzed and are shown below.

Table 6: Elements of Self-discipline

Num.	Elements	Mean
1.	Company provides training on adapting to all regulations	4.22
2.	Company provides training on respecting other group member's view	4.30
	Average of mean	**4.26**

The table shows the two elements of team work. The elements are adapting to all regulation and respecting other group member's view. The average of mean is high where the element of respecting other group member's view is the highest than adapting to all regulation.

The company had also integrated the elements at the intermediate level. The trainees who have problematic issues will be sent to a special course to overcome such situation. Normally, the company will solve the issue internally, unless it

involves serious criminal case. This approach might be different from consultation training as the company puts that at higher level skill training. Besides that, humanistic skills was the most difficult to obtain, whereas skill which is more specific is much easier through training. In the research involving 10 companies in Europe, three types of skills have been identified through gap analysis, which are humanistic, conceptual and technical skills. It was found that the largest gap that needs to be fulfilled is humanistic skill.

Job Opportunities Provided by the SMI to NDTS Trainees

The finding shows that the company had provided four categories of job opportunities. The jobs include engineer, technician, production operator, and general worker whereby the largest percentage of opportunity was technician, followed by production operator, general worker and engineer. The technicians are classified into welding technician, industrial technician, and machining technician. The production operator covers job as tool maker, dress maker, and fiberglass boat makers. The general worker includes ironsmith, batik maker, general machinery, and marketing representative. Job opportunities for engineers were the least available which involved engineering and supervision work. All the job opportunities provided by the SMI are shown below.

Table 7: Job Opportunities Provided

Num.	Job Opportunity	Number	Percentage (%)
1.	Technician	24	44
2.	Production Operator	15	27
3.	Production Operator	12	22
4.	Engineer	4	7
	Total	**55**	**100**

Table 7 shows the list of job opportunities offered by the SMI. The job as a technician has the highest opportunity compared to another job and position, while engineer has the lowest opportunity. There is a vast opportunity in industry especially in the manufacturing sector because the training conducted matches the acquired skills. Jobs such as welder, machine and industrial technician are the most in demand in Slovenia. This is true not only Slovenia, but also in Malaysia which needs such jobs in the manufacturing sector in SMI. According to Zulkifli Mohd Sidi and Syed Johan Syed Ali (2005), there are several levels of workers required by the employer in operating their manufacturing industry. Among the priorities are operator, assistant technician, technician, supervisor and engineer. This shows that the findings agree with other researchers. All employers concluded that they need workers who are not only skillful but who also have good academic qualification.

Conclusions

The humanistic skills identified by the students were self-leadership, personality development, social integration, work management and self-discipline. The main element of self-leadership was categorized by five elements. The elements were self-discipline, positive manner toward change, to act independently, sincerity, being responsible to any action taken and on cooperation where the element of self-discipline had been provided as the most important training by SMI compared to another element of skill. The second main element was personality developments. The main elements were categorized by three. The elements were learning from mistakes, portraying self-confidence and team work where the element of learning from mistakes had been provided as a most important training by SMI compared to another element of humanistic skill. The third main element was social interaction. The element was categorized by three elements. The elements were making consultation with others, mixing with others and disciplinary problem to course to overcome. The element of making consultation with others had been provided with the highest priority of training for the trainees and the element of disciplinary problem to course to overcome was the lowest. The fourth element was work management. The elements were being sincere in work, self-discipline, self-management and time management. The elements were being sincere in work had been provided as a most important training by SMI compared to another element of skill. The last main element was self-discipline. The element was categorized only by two. The elements were adapting to all regulation and respecting other group member's view where the elements were adapting to all regulation had been provided as the most important training by SMI compared to another elements of skill.

The elements of self-leadership, personality development, social interaction, work management and discipline had been provided by the SMI. All the elements were very important for the trainees. The SMI had also provided some job opportunities to those who have the skills whether as an engineer, a technician, a production operator or a general worker. Based on this knowledge, future researches about the skills and on SMI could be undertaken. The research may deal on humanistic skills of novice technician and the types of skills for different workers in SMI.

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Towards a New Architecture of Sustainable TVET Financing: Some Issues, Concepts and Strategies

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Abstract

This paper underscores the need for a sustainable TVET (Technical and Vocational Education and Training) financing and its significance in bringing about improved effectiveness, efficiency, transparency, relevance and confidence in TVET systems in many developing countries. To achieve this goal, one of the biggest challenges ahead is the sustainable financing of the reform process and of the actual operation of the TVET system. The main underlying principle is the need for efficient and effective use of diverse resources in order to be able to provide more and better training to the youth.

The paper also provides insights on some guiding principles, implementation strategies, mechanisms and instruments and some initiatives for performance based funding for sustainable TVET financing.

Key words: sustainable financing, TVET reforms, financing patterns, mobile society

Introduction

The sustainable financing of TVET is often complex and dependent on various facets. In most of the developing countries, the state plays a predominant role in the financing and provision of TVET.

In terms of accountability, it is stipulated that TVET in the region is not based on performance or outcomes. TVET operates without monitoring results and with quantitative expansion (input based financing) as their main strategic objective. It is also noted that TVET institutions have weak incentives for change and relevance, having guaranteed public subsidies.

Hence, TVET has become an increasingly important issue among its policy and decision-makers in most of the developing countries. In any TVET reform initiative, quantitative increase is expected to be accompanied by quality improvement, which will require new occupational standards and curricula, modern training equipment, more and updated training materials, more and competent teachers/instructors, etc. All these require more resources to be mobilized.

In this context, there is an urgent need for conceptualizing and implementing new sustainable financing architecture, instruments and mechanisms and mobilizing additional resources (from both public and private) to appropriately and sustainably fund any planned TVET expansion and quality improvement.

Context and Purpose

Any new venture for sustainable TVET financing must be able to provide a set of principles and standards that will assist TVET leaders and stakeholders to develop, improve, reform and assess the present financing system for TVET system. The framework should be flexible in order to respond to the varying needs and circumstances. It needs to be capable of application at both the central level (macro) and TVET training provider levels (micro), and it should aim to bring benefits such as improved effectiveness, efficiency, transparency, relevance and confidence in TVET systems within and across its various sub systems.

Whenever we talk about TVET and economic development, we generally cite examples of countries such as South Korea, Taiwan, Singapore, Hong Kong, Japan and Germany. Their cases show that the improvement of human capital played a pivotal role in advancing economic and social development. In the case of South Korea, this includes advancing from a largely agrarian to an industry-based economy. In all these countries the development of middle level skilled workers to satisfy the labor demand of the different sectors of the economy was a vital factor.

In this context, in all the developing countries it is important to build a demand-driven, flexible, integrated and high quality TVET system. The need is to involve all stakeholders in the planning, policy making, training delivery and monitoring and evaluation of the TVET system. The on-going reform should seek to increase the engagement of the private sector – both of private TVET providers and enterprises as future employers of TVET graduates – and to provide students and trainees with knowledge, skills and abilities relevant for the world of work. To achieve this goal, one of the biggest challenges ahead is the sustainable financing of the reform process and of the actual operation of the TVET system. The main underlying principle is the need for efficient and effective use of diverse resources in order to be able to provide more and better training to the youth.

The 3rd TVET World Summit held in Shanghai, China from 13 -16 May 2012 provided significant inputs on the development of TVET. It was organized in eight themes such as:

1. Skills development for youth employment: Youth unemployment can be traced back to a number of economic, political and social factors. It is now commonly accepted that youth unemployment is a structural concern that requires long-term solutions. In the skills development field, a mismatch between

demand for skills and the lack of appropriately skilled young workers has often been a root problem.

2. Building the responsiveness of TVET systems: It is generally accepted that quality TVET must be responsive to changes in the demand for skills, whether these are economically, socially or politically generated. The employers' responsibility in terms of responsiveness to the changes in TVET's programs, projects and activities is growing. There are also questions regarding the extent to which TVET responds to the needs of individuals and communities, as well as for self-employment, complex livelihoods and non-wage work.

3. Revisiting TVET funding and enhancing efficiency: TVET is under heightened pressure to demonstrate value for money. Recent years have seen increasing use of a diverse range of funding mechanisms and diversification of sources of financing for TVET, as well as a growing emphasis on relating payment for provision more closely to learning and outcomes in the world of work.

4. Tackling social inequities and exclusion: TVET should promote the skill of all learners regardless of gender, class, ethnicity, age or other social characteristics. While TVET can empower excluded individuals and groups both economically and socially, skills are only one aspect in promoting social inclusion, so TVET policies need to be located within wider public policies.

5. Changing governance and widening stakeholders' engagement in TVET: Many TVET reforms have resulted in the development of new national organizations and new coordination and oversight structures. Attention is often given to the involvement of employers, while at the same time there is growing emphasis on the importance of making TVET more accountable to other stakeholders such as learners, parents, unions, communities and elected representatives.

6. Promoting innovation and sustainable development through TVET: TVET has a valuable role in contributing to economic and social innovation. The rise of the sustainable development agenda suggests that TVET must engage more systemically with social, cultural and environmental issues, in terms of its own ways of working, its contribution to sustainable development, and in response to new skills needs.

7. Achieving better quality teaching and learning: The multiplicity of learning sites and modes in TVET brings policy challenges for achieving better outcomes of teaching and learning. There are very wide differences in TVET learning opportunities across sectors and occupations. In the formal TVET sector, there is a growing awareness of the changing role of teachers and trainers and the need for a systemic view of staff development needs, qualifications, career paths and remuneration.

8. Qualifications systems for connecting skills development and lifelong learning: There is a growing realization that learning takes place in multiple settings that go far beyond formal TVET. This requires establishing flexible and open learning and qualifications systems able to reduce the barriers between education, training and work, and to increase access and progression in initial and continuing TVET.

All these eight themes are related directly to the financing mechanisms and instruments and mainly tackle issues of equity, quality, relevance, efficiency and effectiveness of the TVET systems and its delivery.

The issue of financing is directly related to the overall status of the TVET sector. It is related to the quality, relevance, equity and governance of the TVET system as a whole. The following eleven necessary conditions/elements (but not limited to) should also be considered while formulating and implementing a successful sustainable financing TVET system.

Guiding Principles (4Ps, 4Es, 4Cs and 4Vs) for Sustainable TVET Financing

There is now considerable agreement among TVET policy planners and leaders on what are the major ingredients for success in the National TVET Policy. For national training systems, to successfully achieve the aim of meeting the skills needs of the economy, society and of individuals, five factors should be present: (Ziderman, 2001)

1. Effective: offering meaningful, quality skills development, avoiding time-serving and irrelevant training
2. Efficient: avoiding high cost, inefficient provision
3. Competitive: to counter supply-driven training tendencies and facilitate the development of training effectiveness and efficiency
4. Flexible: technically able in the short term to change the scope and direction of outputs - training provision - if necessary
5. Responsive: designed to be responsive to the changing demands of the market and needs of the economy.

Ziderman (2001) also articulated that a sustainable TVET finance mechanisms, in addition to supplying funding for the National TVET System, also have a central role to play in achieving the above five overall policy objectives.

Financing mechanisms and instruments are powerful tools to shape the social and economic impact of the TVET system: the way a country chooses to finance its TVET system has a significant impact on its governance, direction, equity, quality, efficiency and relevance. This will influence the potential of TVET to foster fair social and economic development and – ultimately – to reduce poverty.

The Four Ps for TVET Sustainable Financing:

1. Performance - creating the right incentives for better results, excellence and quality
2. Partnership – creating the right environment for active involvement of the private sector and communities in governance, financing and delivery
3. Positioning – lifting the status of TVET in the society
4. Poverty Alleviation - assuring attention to the poor (excluded should be included)

The Four Es for TVET Sustainable Financing

1. Excellence – achieving and assuring quality and relevance
2. Effectiveness - fulfilling national developmental goals
3. Efficiency – increasing outputs and outcomes per unit costs
4. Equity - degree to which students from different background have access to good quality training.

The Four Cs for TVET Sustainable Financing

1. Competition – incentives/rewards based on agreed evaluation mechanisms.
2. Cooperation – fair and transparent collaboration amongst all stakeholders (private, public and communities)
3. Consistency – quality assured and reliable training delivery
4. Commitment – long term funding assurance from all the stakeholders

The Four Vs (related to TVET courses) for TVET Sustainable Financing

1. Value (benefit/cost)
2. Velocity (speed, flexibility, agility)
3. Volatility (uncertainty in demand, risk management)
4. Variability (market signal/outcome based)

The choice of any sustainable TVET funding mechanisms should have leverage on the achievement of national development goals and objectives (effectiveness, commitment factors), on outputs and outcomes per unit costs (efficiency, value factors) and on the degree to which students from different backgrounds have access to good quality training (equity, consistency factors). They should also assure the quality and relevance of the products (excellence, performance factors).

Similar factors using the three P's (poverty, performance, and partnership) and three E's (equity, efficiency, effectiveness) were also introduced by Adams, A.V. & Mulaw D. (2007) and Gasskov, V. (2007) as a frame of reference for TVET Financing.

TVET should be a holistic undertaking to develop the "complete TVET graduate" with the passion for what they do and with confidence and care for the community and society. These attributes underpin a comprehensive TVET where the environment is competitive. TVET should also integrate theory with practice through coursework, projects, industry partnership (cooperation), community service and global education with the intent to produce committed graduates that possess employable characteristics such as: market-relevant, enterprising and adaptable as lifelong learners in a global economy. The reliability and its consistency are judged by its quality assured programs.

TVET, in most societies is productive, mobile and competitive, but in most developing countries, TVET is still a second priority. TVET students are considered to have much less status than those in the mainstream academic path. Another misconception is that TVET courses tend to draw students of less academic ability (and from more disadvantaged income groups). Currently, TVET is still an undervalued part of the total education system despite its importance of improving the economic and social situation. From the perspective of a TVET development worker, a critical question becomes 'How do we effectively and efficiently manage our TVET development initiatives to ensure a balance of the 'Three Es' – Economy, Environment, and Equity – in governance, decentralization (empowerment) and development?'

Sustainable TVET Financing for Developing Countries – Some Implementation Strategies

In the past, the analysis of financing patterns used to focus only on collection and allocation mechanisms. Now, these concerns are being linked to the wider question of organizing TVET systems and particularly with the sharing of responsibilities between key stakeholders (private, public and communities). The question of supply driven and demand-driven systems is clearly too simplistic in the TVET sector. The performance of a TVET system as a whole and its capacity to meet the needs of both the market and individuals require that interfaces be set up between the supply and the demand side. In this context, intermediary bodies, such as groups of employers, trainees, government and communities have an important role to play in achieving a balance between needs and provision through constant consultation and dialogue.

Hence, sustainable financing strategies for developing countries should be taken as a part of a broader effort to engage all concerned parties, particularly industries/ employers and learners, in a dynamic process of skills acquisition. Achieving such a mission requires maintaining a careful balance between incentives and constraints in TVET financing according to national circumstances. Generally the debate on sustainable TVET financing typically turns around two key questions (Atchoarena, D. 2009):

1. Who pays for skills development in running a TVET institution?
2. What mechanisms can be put in place to develop and implement a sustainable financing framework for running TVET programs? What works best, in particular as far as spending public money is concerned?

The new skills requirements linked to globalization, the constant search for competitiveness, quality, equity and relevance and the preservation of social cohesion clearly require new sustainable TVET funding mechanisms and instruments.

Financing Mechanisms and Instruments

Traditionally, governments directly finance TVET providers and training delivery. Financing mechanisms and instruments are generally seen as a way to mobilize additional resources. Payroll taxes and training funds constitute the most significant attempt to involve industry in the financing and regulation of a training market. Financial arrangement can also contribute to improving the efficiency of public spending. They are often part of a broader body of reform inspired by the new public management principles.

1. Establishment of a Central Training Funds and Provincial/District Training Funds

Training funds are powerful tools to expand training provision. These will stimulate employers' investments in training and skills development and will contribute to the establishment of a market for training when resources are also allocated to private providers, which can lead to a competition between public and private providers. This system cannot operate on a sustained basis without sufficient support from the industries, employers and communities. It is, thus, required that the industry and the employers be willing to participate in contributing to the Training Funds. Government policies should encourage enterprises to invest in skills and subsidize the cost of this investment through various measures. The incentives may vary in their impact on the actual amount of training done. These funds could also reimburse enterprises for the cost of qualified training undertaken. A co-funding arrangement is highly dependent on the existence of sufficient participating enterprises. In addition, contributions by the enterprises and redistribution mechanisms must be appropriate. The administration of a 'training fund' has to be efficient as it otherwise induces costs.

The sources of funding for the National and Provincial Training Funds could be:

1. Foreign Donors
2. Central Government/Provincial /District Government annual funding.
3. Enterprise Compulsory Contribution. The contributing enterprise will get tax reductions/ tax rebates. Tax reductions and tax rebates (tax deductibility)

provide an incentive for firms to cover the costs of training by reducing their net costs. In the beginning, we could have a tax rebate of 100%.

2. Combine TVET Training with Micro-Credit

TVET providers should consider the Training with Credit (Loan) schemes to start small and medium scale enterprises. The Training Funds can also have a Micro Credit Revolving Fund and through that, Micro Credit facilities can be given to eligible TVET graduates who have successful completed their training from designated TVET institutions (both public and private).

3. Start TVET Training Vouchers System

Training vouchers are instruments used by governments and training funds to subsidize the cost of training by enterprises and individuals. TVET vouchers can help pay for training selected by the trainees. The cost of training through TVET Vouchers can also be subsidized by governments by allowing enterprises to deduct eligible training costs from their income for tax purposes or that can provide tax credits for qualified training expenses.

This method empowers the trainees with vouchers that can enable them to select the well-performing institute that delivers quality training. National TVET authorities should benchmark institutes trade wise on yearly basis in partnership with industry for the guidance of trainees, parents and employers.

The TVET voucher can be redeemed in four parts:

- 25% on admission and joining
- 25% on course completion
- 25% on trainee OJT (on the Job Training)
- 25% on employment

4. Initiate Performance-Based Funding Formula

The government purchases the training outputs and outcomes. This is especially relevant to shaping incentives and accountability for state-sponsored training. Norms for financing can be established using inputs, such as trainees enrolled; outputs, such as trainees graduated: outcomes, such as trainees employed.

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Papua New Guinea's TVET: at the Crossroads

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Abstract

Papua New Guinea (PNG) is a developing country and is considered as the biggest island state in the Pacific with 7.2 million people population with diverse culture. It gained its independence in 1975 with only 15% of its population in formal employment.

The Technical and Vocational Education and Training (TVET) is one of the institutions in PNG that provides skills training to its people for possible employment. Although, TVET regulations come into different state agencies, it has contributed to the workforce demand in the country. It undertakes training on qualification framework since 2005 as part of the reforms in the country's TVET system through the Department of Education. The government's vision - goals 2050 are reflected in its Strategic Management Plan (SMP). To achieve its vision-goals 2050, PNG employed strategies which are defined in outcomes stated in its SMP. However, SMP's success is dependent on the government's political will to centralize and regulate the entire TVET system in the country.

Keywords: flexible and open learning, sub-standard qualifications, regulatory framework

Introduction

This paper presents the different practices and strategies of TVET in PNG. It focuses on the current practices in strategic planning, priorities, essential good practices, and lessons learned in nurturing the TVET system. This paper covers the following:

The context of Papua New Guinea and its education system;

- Key challenges in developing a national TVET strategy to meet local and global challenges;
- Major strategies adopted and paradigm shifts in the current TVET strategic plan;
- Major achievement and best practices; and
- Lessons learned and future challenges.

The Context of Papua New Guinea

A country's quest to achieve education and training for its citizens is fundamentally about providing an adequate learning environment that is accessible to all citizens to better improve their lives and play a productive role in society (UNESCO, 2011). Thus, in this context, quality vocational education and training is imperative, although PNG is faced with a challenge on how to provide equitable service to its people. The country's geographical, cultural, political, economical, bureaucratic and social ditinctiveness are briefly discussed to provide a background to these challenges.

Geographically, PNG lies in the tropics, 141-160 degrees east of Greenwich and 0-14 degrees south of the equator. PNG's 600 offshore islands and the mainland in total cover a land area of 462,840 square kilometres, which is just a little over the size of Iraq. (New World Encyclopaedia, 2008). PNG's geography is diverse and, in places, extremely rugged. Culturally, PNG is one of the most diverse countries in the world, with over 800 languages (Litteral, 1999) with distinctive cultures practised by its 7.2 million (2007 estimate) Indigenous inhabitants (National Statistics Office [NSO], 2000). PNG is governed by three political structures – national, provincial, and local level governments.

Economically, PNG is classified as a low to middle income developing country (AusAID, 2003; Pagelio, 2002). PNG has a small dual economy that consists of an informal sector supporting 85 percent of the total population in semi-subsistence agriculture and a minority of 15 percent in the formal sector.

The Context of Education in PNG

The education sector within PNG comprised of three sub sectors, namely, general education, TVET and higher education. The following PNG education system structure somewhat depicts these sectors and their linkages to community and work.

General education starts with children at 6 years of age. All children begin their basic education in an elementary school in a language that they speak. For the next three years they develop the basis for sound literacy and numeracy skills, family and community values including discipline; personal health care and respect for others. Primary education starts at 9 years of age. Children continue their basic education in a primary school. After six years of primary education that begins with a bilingual program, children have the skills to live happily and productively, contribute to their communities and use English to understand basic social, scientific, technological, and personal concepts and value learning after grade 8.

Secondary education is offered at secondary schools and flexible and open learning Colleges. Students in Grades 9 to 12 achieve their individual potential

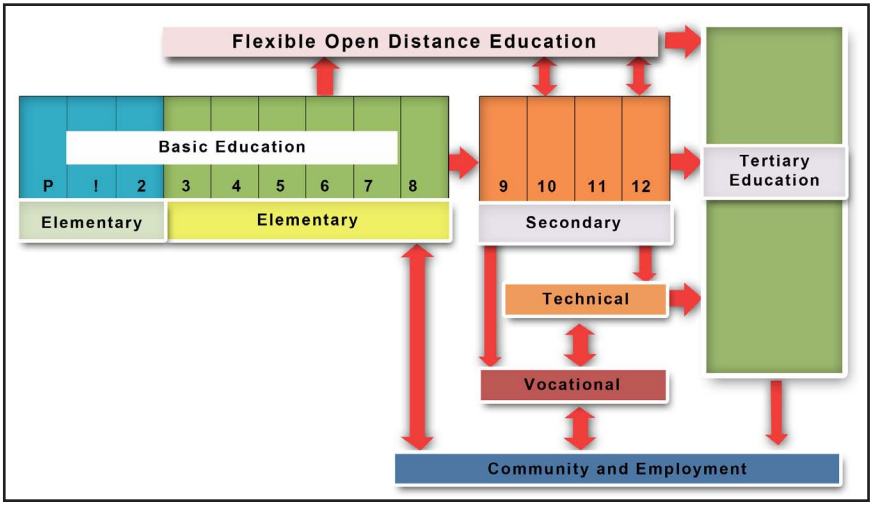

Figure 1: PNG Education System Structure (Source: Apelis, 2012)

to lead productive lives as members of the local, national and international community and partake in further quality education and training, having undertaken a broad range of academic subjects and vocational related life skills that can be used in everyday life.

Responsibility for the TEVT sector sits with a number of Government agencies. The three key players in the provision of technical education and training are the National Apprentice and Trade Testing Board (NATTB) and the National Training Council (NTC), the Department of Labour and Industrial Relations (DLIR) together with the Department of Education acting through the Technical Vocational Education and Training Wing.

The TVET system in the Department of Education is delivered at the provincial and national levels across all the 22 provinces of PNG including National Capital District and Autonomous Region of Bougainville through vocational training centres Community Colleges[1] (Parallel), technical secondary schools[2] technical and business Colleges and a National Polytechnics. PNG has 132 vocational training centers. Technical Secondary Schools, seven Technical and Business Colleges, one national polytechnic and a number of Community Colleges with total enrolment of approximately 21,000 students and 377 teachers (DOE, 2010).

The Department of Education has managed TVET institutions since the establishment of a national education system in the early 1970s. The TVET system has gone through a number of reforms to enhance the system in recent

[1]Community Colleges is a TVET concept that is being trialed in PNG. Standalone Community Colleges will be national institutions. Selected VC are offering Community College programs. These college aims to provide for all and especially the disadvantaged. [2]Secondary Schools or in some cases technical high schools are institutions that deliver a dual curriculum – a vocational and academic curriculum. A formal policy on this type of institutions is being developed, discussed and articulated.

years. This includes the amalgamation of vocational and technical education under one division and a recent upgrade to a wing status, adoption of a national TVET qualification framework (NTQF) and National Certificate (NC) courses including Diploma programs, the shift in the teaching and assessment approach to Competency Based Training and Assessment (CBT&A), vocational centers rationalization and systemization. Despite the reforms there has been inherent challenges. The lack of special laboratories, computer facilities, workshops and funds to purchase adequate teaching materials, as well as a shortage of general studies and specialist teachers. These issues have impeded the growth and quality of TVET in PNG. A recent Needs Analysis of Technical and Business Colleges report (AusAID, 2011) confirms the challenging status of almost all Colleges' infrastructure and instructional resources.

It is the responsibility of the DLIR through the National Training Council and National Apprentice and Trade Testing Board to ensure that there are no duplication of functions. All regulatory functions are carried out by improving coordination, either by strengthening the capacity of existing bodies or by forming an overall regulatory body. Advice is taken from industry, business and community leaders in order to provide a policy framework. However, weaknesses have been noted in the regulatory policies and implementation (Kombra, 2012).

Key Challenges in Developing a National TVET Strategy to Meet Local and Global Challenges

Firstly, in the views of some observers such as the PNG National Research Institute (Seta, 2010), the PNG TVET system is dysfunctional since independence. Banda (2009) made similar observation and attributed these circumstance to inconsistency of support from different levels of government.

The views of the critics are affirmed by the TVET policy (DOE, 2010) statement that the whole TVET system in PNG is very fragmented, and thus, requires serious intervention by the national government. TVET may be delivered in different types of institutions, including technical and vocational centers and Colleges – public and private, by NGOs, in enterprises, apprenticeship training, informed (sic) and non-formal learning and industry training centers (p.5).

A national training plan, a national qualifications framework, a clear leading role for business and industry as well as quality standards in curriculum and delivery are the essential components of a functional system.

These key elements are missing or not functioning effectively. Other key players suggest that industry and business does not see value in engaging with the public TVET system and sees opportunities to either set themselves up as registered TVET providers (Ela Motors, Hastings Deering, Ok Tedi) or to partner with Australian providers (APTC in the case of local businesses, SkillsTech in the case

of the Exxon Mobil LNG project). Some local businesses had set up their own TVET providers to avoid sending their apprentices to the government TVET providers.

Next, there is no PNG National Qualification Framework (PNGNQF) that regulates and standardize training and qualifications. At present, different providers are awarding unregulated certificates. Some of these providers are offering internationally recognized certificates whilst some are possibly awarding 'sub-standard' and questionable programs and qualifications.

In the absence of a PNGNQF, the MOE TVET sub sector has moved ahead to develop its own National TVET Qualification Framework (NTQF) in 2005. The NTQF that categorizes qualifications offered in all TVET institutions under 6 National Certificate (NC) levels. Namely, NC1 to NC4, National Diploma and Advanced National Diploma. This NTQF is similar to the Australian TVET qualification model. Despite this, the TVET NC qualifications have yet to be harmonized with school and higher education qualifications. TVET institutions are offering NTQF courses as well as technical training certificates, diplomas, short-term courses, apprenticeship training.

The reforms are planned to be fully implemented in business and technical Colleges by 2015 and vocational training centers and other institutions by 2020. The slow implementation of the NTQF courses is caused by a lack of appropriately qualified teachers, lack of equipment and tools, and teacher in-service training to offer NTQF courses using the CBT&A approach.

PNG's current context where TVET is provided by different ministries and state owned enterprises such as the Department of Education, Fisheries, Forestry, Telikom, DAL, and Health as an indicator for unsatisfactory governance of TVET. On the contrary, it should be seen as an indicator for a broad variety of opportunities for vocational education and training in PNG, as opposed to a rigid monolithic TVET system with a limited spectrum of specializations and delivery patterns.

For TVET to advance in PNG, the Department of Education is advocating that currently fragmented and loosely coupled PNG TVET system has to put in place processes and systems that:

1. seek advice and research into current and future skill needs and effectiveness of existing training programs of all providers and regulators;
2. allow direct industry and business participation in developing competency standards and skill sets aligned to specific occupations and job roles;
3. allow direct industry and business participation in training, which may include delivering training as a registered training organization, providing work placements or work experience, and employing trainees who are also studying; and

4. support TVET initiatives including student scholarships and awards, work opportunities for TVET teachers and trainers engaging in return to industry programs; and above all,

5. establish a single entity to plan, set policies, regulate and monitor all TVET training.

Major Strategies Adopted and Paradigm Shifts in the Current TVET Strategic Plan

The Government of PNG through its Vision 2050 and associated planning documents has prioritized the need to increase the quality and quantity of skills training in the technical and business Colleges and other tertiary institutions as part of an overall strategy of increasing the skills capacity of the PNG workforce. Skills training is now a very high priority on the GoPNG policy and planning agenda after decades of neglect. The PNG Government has developed a number of significant policy initiatives that have the potential to impact the TVET sector. (The Independent State of Papua New Guinea, 2009).

The 'Papua New Guinea Vision 2050' is an aspirational document developed in 2007 and 2008. Vision 2050 is underpinned by seven Strategic Focus Areas, which are referred to as pillars. Human Capital Development, Gender, Youth and People Empowerment are identified as Pillar 1. Under this Pillar, the following statements refer to the TVET sector and are projected to form part of the basis of socioeconomic growth under Vision 2050.

- Access to industry and sector-based applied education for the adult population in the informal sector;
- Expand teachers, technical, business, forestry, fisheries, maritime, tourism and hospitality, and Community Colleges that are recognised as institutions of higher education;
- Establish one multi-disciplinary technical College in each province;
- Establish one vocational school in each district;
- Establish a National Curriculum, Assessment and Monitoring Authority;
- Establish an Industrial Technology and Development Institute.

To address critiques highlighted by Banda (2009), Seta (2010) and AusAID (2011) in the preceding section, Kombra (2012) articulated the need to transform and expand TVET in PNG at the recent Principals' Conference in Madang. Kombra (2012) espoused emphasis on a number of areas, including:

(a) applying an economic lens to examine and address the deficiencies and ineffectiveness in governance and regulation of TVET provision and quality standards;

(b) applying an equity lens to examine and address access, equity and inclusion so that every school leaver and citizen has an opportunity to work; and

(c) applying a transformational lens to initiate changes in rationalizing management and financing so that real difference at the institutional level than past year's rhetoric.

Kombra's (2012) suggestions are the essence of the Department of Education through the TVET Wing's Strategic Management Plan 2011 – 2020 (TVET DOE, 2011). This strategic management plan refocuses and aligns the outcomes assigned to the National Education Plan (DOE, 2005) under the Government's Vision 2050 which consists of 8 major outcomes as listed below:

Outcome #

Description of Outcome

1. Legislate a regulatory framework for TVET consistent with the National Government's Vision 2050
2. Provide access to industry and sector-based applied education for the adult population in the informal sector
3. Expand teachers, technical, business, forestry, fisheries, maritime tourism and hospitality, and Community Colleges
4. Establish one multi-disciplinary technical college in each province
5. Establish one vocational technical high/secondary school in each district
6. Establish the Industrial Technology and Development institute
7. Establish the TVET Flexible and Open Learning (FOL) Institute
8. Establish new TVET Human Resource Management requirement

The next section highlights several specific activities in the Department of Education TVET system.

Major Achievement and Best Practices

The Department of Education has taken up a number of significant reforms within the Department of Education TVET subsector, since 2005. These achievements include the following:

TVET Policy Statement

The guiding principle of the administration of TVET system within the Department of Education is a policy statement developed in 2005. These statements incorporated the NEP 2005 – 2014 directional goals and outcomes. Additional polices were incorporated in 2010 to include changes such as the community college concept and the relevant Vision 2050 TVET goals.

For PNG, the development of the TVET Policy was a step forward to enhance commitment to change and to provide continuous direction for growth and progress in the development of TVET sector consistent with the National Education Plan for 2005 to 2014. It was envisioned that this Policy would eventually see the coordination of a functional TVET system that recognizes the alignment of efforts towards PNG's economic directions and national training priorities.

PNG TVET National Qualification Framework

Another significant development in PNG's TVET systems within the Department of Education has been its leadership in developing a qualification framework. It is gaining more recognition, as it phases out its previous generic qualification called technical training certificate. The TNQF recognizes that the schools and higher education sectors have different industry and institutional linkages to those of TVET. It links school and initial vocational/technical qualifications through to those of higher education with a transparent mechanism for the assessment, certification and recognition of skills including prior learning.

The TNQF also recognizes and supports the need for specialized curriculum oriented towards rural and village development. This curriculum will be underpinned by short courses in topical areas such as building, forestry, agriculture, maintenance etc. Furthermore, national occupational competency based standards are driven by input from business, industry and community. Curriculum is written to national occupational standards. Credit in the future will be made available for any modules or courses, which are run in schools or as short courses.

Competency-Based Training and Assessment

As stated elsewhere in this report, the Department of Education TVET qualifications are based upon a CBT&A model. There are traditionally seven core trade areas, namely, Business Studies - Office Administration, Carpentry Construction, Electrical, Motor vehicle mechanics, MVM, MFW, MFM and Plumbing trades have already been converted to CBT&A modules. Recently, Community Services, and Primary Industries have been added.

The next section discusses the monitoring and evaluation component of the Department of Education's TVET Strategic Management plan.

Monitoring and Evaluation Mechanisms

The Department of Education's TVET Strategic Management Plan 2011 – 2020 implementation is routinely monitored and evaluated. Monitoring is ongoing at the Branch, Section, Division and Wing level during normal meetings and at specific periods of this plans timeframe.

Team leaders of Units, Divisions and the Wing are responsible for

(a) Monitoring and evaluating the status and performance of TVET;

(b) Managing, assessing leaders, and taking corrective measures when and where necessary;

(c) Collecting information to improve on past performance; and

(d) Measuring progress of the key outcomes and outputs and report on a regular basis. This specifically aims at:

- Progress on the implementation of the programs, eight core outcomes foreseen by the Plan with respect to schedules, resources, inputs, objectives, costs and funding; and
- Results and impact achieved.

Monitoring and evaluation also includes reviewing the planned strategies. The TVET Strategic Management Plan will be reviewed in 2015.

This will be done to align with the next National Education Plan (2015 to 2024) visions and directions. This process also ensures that the plan is relevant and is 'living'. The Measurement and Quality Assurance Unit is responsible for overall monitoring and evaluation of the plan until a planning branch is established.

The final section, next, describes a few lessons learnt and potential future challenges.

Lessons Learned and Future Challenges

There are three significant challenges facing TVET. First, numerous reports including a Commonwealth Secretariat research has highlighted that in PNG the issue of multiple stakeholders and no clear responsibility for TVET policy or delivery causes confusion and with little or no clear definition of responsibilities for the sector (AusAID, 2011; Commonwealth Secretariat, 2012; TVET DOE, 2012). Therefore, the TVET system in PNG considered as somewhat fragmented, and the Department of Education has called for serious undertaking and intervention by all key players to come together for the common good. One of these, for instance, is for TVET across the whole country to be governed by a single entity to ensure that quality skilled workforce needs are met (Kombra, 2012).

The concern here is the need for PNG to establish appropriate national structures and frameworks for information, communication, collaboration and coordination among ministries and state agencies that own and offer training. The Department of Education is advocating that PNG should have articulated national policy guidelines that include these principles:

- A national approach to TVET policy development and implementation

- The establishment of appropriate structures and agencies to implement TVET policy; and
- The allocation and/or coordination of funding to support policy development, implementation and review. This includes funding from donor organizations and agencies and financing TVET through corporate taxation schemes and endowments.

Second, PNG needs to provide flexible and multiple TVET pathways for students and adults to access skills training. The Department of Education offers TVET through four post basic primary and post-secondary education - types of institutions. As depicted in Figure 2, the MOE recognizes the importance of linking vocational education and training, technical education and training, general education and flexible open distance education (FODE).

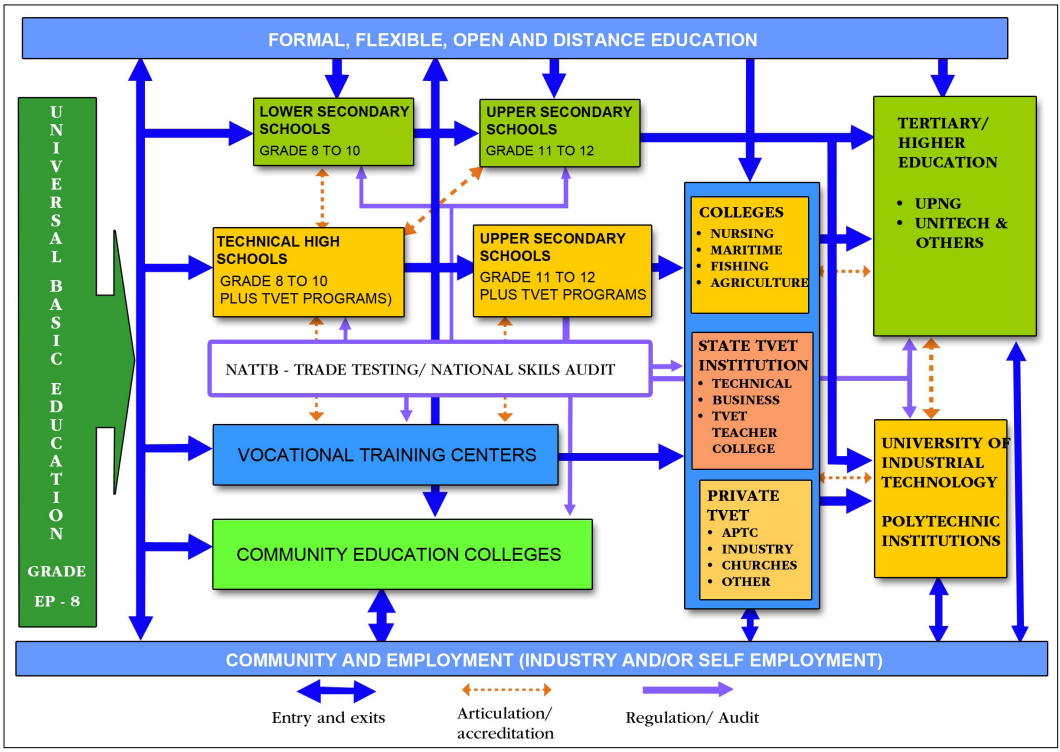

Figure 2: Department of Education's TVET System Pathways and Linkages
(Source: DOE TVET Strategic Management Plan, 2011 - 2010)

The national education reforms and TVET pathway structure rendered in Figure 2 provides the framework and depicts the planned reforms in linking all TVET institutions. Curriculum and policies are being reviewed and reformed to improve the linkages, accreditation and articulation between the different

institutions. At present there is no national qualification or accreditation policy framework so TVET students are facing a dead end -- at the end of their study and training programs.

The final challenge facing TVET institutions is financing and resourcing, specifically teachers, instructors and trainers. The TVET Needs Analysis documented severe deficits in the buildings and equipment of the technical and business colleges (AusAID, 2011). The position in the vocational training centers is more acute. Standards are also low at the cheaper end of the private sector. Hence, training to standards required by industry in these conditions are somewhat not met. The overall financing of TVET by the state through a tax levy scheme is being discussed. The outcome of the current discussions is very critical for the future of training institutions existence and sustainability.

Conclusion

To conclude, PNG is at the crossroads to either move ahead with major reforms or remain stagnant with a loosely coupled and fragmented TVET system. Strategic shifts to address the challenges of the whole TVET sector and building effective skills development that is responsive to current labor market demands and help achieve long-term socio-economic development goals envisioned in the Vision 2050 is paramount. The Department of Education TEVT is advocating growth in access and improving quality of TVET. The changes needed include

The need for national planning, coordination, qualification framework, regulation and monitoring of TVET. Legislative changes with clear defined roles for regulatory authorities and training organisations is needed; and state recognition of the need to establish a sustainable funding model.

With the institutionalisation of CBTA, full implementation of courses under the national qualification framework, advocacy to regulate TVET provision and quality assurance initiatives, coupled with the current government's interest in TVET, there is hope for the growth of a bigger and better TVET system that produces adequate and quality tradesman and technicians that are at par with international standards.

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