ABSTRACT

Research studies on the TVET system in India have identified several systemic issues which have resulted in extremely low gross enrolment rates in TVET and poor labour market outcomes for the learners. Salaries of those who find a job after TVET hover around minimum wages fixed by the government as the industry is unwilling to pay a premium for the acquired skills and career paths are limited. This further discourages youth and their families from investing time and money in skill development or pursing formal vocational education.

On the other hand, the ***Dual Model of Education*** of Switzerland & Germany has been credited for playing a key role in the economic development of these nations. Despite best government efforts, India has not been able to adopt this system of education due to the vastness & complexity of the country and the rigidities of the education system. The Dual System of Training announced by MSDE's Directorate General of Training and other similar schemes piloted in India have been unsuccessful. However, the ***National Education Policy*** launched by Ministry of Education in 2020 and subsequent policy announcements such as National Credit Framework lay the foundation for bringing in the flexibilities and innovations that are required for adopting the Dual Model of Education.

Lernern aims to develop a framework and sustainable, scalable implementation model for adaption and adoption of the Dual Model of Education in the Indian context which ensures better learning outcomes while maintaining an optimal *Return on Investment* for the learner.

Keywords: Technical Vocational Education & Training, Dual Model of Education, Dual System of Training, Short Term Skilling, Skill India Mission, ITI, Learning Outcomes, Competency Assessments, Labour Market outcomes, Apprenticeships, Work Integrated Learning

Background & Rationale

Labour is the most abundant asset of the poor, and effective engagement of this asset in productive activities is seen as the fastest way of alleviating poverty in the developing world. India's labour force participation rate is just over 50% and has an unemployment rate of under 10%. The last decade or so has seen a sharp drop in the proportion of people living below the poverty line but more than 90% of the employment continues to be in the unorganized sector and most of these would dropped out at some stage of the formal education system.

An irony in our labour surplus country is that the industry faces a shortage of skilled manpower and is beset with problems of low productivity and high attrition. The manufacturing sector operates in a highly cost competitive environment, domestically & globally, and sees little benefit in investing in skill development of its manpower. It is increasingly shifting to automation and manages with unskilled or semi-skilled workers on short term contracts. The services sector which contributes to

over 50% of the economy only employs 25% of the total workforce. Most of these are in entry level, low paying jobs in retail, hospitality, sales & marketing and healthcare with high turnovers.

The formal education system in India, including TVET, is plagued with endemic issues of inadequate physical infrastructure, outdated curriculum, sparse geographical coverage, poor quality of faculty, lack of academic integrity, limited industry involvement and rigidities in terms of entry and exit barriers. The penetration & quality of government run institutions is poor and private institutions are often out of reach for the bottom of pyramid. This has resulted in high drop-out rates across the education system and a high degree of unemployability of the throughput. TVET remains un-aspirational and this reflects in the low gross enrolment rates in various institutions offering vocational & further education.

In response to these challenges, different governments have launched skilling schemes at both central and state level since 2010. In 2014, the central government carved out a separate ministry (Ministry of Skill Development & Entrepreneurship) from the erstwhile Ministry of Labour & Employment to focus on governance of the long term and short-term skilling ecosystem. Many state governments have launched skill missions and have consolidated skills training at grassroot level through employment offices and engaging with the district administration. Through its apex bodies, *National Skill Development Corporation* and the more recent *National Council of Vocational Education and Training,* the Ministry of Skill Development & Entrepreneurship has synthesized the TVET system into long term and short-term skilling and standardized qualifications within the *National Skills Qualifications Framework* which maps out all qualifications and corresponding occupational standards. However, these efforts thus far have yielded limited results and studies on long term employment outcomes of the schemes are not very promising.

On the other hand, the much-vaunted ***Dual Model of Education*** of Switzerland & Germany has been credited for playing a key role in the economic development of these nations. Despite best government efforts, India has not been able to adopt this system of education due to the vastness & complexity of the country and the rigidities of the education system and the Dual System of Training announced by MSDE's Directorate General of Training has not quite taken off. However, the ***National Education Policy*** launched by Ministry of Education in 2020 and subsequent policy announcements such as national Credit Framework does lay the foundation for bringing in the flexibilities that are required for adapting the Dual System of Training.

My personal work in TVET over the past 14 years includes the incubation of two social entrepreneurships which have attempted innovations in the skill development space in partnership with *Centurion University of Technology & Management*, one of India's leading Skills Universities. The first initiative, *Gram Tarang Employability Training Services*, worked closely with National Skill Development Corporation on grassroot skill development for rural, disadvantaged youth by setting up brick and mortar institutions across remote regions. *Lernern*, the second startup was seeded more recently during the Covid pandemic, seeking to leverage Apprenticeship models with industry

partners for implementing the Dual Model of Education & Training facilitated by technology & blended learning. However, given the vast, complex & dynamic nature of the labour market in India, there are several implementation challenges. At Lernern, we aim to develop a unique, customized model of Dual Education for India which ensures academic rigour with learning outcomes, labour market outcomes and offers a good RoI to the learner.

LITERATURE REVIEW

UNESCO-UNEVOC have developed a specific strategy especially for TVET in the developing world for achieving UN's Sustainable Development Goal 4 (SDG 4) of Quality Education. TVET directly impacts SDG 8, Decent Work & Economic Growth and naturally impact other SDGs especially SDG 10, Reduced inequalities. The UNESCO strategy 2022-2029 lays out the objectives for 'TVET systems to offer equitable access to skills development for jobs, apprenticeship, entrepreneurship and economic opportunities' and also aims to 'Build flexible lifelong learning pathways'

Ample empirical evidence exists to show that TVET enhances skills of youth, especially uneducated youth (Nilsson, 2010); Blunch and Castro (2007) state that TVET is particularly crucial to economic growth and social inclusion in developing countries.

TVET enhances skill and knowledge of individual and thereby facilitates employment in the labor market (Vandekinderen et al., 2018; Dean, 2003; Becker, 1962; Schultz, 1960, 1961, also cited in Jacobs, 2015). It has been established that investment in education and training to develop technical skills & competencies and economic growth is positively correlated (Dean, 2003; Regmi et al., 2015, also cited in Asadullah & Zafar, 2019).

Labour market outcomes of VET graduates are a fundamental measure of the extent to which VET programmes are meeting labour market needs, helping VET institutions to adjust provision to labour market needs and public authorities to support the most relevant programmes and institutions. Data also help students to choose career paths (OECD, 2009).

TVET System in India

The first Industrial Policy in post-independence India formally introduced Technical and Vocational Training Education and Training (TVET) in India as the government identified the need for developing skilled manpower to fuel the 'temples of modern India'. The Apprenticeship Act 1961 looked to impart practical training in partnership with the Industry. The Kothari Commission created in 1964 sought an overhaul of the Education Sector through pathbreaking policies & guidelines. Under the aegis of the Ministry of Labour & Employment (MoLE), the first Industrial Training Institute (ITI) was set up in 1969 offering a host of technical courses under the Craftsman Training Scheme. For better governance, Directorate General of Training and National Council of Vocational Training (NCVT) was setup to standardize and approve curriculum, create norms for affiliation of ITIs, conducting examinations and offer certifications and also encourage private sector

participation. Soon NCVT certificates became the recognized nationally and globally as the demand for skilled welders, fitters and electricians met the industrial demand of skilled workers.

In order to develop a cadre of grey & white collar technicians, the All-India Council of Technical Education (AICTE) was formed in 1987, as the official regulator and funder for polytechnics and technical colleges.

(India in the 1980s and 1990s: A Triumph of Reforms, 2004) Arvind Panagariya cites that India lagged behind China in growth rates largely due to inability to attract industry because of complex labour law and lack of forward looking policies for developing industry or the labour market.

The subsequent period of the liberalization of the Indian economy saw very little progress in the formal TVET system in the country. There was a clear need for the country to revisit and reinvent the curricula and systems devised years ago, however very little progress was made on this front. TVET remained un-aspirational as the masses suffered from the colonial hangover and preferred general education as the only pathway to white collar or desk jobs. Gross enrolment rates in TVET institutions remained abysmal with less than 10% of Indian youth going for vocational education unlike developed countries like Germany where over 50% of the youth opt for hands on skills or South Korea where the number is over 90%. This reflected in an inertia in formal TVET system in the country both in terms of quality and quantity. School & College dropout rates remained high and the need for creating credible alternatives to the theory & rote based higher education system was palpable. (*Shyamal Majumdar, Asian Development Bank Institute, 2008)*

However, training capacity at ITIs remained extremely low at 1.69 million as compared to 23.76 million students in higher education (Stiftung & FICCI 2015). Course completion rates too were low with a high drop-out rate as the institutions and schemes simply did not give the learners adequate 'clarity about career prospects' (KPMG & FICCI, 2016)

As the effects of opening up the economy were felt in the dynamic, vibrant industrial environment in manufacturing and services sector, skill shortages was the common refrain across the industry as we simply did not have enough ITI graduates. To supplement the shortages on the supply side and augment the capacity constraints of ITIs, India took its first significant step in 2008 through the creation of National Skill Development Corporation which created an ecosystem of Private Training Partners, Sector Skill Councils and carved out the Short-Term Skill development ecosystem and encouraged private sector participation in skill development of youth of the country.

The first National Policy on Skill Development in 2009 and stronger governance was put in place through the National Skills Development Agency (NSDA) established in 2013 and standardization of the Qualifications Framework. Sector Skill Councils were created along the lines of UK & Australia who were tasked with creation of Qualification Packs (QPs) and National Occupational Standards (NOS) to consolidate and standardize the skill courses, curricula, trainer qualifications, assessments and certifications across the country.

In 2014, the government carved out a separate Ministry of Skill Development & Entrepreneurship (MSDE) to give an impetus to the sector. 2015 saw the launch of the Skill India Mission and announcement of the National Policy on Skill Development and Entrepreneurship. In a significant restructuring, the Directorate General of Training (DGT) which was responsible for the long-term skilling through a network of ITIs and the Craftsman Training Scheme, Craftsman Instructor Training Scheme and National Apprenticeship Scheme was moved from Ministry of Labour of Employment under the newly created Ministry of Skill Development & Entrepreneurship. Recognizing the success of Dual model of education in Germany & Switzerland, DGT experimented with its own version of the program called Dual System of Training (DST) with limited success. The Ministry of Education has also encouraged introduction of vocational education in higher education institutions through a failed Community College program and subsequently issued guidelines for Universities to introduce Vocational Diplomas and Degrees called B.Voc and D.Voc.

'Make in India', India's flagship scheme for encouraging the manufacturing sector, accelerated growth in the economy and fuelled demand for skilled manpower in India. The services sector still remains the mainstay of the economy and depends heavily on skilled workers. In order to leverage the often-touted demographic dividend of India, short term skill development program under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) was announced as flagship scheme of the MSDE to be implemented through National Skill Development Corporation (NSDC) and the first phase was implemented from 2016-2020 with the aim of benefiting 10 million youth. Taking learnings from the precursor this scheme (called STAR), the objectives of this scheme were clearly defined to enable Indian youth to take up industry relevant skill training that will help them in securing a better livelihood, improve productivity of workforce and drive standardization of certification process.

Dilip Chenoy (2019), also the first CEO of NSDC, did a study on "Skill development for accelerating the manufacturing sector: the role of 'new-age' skills for 'Make in India'". The aim of the study was to focus on developing right skills to address the growing skill gap in various manufacturing sectors and concluded that that India's demographic advantages can be realized only if the existing workforce is re-skilled and upskilled through lifelong learning initiatives, and new recruits are prepared with 21st century skill sets.

The National Council for Vocational Education and Training (NCVET) was formed in December 2018, by merging the existing regulatory bodies i.e. National Council for Vocational Training (NCVT) and National Skill Development Agency (NSDA) seeking to integrate the regulatory system for better governance and training outcomes. (Skilling ecosystem in India Unlocking the potential of youth September 2020, Grant Thorton)

The short-term ecosystem through the NSDC partner network had collectively developed capacity to skill youth in each district of the country, over and above the ITI institutional network, but has however failed to make a significant sustained impact on account of two key influencing factors:

1) The lack of industry involvement to ensure improved labour market outcomes after the skilling. Short term skilling, while effective in bridging short term demand supply gaps,

simply did not provide a premium in terms of earnings to the learner and therefore remained unaspirational.

2) Large dependence on government subsidy for skilling of rural youth, especially those at the bottom of the pyramid through schemes like DDU GKY, PMKVY etc.

According to the KPMG study in August 2020, "National Education Policy (NEP) 2020 lays down strong emphasis on holistic education across schools and higher education and acknowledges the importance of vocational training." The landmark policy reiterates that less than 5% of India's workforce is formally skilled and identifies the key reasons including lack of focus on dropouts, absence of pathways between vocational and higher education, and un-aspirational nature of vocational education.

Through better policy and governance, short term the short-term ecosystem could have continued to be a key contributor to the economy through a steady supply of semi-skilled and skilled workers from rural areas to demand centers in the cities & industrial belts. However the Covid Pandemic too exacerbated the situation and the short term skill initiatives now are fragmented and the government has shifted focus to implementation of the National Education Policy 2020 and is focusing on skills integration with school & higher education. (Kumawat, Karunesh Saxena and Manoj. Skill Ecosystem in India- A Critical Jan. 2020).

More recent initiatives of MSDE & NSDC in driving National Apprenticeship Promotion Scheme and promotion of Vocational Diplomas, Degrees and Apprenticeship Embedded Degrees through Skills Universities show promise but need better research and program design for effective implementation and ensuring learning and labour market outcomes.

A summary of the various delivery models of TVET in India is provided in the table below which will form the basis for the comparative study.

Table 1

System	Governed by	Implemented by	Courses / Certificates	Funding Model
Higher Education	**Centre:** Ministry of Education, University Grant Commission (UGC), All India Council for Technical Education (AICTE) | **State**: Higher Education Department	Universities, Skills Universities, Higher Education	Vocational Diplomas & Degrees (BVoc/DVoc)	Private Sector: Self-funded; Subsidized in Govt. Institutions
Formal TVET Ecosystem	**Center:** Ministry of Skill Development & Entrepreneurship (MSDE), Directorate General of Training (DGT), AICTE, National Skill Development Corporation (NSDC); **State:** Department of Technical Education/Labour/Industry	ITIs; Polytechnics; Certificate & Diploma Institutes	1-3 year certifications: ITI, Diploma Engineering, Diploma in retail/hospitality/healthcare etc.	Private Sector: Self-funded; Subsidized in Govt. Institutions
Apprenticeships	DGT, NSDC, Board of Apprenticeship Training (BOAT)	National Apprenticeship Promotion Scheme; National	Apprenticeship Trade Certificate, NSQF Skill Certificate,	Industry pays wages, Govt. provides some subsidy to

		Apprenticeship Training Scheme	Apprenticeship Embedded Degrees	wages
Short Term Skilling Ecosystem	National Council of Vocational Education & Training (NCVET) National Skill Development Corporation (NSDC), State Skill Missions, Individual Ministries like Ministry of Rural Development, Urban Ministry, Minorities & Tribal Affairs, Agriculture, Industries, Ministry of Textiles etc.	Schemes like PMKVY, DDU GKY, NULM, Samarth etc.	NSQF Skill Certifications (NCVET), Typically 2-3 months in duration	Government provides outcome linked reimbursement to training provider; Paid models also being attempted
Industry Training	Ministry of Labour / State Labour Departments	Induction & Job specific training	Industry Certifications	Industry Sponsored

Dual Model in Switzerland & Germany

"The dual system of VET, widely practiced and popular in Germany, serves as a model for the European Union. The effectiveness of such training, successfully combining the development of theoretical knowledge with the practical activities of students, has been tested by life and time." (GERMANY'S DUAL EDUCATION SYSTEM: THE ASSESSMENT BY ITS SUBJECTS A. Yu. Pleshakova, 2009)

"The dual system of VET is regarded as one of the major reasons for favourable school-to-work transitions and very good performance when it comes to youth unemployment on the one hand and a good mix of analytical-theoretical knowledge and tangible professional ability on the level of intermediate skills on the other hand" (Dr Philipp Grollmann, Deputy Head of the Internationalisation / Monitoring of VET Systems at the BIBB).

Several studies have identified the unevenness and quality of TVET across sectors and regions as one of the key reasons some countries remain trapped at the middle-income level of development (Doner and Ross Schneider 2016).

The foundation of the dual TVET model requires division of vocational education and training between school-based learning and workplace-based learning in the industry. "In Germany, dual TVET grew out of a long history of guild-based apprenticeships, class conflict and bargaining, industrial modernisation during and after the Second World War, and multiple refinements in recent decades" (Thelen 2004 ; Thelen and Busemeyer 2012; Deissinger 2015a, 2015b).

"Business chambers play a central role in the dual TVET system. Chambers are public law bodies and businesses are required by law to belong to chambers and in turn federal law assigns the chambers substantial autonomy and regulatory power. The chambers, through their member dues, provide a little over half of the total financing of TVET, with government providing the balance. Trainees do not pay for their own training. The chamber system helps ensure that the interests of small and medium sized firms are not overshadowed by large enterprises." (Public–private partnerships in

TVET: adapting the dual system in the United States, Journal of Vocational Education and Training, T. F. Remington 2018)

Oosterbeek and Webbink (2007) studied the economic benefits of an extra year in vocational education in the Netherlands. Their findings indicated that graduates with an extra year do not benefit significantly in terms of wages when compared to those who do not and establish that an extra year in vocational education is equal to an extra year of work experience in terms of labour market outcomes.

Adapting the Dual Model to the Indian Context

The government has made several large-scale efforts in encouraging industry participating in vocational education through the Apprenticeship Scheme. However, looking at the poor participation rates of industry in enrolling apprentices on their shopfloor, an *Apprenticeship Protsahan Yojana* (Encouragement scheme) was announced where the industry was offered an incentive for enrolling Apprentices. However, systemic issues especially around the process of registering the candidates and processing the incentives yielded poor results. More recently MSDE announced the National Apprenticeship Promotion Scheme (NAPS) which handed over charge of implementation of the scheme to NSDC and results have been more encouraging. However, the scheme suffers with a fundamental issue of absence of any formal training to the Apprentices and the learning is limited to shopfoor, job specific skills with little development of knowledge, soft skills and attitudinal aspects.

Other than Apprenticeships, there have been several attempts at replicating the Dual Model of Germany in India by the TVET governing bodies. These include Dual System of Training (DST) and National Employability Enhancement Mission (NEEM) of AICTE, both of which have largely failed. Through the DST, ITIs were encouraged to enroll an additional batch of trainees who will move between industry and the training institute over a two year period to complete their vocational course. However the geographical distance between industry clusters and labour surplus districts remained a big challenge and industry response was poor.

The key missing factor resulting in the failure if these schemes is of 'Codetermination' which is an essential component of the German Dual system which is evident in the role that employers associations and trade unions have in working together on funding, curriculum design, certification and overall governance of the dual system (Mehrotra et al 2014). In the Indian context, Industry associations at central level like Confederation of Indian Industries (CII), Federation of Indian Chambers of Commerce & Industry (FICCI) or sector specific associations like Society for Indian Automobile Manufacturers (SIAM), Auto Component Manufacturers Association (ACMA) etc. and more recently created Sector Skill Councils and trade unions have little or no consultations. The burden of private sector engagement is left to the management of individual ITIs or to the states which makes the efforts scattered and not scalable or sustainable.

"This is where the Indian DST model significantly differs from the German model as state institutions in India are mandated to induce partnerships and there is relatively little interest for corporate institutions to sustain the dual training on their own. Introduction of DST has not been able to bring about this much sought-after and talked about synergy." (Uncertain itineraries: dual

system of training and contemporary TVET reforms in India, Srabani Maitra, Saikat Maitra & Manish Thakur 2021).

The NEEM scheme was able to address this problem with private sector participation and there was some scale achieved in the roll out of the program which even exceeded enrolments in MSDE's Apprenticeship scheme, however the learning aspects were once again ignored. The participants enrolled in the program became a source of cheap labour for the industry and the government was forced to roll back the program in 2022.

The fundamental challenge is on affordability of implementation especially when the industry has a lack of willingness to participate formally in any training schemes. "As the classical economic literature on human capital formation argues, firms are typically reluctant to devote resources to general training beyond the immediate needs of the firm out of a reasonable fear that other firms can freeride on their training efforts" (Acemoglu 1997 ; Acemoglu and Pischke 1998 , 1999).

"Deeper co-investment by individual employees, firms and government in job specific and industry specific training may require some guarantee to both sides that the resources invested in training will yield a longer-term return; social insurance mechanisms protecting the value of such skill against the loss of employment income may help induce such joint investment" (Busemeyer and Trampusch 2012; EstevezAbe, Iversen, and Soskice 2001 ; Iversen and Soskice 2001).

There is a clear need to further research and study the model in detail to adapt and contextualize the Dual model to India's dynamic and complex environment which will ensure learning outcomes as well as labour market outcomes and *Return on Investment* for those investing in the training.

Assessment tools for TVET systems

"Assessment can help you identify strengths and weaknesses, map development or progress, make decisions regarding suitability for a job or a field of study, identify training and education needs or it can assist in making a diagnosis" (Foxcroft & Roodt, 2009, p. 3).

Assessment is defined by the Department of Education & Training, Western Australia, as the process to identify, gather and interpret information against the required competencies in a qualification, part qualification or professional designation to judge the learner's achievement. Assessment can be informal, formal or non-formal. Recognition of Prior Learning (RPL), credit accumulation and transfer must be included. Assessment tools are required to gather and interpret the evidence of competence across dimensions and the instrument refers to the activity or specific questions used while the procedure entails the instructions on how the assessment must be conducted, analysed and presented

In the recent past, several initiatives were taken to develop large-scale assessment instruments to enable comparisons of learning outcomes of different systems for technical vocational education and training. Baumert (2009) states that universalization and standardization of schooling are global trends which stir an interest in international comparisons of educational systems.

While International large-scale assessments have a limited focus on students performance in mathematics and science (PISA), replicating studies for TVET would need to account for a large

variety of skill domains and contextualize the differences in the educational systems between countries." (Large-scale studies of holistic professional competence in vocational education and training (VET). The case of Norway Leif Chr. Lahn*, Hæge Nore, 2019)

Holistic approaches to the assessment and comparability of professional competence have been propounded by several scholars and critical studies such as the one by Hager, Gonczi and Athanasou (1994) highlighted the weaknesses of two dominant approaches – behavioral and the cognitive. The COMET model has been well researched in reports and articles. The instrument has been tested ins several countries like Germany, China, South Africa, Norway, Switzerland, Vietnam, Spain and Poland. Domains such as industrial mechanics, car mechatronics and elderly care nursing have also been explored in addition to the original focus on craft and industrial electronic technicians. The model clearly has the potential for "international comparative competence diagnostics" (Fischer et al., 2015; Zhao, Zhang, & Rauner, 2016).

The unification of Qualification systems for vocational skills has been a key issue for TVET for some time (Rauner et al 2013). The Competency Development and Assessment in TVET or COMET model has been acknowledged as the most comprehensive "international and portable assessment framework to test for competence diagnostics in TVET".

COMET or Competence-based assessment is a large-scale process designed along the lines of OECD's Program for International Student Assessment (PISA). "However, COMET assessment accentuates content validity in contrast to PISA where the valuing of different educational contexts is overlooked" (Schleicher, 2013; Kaplan & McCarty, 2013). The COMET assessment model enables benchmarking as a quality assurance tool applicable to help measure the effectiveness of the learning at institutional level which can be rolled up for national / international level comparisons.

"With the (COMET) tool, required and existing competences are contrasted in order for the qualification deficits to become visible. Thus, the tool provides a quick and comprehensive overview of the employees' competences" (Berufsfoerderungswerk Nuremberg). "The COMET competence model for large-scale competence diagnostics can be used as the basis for comparative assessments between current assessment strategies." (The potential of the comet competence Diagnostic model for the assessment and Development of occupational competence and Commitment, in technical vocational Education and training, Patricia Ammarenthea Jacobs 2015)

Studies by KNAPP and Assessment Certification (ACE), New South Wales support the fundamental principles of COMET (KNAPP. (n.d.). Competency Based Assessment. Is is right for you? Knappinternational.com).

Key elements of COMET Model.

The COMET competence model, is based on the four-stage scientific and technical literacy model proposed by Bybee (1997).

- Nominal Competence
- Functional Competence
- Procedural Competence
- Multidimensional Competence

(Rauner, Heinemann, Maurer, Haasler, Erdwien & Martens, 2013, pp. 42-43)

COMET Competence model has three dimensions (Figure 1) namely, the Requirement dimension, Content dimension and the Action dimension.

Figure 1

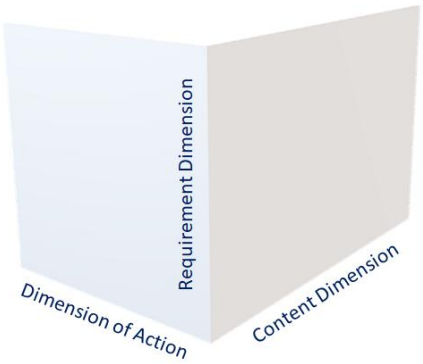

Table 2

Requirement Dimension Level of Competence	Content Dimension Domain based	Dimension of Action Holistic Work and Learning
Nominal	Beginner	Informing
Functional	Advanced	Planning
Processual	Professional	Deciding
Shaping	Expert	Conducting
		Controlling
		Assessing

Content Dimension:

The Content dimension was originally advocated by Dreyfus (2004) as part of a linear learning trajectory and forms an important base dimension of the model. The content of teaching and learning in a specific subject or learning area serves as a basis for the model. In this aspect, the model diverges from the PISA model where a "world-curriculum" is adopted. This dimension allows for an occupation-specific implementation permitting comparison of competence levels and development of learners in different occupations as well as different TVET. In addition, competence can be tracked at different stages in a specific vocational programme. The phases of competence development may be identified from Beginner to Expert worker.

Requirement dimension (levels of professional competence):

The requirement dimension, specifies the levels of "professional problem-solving" ("Berufliche Problemlösung", Rauner et al., 2013b) and is based on the four-stage literacy concept formulated by Bybee (1997) and incorporated in different versions of PISA.
This dimension allows for concrete description of empirically tested competences at various levels ranging from Low to High competence levels.

(1) Nominal competence (Nominelle Kompetenz), indicates the learner has basic conceptual knowledge and is unable to complete the assigned task adequately in practice.
(2) Functional competence (Funktionale Kompetenz), implies that the learner has some abilities in a domain, but may be weak at connecting different elements in practice.
(3) Processual competence (Prozessuale Kompetenz) is when the solutions to the task include an appreciation of work processes and situational constraints, and
(4) Holistic shaping competence (Ganzheitliche Gestaltungkompetenz), entails complex vocational problem-solving that encompasses a generative aspect.

The Action Dimension:

As its main building block the Action dimension traces its roots to German work psychology (Hacker, 1973; Oesterreich & Volpert, 1986; Monnier, 2015) and is underpinned by "complete professional action" a fundamental normative principle. It is diverged into six steps of activity aiming at validating holistic problem solving constituted by the requirement and the action dimensions, contributing to refining COMET as a basis for the development of test tasks and the rating of solutions. The actions are: informing, planning, deciding, conducting, controlling and assessing. (Rauner et al. 2013, pp. 49-52) (Patricia Ammarenthea Jacobs 2015)

3.5 Establishing Return on Investment from TVET

"Strengthening technical and vocational education and training (TVET) is an important strategy to contributing to equitable, inclusive and sustainable economies and societies. More than ever before, there are calls for providing more evidence of the return on investment (ROI) from TVET… the Information on the ROI is also useful at the enterprise and individual levels and the role it can play in the evaluation of public policies related to TVET." (Understanding the return on investment from TVET UNESCO/UNEVOC/NCVER 2020)

Return on Investment (RoI) is defined in general as a metric that establishes the benefits accrued from an investment relative to the costs incurred therein. In the context of TVET it may be defined as the benefit derived by learners, industry and economies or countries in general from investing in the education & training. In this study, ROI will be defined from the perspective of the learner:

Table 3

Possible Measures of Return	1) Skills & Competencies Acquired 2) Qualifications Earned 3) First salary / stipend / wages earned & Growth in wages over 3-5 year period
Possible Measures of Investment	1) Time spent in learning 2) Fees Paid by the learner or sponsor (e.g. Subsidy from government schemes) 3) Loss of earnings during the course

Several studies have been done to understand the Return on Investment of TVET versus General and Higher Education (GHE) and these have yielded varying results. A study in Indonesia (Chen 2009) showed no statistically significant difference in labour market outcomes of TVET students compared to GHE ones. Kahyarara and Teal (2008) found that in Tanzania, TVET provides relatively more returns than general education in cases of lower levels of education. In Sweden, Stenberg and Westerlund (2015) find that graduates trained in specific skills learn more in the short-run, but that the difference converges 5 to 7 years after completion of the program.

"The economic returns of TVET, however, are not clear. Without credible data showing the economic return of education at both the individual and wider economy level, there is a tendency for an undervaluation of TVET. Hence, 'hard evidence' of monetary rates of return at the individual, household, and at economy-wide levels is needed." (UNDP STUDY ON ECONOMIC RETURN TO INVESTMENT IN EDUCATION AND TVET August 2019, Swiss Agency for Development & Cooperation SDC).

Tripney and Hombrados (2013), conducted a meta-analysis of studies examining the impact of TVET interventions for youth in low and middle-income countries. The authors found small yet statistically significantly positive impacts of TVET. However this depended heavily on the method employed in estimating the impact.

Overall, the inconclusive empirical results of this aspect of TVET point to gaps in the literature as these studies may not account for socio-economic background, geography or other demographics which could be key influencing factors in the labour market outcomes.

Summary of Literature

The Indian TVET ecosystem has been through a fair bit of overhaul in the past decade and new models of delivery have been experimented at length across the length and breadth of the vast country with mixed results. It is imperative that we take stock of the learning outcomes being delivered through different models through a framework that allows us to benchmark the outcomes internationally especially as the country is working towards a vision of becoming the "Skill capital of the world". A large percentage of the youth of India continue to be excluded from the formal TVET and Higher Education system of the country and have an imperative need to start earning by entering the workforce. Developing a TVET delivery model that combines competence development at institutions and workplace learning while being affordable is the need of the hour and holds the potential of ensuring the demographic dividend does not become a liability. There is a clear gap in literature on quantitative studies of learning outcomes and labour market outcomes of TVET in India.

The dimensions of competence diagnostic assessment and development models can form the basis of this assessment of occupational competence. Expertise in work processes requires knowledge and skills learnt at TVET institutions coupled with real-world, hands-on learning. The COMET model has emerged as the PISA for TVET and will provide the best basis of assessing learning outcomes of TVET in India. For establishing evidence of *Return on Investment*, econometric methods with proper sampling methodologies and a rigorous methodology will help fill the knowledge gaps identified on this front.

Research Objective 5: Develop a comprehensive framework for effective implementation of the Dual Model of Vocational Education in India in light of the National Education Policy and subsequent policy notifications of Ministry of Education and Ministry of Skill Development & Entrepreneurship.

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