Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development: The Case of Africa

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Abstract: Technical and Vocational Education and Training (TVET) is the icon of the new dispensation and pivotal to sustainable socio-economic development. Governments around the world are increasingly expositioning the philosophy of "heritage based education" as the anchor of sustainable innovation and skills development for community based industrialization and economic development. The ways of knowing are particularly important in the era of globalisation, a time in which indigenous knowledge as intellectual property is taking new significance in the search for answers to many of the world's most vexing challenges such as: disease, famine, ethnic conflict, and poverty. Indigenous knowledge, endogenous and exogenous have values, not only for the culture in which it develops, but also for scientists and planners around the world seeking solutions to community challenges. The researcher argue that local communities have relevant and appropriate knowledge and resources that can be employed and deployed to construct resilient local architectural designs using traditional Knowledge Management Systems. This ultimately can result in appropriate and relevant infrastructural development which take cognisance of community requirements and can propel sustainable development. The researcher employed mixed method approach in order to benefit from both quantitative and qualitative.

Keywords: Retracing, Reconstructing, Reliving, Heritage and Juxtapose

1. Introduction

1.1. Background to the Study

The African Union, UNESCO [1], the European Union, and the United Nations acknowledge that formal educational eco-systems alone cannot adequately respond to the phenomenal social, technological, and economic inequalities. The 21st century evolution and revolution in Technical and Vocational education and Training (TVET) dictates are predominantly distinguished by an expeditious technological advancement that demand a permanent transformative doctrine for re-organization, reconfigurations and rejuvenation of all Knowledge Management ecosystems grounded in heritage philosophy [2]. The new developmental philosophy highlights the increasing importance of knowledge mobilisation through community interface. A policy of community engagement must be adopted to remove the prescriptive donor syndrome that has crippled many developing countries. New technologies especially from developed countries have culminated in a dynamic discourse and disruptive technologies that have led indigenous knowledge into hibernation thereby completely stifling any developmental imitative. African Technical and Vocational Education and Training (TVET) has been rendered useless with no place or role as it is encapsulated by foreign technologies. With so many distracting and inhibiting factors Africa needs to borrow the tenets of Industrial Engineering and Operational Management in order to break the barriers of insularity and create a competitive operational environment. Appropriate African indigenous technologies that have not gone beyond the craftsmanship and artisanal level are available and can be harnessed and developed into superior competitive technologies.

Technical and Vocational Education and Training (TVET) plays the fundamental role of knowledge and skills acquisition in the world of work, art, craft and have helped sustain communities at grass roots level for centuries. Historically various terms have been used to juxtapose TVET. These include: apprenticeship training, vocational education, technical education, technical-vocational education (TVE), occupational education (OE), vocational education and training (VET), career and technical education (CTE), workforce education (WE), workplace education (WE). A close introspection can reveal that Industrial Engineering and Operations management has a close bond with Technical Vocational Education and Training (TVET).

Technical and Vocational Education and Training (TVET) is the discourse for community engagement in a pracademic way. The disruptive chaos brought about by the COVID 19 pandemic demonstrated the far reaching vitality of TVET within communities as nations safeguarded their resources with trade, travel and interchange were reduced to a minimum. There is urgent need to retrace, reconstruct and relive TVET in the context of community engagement for sustainability chief among them being the high unemployment and underdevelopment especially in Africa reconstruction is impossible [18]. The destruction of African TVET has seen many youths being reduced to street beggars as foreign based products flood the African markets. The curtailment of indigenously generated Technical and vocational education and Training has disoriented Africans who now think foreign products are the panacea to their challenges. Technological acceleration pits Africa at the mercy of technological giants condemning Africa to a big warehouse and supermarket for other nations' products. Retracing, reconstructing and reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development has the potential to unlock, unpack and reignite the much needed impetus in African technical and vocational education and training mitigate against foreign products and go beyond the binary approach.

Furthermore, andragogies should provide platforms to contextualize and decontextualize TVET praxis, researches, innovations and, industrialisation synthesized to juxtapose Industrial Engineering and Operations Management grounded in Heritage Based TVET Skills Development. A well-constructed and fully adopted research, innovation and industrialisation barometer and policy for Africa should guide TVET to adapt and adopt right researches, technologies and innovations that are suitable for the sustenance of Africa. Therefore, application of indigenous TVET Knowledge Management Systems is seen as disruptive innovation and constructive chaos with the potential to improve sustainable Industrial Engineering and Operations Management in the context of heritage based philosophy.

Heritage based TVET is the icon of the new dispensation and pivotal to sustainable socio-economic development, national security through the application of indigenous Knowledge Management Systems [8]. It is now touted as the most likely source of competitive advantage in all spheres of business theaters since it is grounded and anchored in indigenous system and is founded on the sustenance of communities.

Sense-making, mind mapping, environment formatting, problem solving and decision-making must be core to the operational doctrines of TVET gurus. Similarly, tacit and explicit knowledge must work on the interoperability of retracing, reconstructing and reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development.

1.2. Motivation / Problem Area

The study is motivated by the need to inform policy and policy makers on the invaluable synergy of retracing, reconstructing and reliving indigenous technical and vocational education and training through coupling with industrial engineering and operational management and the ontological role it plays for sustainable socio-economic development for nation building.

1.3. Research Objectives

This research study investigated the aspects of retracing, reconstructing and reliving of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management for Resilient and Sustainable Economic Development on Traditional Knowledge Management practices for Africa and Zimbabwe in particular anchored on the following underlying research questions:

Objective 1: To provide an overview of the characteristics of indigenously practised sustainable technical vocational education and training praxis in Zimbabwe.

Objective 2: To analyse the degree of penetration of indigenous Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management for Resilient and Sustainable Economic Development in Zimbabwe and Africa.

Objective 3: To understand the main drivers contributing to integration of resilient and sustainable TVET in Zimbabwe and Africa.

Objective 4: To provide recommendations to Zimbabwe and Africa on need to harness indigenous Technical and Vocational Education and Training coupled with Industrial Engineering and Operational Management based on heritage philosophy for sustainable educational engineering systems.

2. Literature Review

A Roman philosopher [9] once said to be unconscious of what transpired before you were born is to remain always a child. Most Africans are not aware of the indigenous

technologies as exposure has mainly been to foreign products. For what is the value of humanity, unless it is woven into the life of our ancestors by the records and artefacts of history. Africans have been disconnected from their past because of various factors chief among them colonisation. This created a scenario were some technologies were stolen, hidden, copied and patented. Archives are the records, a minor portion of the whole created, which are selected for preservation and retracing, reconstructing and reliving indigenous TVET in order to fully participate and contribute to global development and knowledge system. Archives hold much of our institutional reminiscence and form an indispensable and inseparable bond between past, present and future. Amongst other things, archives record the challenges, the desires and the capabilities of today's generation, and of the generations that have preceded us. The long term preservation of such treasured historical records have made it possible to document a historical narrative of the institutional history as well as tap the much needed knowledge and skills for continuity and sustainability. Historical records document our triumphs and our failures, and are preserved in various formats, oral history, from paper records, which includes, documents, maps and drawings to photographs to recordings of sound and moving images. They are thereby an asset which communities have an obligation to preserve for posterity. Africa has huge troves of such records confirming the vitality of permanent and consistency technological development that has been with Africa for centuries.

Archives are the most important institutional assets, they provide evidence of activities and tell us more about individuals, institutions and nations [3]. They also increase our sense of identity and understanding past events that emanated from one generation to another. Archives by their very nature are distinctive both as individual documents and documents in perspective. Missing archives are irreplaceable, any loss is final, and in most cases, reconstruction is impossible [17] and makes it impossible to retrace, reconstruct and relive especially TVET. Africa's past TVET was adulterated and since then true African TVET has been practically impossible [15]. Archives resembles a snapshot of past events and enables the enhancement of memory and unveil hidden past memories of institutions, individuals, families and the nation at large. The archival philosophy have long been essential to the Africans as to the Europeans and the Middle East. African oral traditions, folk tales, earliest forms of writings and ancient storage devices all suggest some earliest TVET practices throughout the continent. The Africanisation of the archival knowledge was for long regarded as a myth which was later on legitimized by the Nsibidi writings of Nigeria and Cameron that dates back to 2000BC and the Vai writings of Liberia and Sierra Leone of 3000BC [16]. Archaeological evidence indicates that Africa was inhabited by an ancient civilisation that stored its records on stone and clay tablets. Archives express and hold several oppositions, memory and forgetting, suffering and hope,

power and accountability, confinement and liberation, oppression and justice, conformity and diversity, silence and speaking [14]. In other parts of Egypt a culture of archiving information on scrolls was developed and each scroll was given some bibliographic details to facilitate easy retrieval. The adoption of African records by European archival institutions and museums is a clear testimony of the earliest preservation mechanisms of the African heritage.

2.1. Origins of Technical Education

Throughout history, Technical and Vocational Education Training (TVET) has given students practical knowledge and skills-based careers to prepare them for industrial employment and self-sustenance. Technical and Vocational Education Training is used as an integrating term denoting to those traits of the education practice involving, in addition to general education the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding, and knowledge unfolding to career in numerous segments of economic and social life [16]. Industrial Engineering and Operations Management can play a pivotal role in ensuring regeneration of African TVET based sound industrial philosophies. Each community has its own form of TVET which have sustained them from generation to generation. The word technical originates from Greek and it was borrowed from the word technikos which means art, craft or skill and also from Greek tekton which means builder or carpenter [12]. Thus, the word technical refers to a practical skill attained by an individual to understand and operate intricate systems. [11] highlighted that, the word vocational stems from the Latin word vocare which means:

... to call or a summons from God to an individual or group to undertake the obligations and perform the duties of a particular task or function in life: a divine call to a place of service to others...

In Africa, technical education is viewed as a divine calling with God's blessing placed in the hands of a child at birth. The ideology of technical education is mainly centered on one's ability to use his or her hands in order to get in touch with the ever changing natural environment. Weight is placed on encouraging an individual to attain practical skills that comes to one more naturally and be able to utilise surrounding resources to solve the problems of the community, which is also a doctrine of heritage education promulgated by the Ministry of Higher and Tertiary Education, Innovation, Science and Technology development. Technical education stands unique with its practical approach and technically fit the industrial engineering and operational management demands of applied knowledge [4]. Technical vocational education and training can be traced back to antiquity, where a child would learn survival skills from the parents in order to harness the demands of Mother Nature. The pictures below clearly demonstrates some of the earliest forms of indigenous technical education skills in Zimbabwe.

Figure 1. Making a Shangana head-ring.

Figure 2. Knives decorated with brass wire-work.

Figure 3. Stone Age tool.

Figure 4. Spear (Makoni area) and knobkerrie.

Source: National Archives of Zimbabwe

Figure 5. Gold panning.

The above pictures of 1906 clearly demonstrate early traditional apprenticeship skills by the Zimbabwean natives in line with gold mining and tools manufacturing [7]. This was a clear demonstration of a vibrant indigenous Technical Vocational Education and Training then. The man in the left picture does the digging with an Iron Age tool whilst the woman holds a crafted basket that will be used to store the chunk. The woman on the right picture with concentrated chipped ore winnowing out the fine soil at an exposed point where there was some wind.

Figure 6. Artisanal Mining.

The above pictures portray early mining skills by the natives in 1916 using handmade tools of the later Iron Age [17]. Such heritage apprenticeship skills were passed from one generation to another through training and were only disrupted through colonisation. There were quite a number of heritage skills that were trained amongst the indigenous people most emphasis on what comes to an individual more naturally.

The TVET knowledge algorithm and trigonometric landscape and its distribution have tectonically shifted and continue to metamorphosise into different challenging and penetrating creatures which tend to threaten national development. The essence is to Retrace, Reconstruct and Relive Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development to ensure that all nations fully participate in global development. Institutions must invest heavily in TVET Knowledge Management Systems, research; knowledge mobilisation and brokerage and knowledge surreptitious if they are to remain strategically relevant and competitive in the maintenance of resilient and sustainable national strategic development.

Bifurcation of knowledge, commitment to the best development doctrines, meritocracy, knowledge enterprising, and transformational leadership are central to learning and researching for superior resilient and sustainable TEVT development. To what extent, one would ascribe the role of the TVET as the provider and safe guarder of development if the knowledge applied is finite. Such indigenously anchored TVET knowledge coupled with Industrial Engineering and Operations Management has a potential to uplift community standards and spearhead innovation and industrialisation. TVET provides fundamental grounding to particular culture, structure, tools and organization of work in any nation. Africa is mainly depended on borrowed designs, borrowed knowledge, borrowed technology and donor initiated. These projects when implemented have a developmental disconnection with the community and the environment they live in thereby eliminate sustainable development and create dependence.

2.2. TVET Knowledge Management Systems: Environment

Knowledge Management System is the technological part of a Knowledge Management initiative that also comprises person-oriented and organizational instruments targeted at improving the productivity of knowledge work [10]. System that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the Knowledge Management process. Modern indigenous TVET should rely on symmetrical and asymmetrical information from many sources buttressed by Industrial Engineering and Operations Management. This then transcends institutional discourse to become a permanent learning organization rooted and grounded in traditional ethos. Traditional ethos demand environmental consciousness and perception tools that are superiorly branded to maintain identity and originality.

The glocalisation and globalization of TVET and the ripples effects make significant change in modern national development. TVET and its derivatives of pracademic through CBETised and Tvetised competencies go beyond local or regional developmental agenda [19, 20]. This entails environmental awareness and decision-making and to a greater extent fore knowledge coupled with immediate knowledge obtaining in the developmental theatre; thus reliability, sustainability and validity of sources of information and skills become more pertinent and challenging anywhere in the world thus heritage based TVET becomes fundamental. TVET Knowledge Management Systems must be robust, delicate, flexible and jointly having ability to communicate and coordinate operations in a 'seamless' developmental agenda for community survival if coupled with Industrial Engineering and Operations Management. Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development becomes fundamental to successful implementation of projects.

2.3. Gamifications of TVET

Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development through Massification of Technology Enabled and Blended learning to stimulate and sustain learner's motivation through effective methods. Attainment of practical skills, underpinning knowledge and right working attitudes towards learning of technologies and vocational competencies. Learner's engagement and motivation towards achieving intended competencies are key enabling factors that grounds the learner's mind-set in the correct pracademic doctrine. Hence, gamifications zeroed in indigenous TVET creates a new paradigm of teaching and learning processes which enhance engagement and motivation of students to achieve high competency in education and training [5]. Anchoring Technical Vocational Educational and Training ecosystem in cultural and traditional opens an avenue of learning that connects the learner with past thereby create resilient and sustainable Industrial engineering and operational management ecosystem.

3. Research Methodology

The previous section contextualises the identification of factors contributing to the successful Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development. The researchers hereby provide the research design process condensing the computation, the stages followed in the data collection and the methods of data analysis. For the purpose of gathering comprehensive data set, the research study was approached as an investigative process for Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development.

This research pursued an integrated design planted in the epistemology of TVET structuralism and explanatory, philosophy in which reality within this perspective is factual and influenced by the context of the situation, namely the artefacts and perceptions. This can be done iteratively, where findings from some qualitative data are used to inform quantitative data collection, and vice versa (see Sequential Data Gathering), or simultaneously, where qualitative and quantitative data are collected and analyzed together, [6].

Sampling and Target Population
Purposive Sampling

The purposive sampling technique is a type of non-probability sampling that is most effective when studying a certain cultural domain with knowledgeable experts within. Purposive sampling may also be used with both qualitative and quantitative research techniques. The inherent bias of the method contributes to its efficiency, and the method stays robust even when tested against random probability sampling.

3.1. Data Collection in Quantitative Approach

Quantitative and qualitative data collection methods were employed [21]. Structured online survey questionnaires were used for data collection from all selected participants or informants. The strength of the mixed methods of data collection adopted in this study anchored in the fact that the quantitative and the qualitative survey questionnaires are contrasting measuring instruments, they tend to complement each other's weaknesses.

3.2. Design and Development of Data Collection Instruments

A comprehensive literature review was done before designing the questionnaire. Through literature review research constructs, sub constructs and items were identified that constitute research variables. These were meant to provide adequate information on the research questions and the overall research objectives of the study.

3.3. Data Analysis

Quantitative data analysis

Data collected using the structured questionnaires were analysed using descriptive statistics methods. Inferential statistics in the form of the Chi-square test and frequency diagrams were conducted on the research data. Descriptive statistics provide details about the given data, whereas inferential statistics predict aspects of populations outside present data.

4. Research Results and Interpretation

This section presents the analysis and interpretation of the research data for Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development. The analysis follows the triangulation approach where quantitative-qualitative data collected through the survey questionnaires is supported through the use of literature review.

4.1. Demographic Characteristics of the Quantitative Respondents

Emanating from the quantitative research data (demographical characteristics of the respondents), the researcher provides a demographical characteristic's of the respondents in terms of age, gender, academic qualifications, occupation, experience and grade as presented below.

Table 1. Gender distribution of respondents.

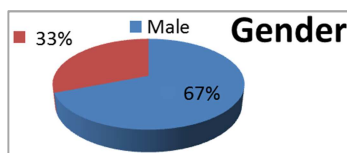| Distribution	Gender	Valid%
Male	8	67%
Female	4	33%
Total	12	100%

Figure 7. Gender distribution.

As highlighted in the Table 1. And Figure 7 Gender distribution of respondents respectively, it is observed that both genders are represented with a 33% of 12 of the quantitative respondents being females and 67% of 12 being males respectively. Views from both gender are considered and this provides for a balanced research study.

Table 2. Educational qualifications of the respondents.

Educational Background	Respondents	Valid Percent
Post graduate	7	58%
Degree	2	17%
Diploma	3	25%
Total	12	100%

From Table 2. Educational qualifications of the respondents, it is noted that educational qualifications of respondents range from Diploma to post Graduate. It is noted that 58% of 12 of the quantitative respondents had post graduate qualifications. 17% of 12 of the quantitative respondents are first degree and 25% of 22 are diploma holders respectively. This provides for cross sectional representativeness in terms of the respondents' in as far as Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development.

Table 3. Work experience of the respondents.

Work Experience	Respondents	Valid Percent
16+yrs	9	75%
11-15yrs	2	17%
6-10yrs	1	8%
Total	12	100%

As highlighted in the Table 3. Work experience of the respondents above, 9 respondents had 16+years of experience, 2 had 11-15 year of experience and 1 had a range of 6-10 years' experience. This demonstrates that creditable knowledge will be derived from the participants in terms of Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development.

4.2. Presentation and Analysis of Results

(1) In Technical Vocational and Education Training (TVET), which 3 elements are more critical?

Table 4. Technical Vocational and Education Training.

Category	Respondents	Valid Percent
The Learner	12	100%
The Content	12	100%
The Educator		
Skills and competencies	12	100%
Total	12	100%

It is apparent from Table 4 Technical Vocational and Education Training above that, 100% of the respondents concur that Skills and competencies, the Learner, and Content are fundamental for retracing, reconstructing and reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development.

(2) Which vital outcomes can be noted from a TVET Process: (*Choose any 3*)

Table 5. Outcomes of Technical Vocational and Education Training process.

category	Respondents	Valid Percent
Conservation and preservation of natural resources	3	25%
Production of quality goods and services	9	75%
Investment in quality technologies and reduction in externalities		
Improved quality of life		
total	12	100%

Table 5 Outcomes of Technical Vocational and Education Training process indicates 75% of 12 of the quantitative respondents demonstrate a positive belief in Production of quality goods and services and 25% Conservation and preservation of natural resources. 75% for the production of goods and services is quite significant as the outcome of TVET.

(3) Green Skills or Technology adoption is achieved through Integrating Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management: (*Choose any 2 possible option*s)

Table 6. *Integration of green skills or technology in TVET.*

Category	Respondents	Valid percent
Defined course of action		
Clear and consistent policies	8	67%
Adequate funding of training programs	3	25%
Heritage based Education Policies	1	8%
Total	12	100%

Table 6 Integration of green skills or technology in TVET shows that 67% of 12 of the quantitative respondents demand clear and consistent policies to be in place for Green Skills or Technology adoption to be achieved through Integrating Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management. Policies generally provide guiding principles and procures for implementation. 25% concur that adequate funding of training programs must be in places and 8% points to heritage based education policies.

(4) Training processes in TVET may result in conserving the Natural World through Integration of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management: *(Choose any 3 possible options)*

Table 7. *Conserving the Natural World through Integration of Technical Vocational Educational and Training Ecosystem.*

Category	Respondents	Valid percent
Decrease in marginalization		
Mastery of the triple bottom line concept (people, planet &profits)	4	33%
Culture and heritage based education and training	7	58%
Proper waste management	1	9%
Total	12	100%

From Table 7 Above, conserving the Natural World through Integration of Technical Vocational Educational and Training Ecosystem 58% of 12 the respondents concur that Training processes in TVET may result in conserving the Natural World through Integration of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management. 33% support Mastery of the triple bottom line concept (people, planet &profits) and 1% is for the waste management.

(5) Integrating of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management should be fostered by:

Table 8. *Integrating of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management.*

category	Respondents	Valid percent
Society at large	4	33%
Training institutions	6	50%
Community		
Politicians		
Policy makers	2	17%
Total	12	100%

From table 8 integrating of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management, above it is noted that 50% of the respondents concur that Integrating of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management should be fostered training institutions. 33% are of the view that society at large should foster the integration while 17% support policy makers to be at the forefront. From TVET perspective it prudent that the 50% constitute the majority and the generally training institutions are better equipped to foster integration with Industrial Engineering and Operations Management.

(6) To foster a resilient and sustainable Integrating of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management Green Technology Culture, green skills should be taught from:

Table 9. *Resilient and sustainable Integration of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management Green Technology Culture, green skills.*

Category	Respondents	Valid percent
Cradle to grave	3	25%
Primary and Secondary Education level	7	58%
Tertiary Education Level	1	7%
Heritage based perspective	1	7%
Higher Education Level		
Total	12	100%

Table 9 above, resilient and sustainable Integration of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management Green Technology Culture, green skills 58% of the respondents noted that to foster a resilient and sustainable Integrating of Technical Vocational Educational and Training Ecosystem into the Dynamics of Industrial Engineering and Operational Management Green Technology Culture, green skills should be taught from primary and secondary education level. This critical in that students will be at a tender age and once inducted into green technologies it becomes a stepping platform for any future engagements. 25% proposes cradle to the grave. This may present challenges as the level of assimilation may be low. Tertiary Education Level and Heritage based perspective shared 7% apiece which demonstrates the rejection of these categories as vehicles for transformation.

(7) Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development through.

Table 10. *Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management.*

Category	Respondents	Valid percent
Primary and Secondary Education level	8	67%
Tertiary Education Level	1	8%
Heritage based education	3	25%
University education		
Higher Education Level		
Total	12	100%

From Table 10 Above, Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management, 67% of the respondents considered the importance of primary and secondary education level as being critical in Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development. Primary and secondary education level provide the formative phase of formal learning. Exposing students to the dictates of indigenous TVET will act as a seed for nurturing future gurus in TVET coupled with Industrial Engineering and Operations Management. This is quite significant and gives a positive launch pad for in resilient and sustainable indigenous TVET in Zimbabwe and Africa. 25% supported heritage based education with 8% being for Tertiary Education Level. At tertiary level it will be late for introducing critical components of Retracing, Reconstructing and Reliving Technical and Vocational Education and Training to Juxtapose Industrial Engineering and Operation Management for National Development.

(8) How can Culture Integration into TVET Philosophy promote the development of skills and community solutions?

Table 11. *Responses given by the participants.*

I. Competence based training	ii. Safeguarding cultural heritage	iii. Re-visioning education to Ubuntu inspired
Relevant skills will be imparted to the students depending on the needs of community	The cultural bond between the student and community will ensure that the element of responsibility is instilled with in the student	The inclusion of cultural values in the training curriculum will inspire the element of Ubuntu.
competence based training	safeguarding cultural heritage	re visioning education to Ubuntu inspired
	Cultural Heritage can best be preserved if TVET fosters a culture of researching into the practices by local communities such that local societal competences are defined harmonised and standardised by those people who live and apply the cultural standards to their heritage based education and training. TVET lacks baselines to inform research and it is these baseline that ensure that cultural heritage is not lost. Action Research in TVET is non-existent and more papers to prop up and support best cultural and heritage practices in TVET are needed. That is why all the great architecture by the Africans has not been studied enough nor documented through TVET Research	There is need to ensure that the Affective domain of learning in TVET deliberately calls for the pronouncement of Ubuntu as the anchor for competence focus when we work on sift skills that speak to our national Qualification standards. Mainstreaming of Ubuntu has not been emphasised or attempted in the whole of Africa and there a lot of work that needs to be invested into this regard in TVET
By ensuring that TVET value adds natural endowments in any given set up programmes must be informed by the local culture and natural endowments so that TVET produces tangible goods and services that add value to the communities that TVET is being practiced		
It acts as foundation	should be included in the curriculum	Education should be cultural based on indigenous knowledge system
Inculcating TVET philosophy into our culture will result in a paradigm shift in the way we perceive issues. As Education 3.0 was integrated into our culture so can this new philosophy permeate into the society at large? It will allow learners to demonstrate their abilities not only learnt in institutions but from cultural knowledge and teachers giving solutions to problems within the community.	It is possible to be self-reliant in key requirements of the Zimbabwean society in the long run, thus departing from the culture of depending on purely exotic technologies [which generally leads to a culture shift].	Self-consciousness and respect. Being assertive in all respects.
	Integrating cultural heritage allows for the transferring of heritage-based knowledge and skills, from one generation to the other thereby safeguarding cultural heritage [13]	Ubuntu and ethics go hand in hand. "Our very lives depend on the ethics of strangers, and most of us are always strangers to other people." - Bill Moyers.
BY Cultural Competence based training	Safeguarding cultural heritage through patriotism conserve our natural resources as we use them in production of quality goods and services	Re-visioning education to Ubuntu inspired
Development of the 3Hs in students		Change of mind set in respecting each other.
Cultural Integration provides relevant skills and competences on the local labour market with capacity to bring long lasting solutions to community derived problems.	Culture Integration into TVET Philosophy can promote the development of systematically derived community centred solutions as it is a direct response to community based problems hence safeguarding the nemesis of cultural heritage.	It also promotes the adoption of heritage based drivers in the TVET system as the whole ecosystem would culminate in the re-visioning of education to be Ubuntu Inspired.
Following people's culture and values gives standards and direction	Maintaining history and values	Brings oneness and direction with set standards
By allowing learners to demonstrate their abilities lead them to apply those gained skills in community development.	capacity building, by transferring knowledge from one generation to another	Includes fresh thinking about education in a Community and a country as a whole. Policy questions which have impact on national, continental and international levels should be put in place

Table 11 Responses given by the participants, respondents in all the three categories of Competence based training, Safeguarding cultural heritage, Re-visioning education to Ubuntu inspired demonstrated the requirement for a robust TVET system based on cultural discourse. Ensuring transfer of knowledge and skills from one generation to another to which this in Africa is not happening having been disrupted by colonisation and being bombarded with foreign products. Such practice castrate intellectual implementation of traditional indigenously crafted and thought out initiatives.

i. Competence based training: "By ensuring that TVET value additions to natural endowments in any given set up programmes must be informed by the local culture and natural endowments so that TVET produces tangible goods and services that add value to the communities that TVET is being practiced". The foregoing response has far reaching implications. First it depicts a system were no value addition is done and that natural endowments are being exported in there raw state. There is no link between industry and what the community needs. All the innovations are originated from outside the community and do not serve the community to their best interests and resilient and sustainability is lost. The foreigners are in business and come with commercial mentality. Indigenous TVET coupled with Industrial Engineering and Operations Management should be able to retrace, reconstruct and relive Technical and Vocational Education and Training in its unadulterated community setting.

ii. Safeguarding cultural heritage: extract from one of the respondent had this to say: "The cultural bond between the student and community will ensure that the element of responsibility is instilled with in the student". The response points to a curriculum gap between what is being learnt and what the community wants. It means the students are bombarded by foreign text and other related materials thereby alienate them from their community. Retracing, Reconstructing and Reliving Technical and Vocational Education and Training in cultural discourse to Juxtapose Industrial Engineering and Operation Management for National Development will be fundamental to create a community based innovator. Industrial Engineering and Operations management will create a platform for industrialisation and commercialization of these culturally based developments.

iii. Re-visioning education to Ubuntu inspired: "The inclusion of cultural values in the Training curriculum will inspire the element of Ubuntu".

Ubuntu-A collection of values and practices that people of Africa or of African origin view as making people authentic human beings. While the nuances of these values and practices vary across different ethnic groups, they all point to one thing – an authentic individual human being is part of a larger and more significant relational, communal, societal, environmental and spiritual world [4].

From an African perspective one cannot phantom a creation, invention or development which does not take cognisance of Ubuntu. Most technologies which are brought from afar generally do not take cognisance of the values and ethos of the African communities.

Literature review revealed that technology and inventions were with the African from time immemorial. The interruptions through colonisation and other factors destroyed various initiatives that were in place then. It is the researcher's view that retracing, reconstructing and reliving indigenous TVET to juxtapose Industrial Engineering and Operation Management. Through such synergies the rather dormant and potent African technologies will be able to come to life.

Table 12. The concept of humanism or ubunthu [22].

"Humanity" in Bantu languages		
Language	Word	Countries
Chewa	umunthu	Malawi, Zambia
Zulu and Xhosa	ubuntu	South Africa
Kinyarwanda and Kirundi	ubuntu	Rwanda, Burundi
Sesotho	botho	South Africa
Shona	unhu, hunhu	Zimbabwe
Swahili	utu	Kenya, Tanzania
Meru	munto [a]	Kenya
Kikuyu	umundu [a]	Kenya
Herero	omundu	Namibia
Tswana	botho	Botswana
Kongo	gimuntu	Angola
Tonga	ibuntu	Zambia, Zimbabwe
Luhya	Omundu	Kenya

5. Findings, Recommendations, Way Forward and Conclusion

5.1. Empirical Findings

1) Indigenous African TVET was vibrant during the early human settlement and sustained communities for centuries as revealed through literature review.
2) Implementation of community projects and developments are done without proper consultation with the community.
3) Cultural values are fundamental to any community projects.
4) Curricula implemented in training institutions is not culturally based.
5) There are no policies which relate to community engagement when implementing projects.
6) Foreign designs and projects populate African communities.
7) Indigenous Knowledge Systems could play a key determining factor as an enabler and facilitator to the acquisition, sharing, networking and generation in resilient and sustainable infrastructural Knowledge Management Systems.

5.2. Recommendations

Emanating from the implication of the research study, the researcher make the following recommendations for effective and efficient Retracing, Reconstructing and Reliving Technical and Vocational Education and Training in cultural discourse to Juxtapose Industrial Engineering and Operation Management for National Development.

Develop clear policies and philosophies that recognise the importance of inclusion of indigenous knowledge.

Understand and emphasise practical approaches to Retracing, Reconstructing and Reliving Technical and Vocational Education and Training in cultural discourse to Juxtapose Industrial Engineering and Operation Management for National Development to solutions to community based challenges.

Ensure heritage based TVET is developed for a holistic approach to capacity building and consultation with communities when it comes to TVET [14].

Decolonize, liberate and recalibrate the curricula to respond to community needs based on heritage philosophy.

Develop clear policies and philosophies that support continuous and perpetuate technology innovation (Kaizen Philosophy).

Recognize intellectual and social capital assets.

5.3. Way Forward

This study was significant in that it provided opportunities for future research and pilot implementation of African indigenously based training. Literature review also demystified the concept of technology as it was also revealed that Africa is endowed with intellectual repository of artefacts, knowledge and skills that can be harnessed.

5.4. Conclusion

Through this research study one cannot phantom of Africa as a land of intellectual ineptitude as the findings demonstrated significant technological prowess before interruption due to colonisation. Retracing, reconstruction and reliving such technologies is quite possible if coupled with Industrial Engineering and Operations Management ecosystem. The research objectives were meant as revealed by the findings and recommendations. African Governments must domesticate, institutionalise, commoditise, and embody retracing, reconstructing and reliving indigenous TVET that will mould a complete person through infusion of Ubuntu in all capacity building projects.

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