THE DEVELOPMENT OF A CURRICULUM FRAMEWORK FOR THE NATIONAL DUAL TRAINING SYSTEM IN MALAYSIA

Exposé

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ABSTRACT

At present, there are about 750 job titles of National Occupational Skill Standard (NOSS) that cover 7000 training programmes or so, conducted in skill training institutions throughout the country which has been acknowledged as a sole system of training for pre-employment to cater for industrial needs. This system has been in place since the year 1993 as a basis for implementing skills trainings and certification processes.

These NOSS-based training programmes however, have been gradually found mismatched against what they were initially meant for i.e. to meet the requirements of industries. In addressing this growing issue, the government on the 19th May 2004, decided to implement the National Dual Training System (NDTS) by the year 2005. The NDTS, which exposes apprentices to the actual practices in industries, was introduced to produce k-workers to meet the industries prevailing requirements. The NDTS is hoped to resolve the issue of skilled workers being produced but not meeting the needs of the industries.

Therefore, the development of the NDTS curriculum or better known as the National Occupational Core Curricula (NOCC) were started in April 2005, organised by the National Vocational Training Council and spearheaded by experts from related industries. Unfortunately, to date, only 4 training occupations have been completed. This will definitely result in serious scarcity in curriculum in the market.

Hence, the main purpose of this study is to propose a new NDTS curriculum framework that will fulfil the needs of industries and expedite the process of curriculum development to be implemented in Malaysia as well as in other interested countries. The methodology used to conduct the study consists of surveys, case studies and curriculum development methods. The research’s targeted populations are the automotive companies and industries as well as the public institutions that are already involved in the NDTS programmes.
1. BACKGROUND

Technological application has been widely used in developed and developing countries to enhance and expedite their economical development by exploiting the modern and advanced techniques especially in industrial sectors. In this regards, carefully well-moulded development of human resources is vital in fulfilling the manpower requirements of the industries. As a result, a proper design of vocational training is indispensable to serve this purpose. Consequentially, a careful study of curriculum development and training-need-analysis must be done to come up with good quality curricula.

Malaysia must not be left behind in this industrial development to enable the aspiration of the country to become a developed country by the year 2020 a reality; it should work smarter and harder. In achieving this objective, it has appointed several relevant ministries to look into this matter.

The Ministry of Human Resources is one of the key ministries, which actively involves in developing the national industrial workforces. It takes care of workers’ welfares, training affairs and labour laws, inclusive of foreign workers. The National Vocational Training Council (NVTC) or better known as MLVK has been established on 2 May 1989 to administer the training affairs. The functions of this department are to formulate, promote and co-ordinate the vocational and industrial skills training to fulfil the national economic development of the country.

The NVTC is not only coordinating the training institutions under the Ministry of Human Resources such as the Advanced Technology Training Centres, Industrial Training Institutes and Japan-Malaysian Technical Institute, but also under other various ministries and state governments as well as private training institutions which total up to about 1100 centres. The main role of the NVTC is to bridge up the gap between training providers and workplace requirements or in other words - between world of training and world of employment. In order to make it a success, NCTC was given responsibility to develop a training standard according to the requirement of industries involved. In December 1992 the NVTC has introduced the National Occupational Skill Standards or NOSS (MLVK, 1994; NVTC 2001). The NOSS based training system has been developed using the DACUM (acronym for ‘Developing A Curriculum’) process approach (Ahmad, 1993; Pang, 1986). Then this NOSS is distributed to the training institutions to be used as training guides. In the training institutions, training syllabus is then derived from the relevant NOSS. In term of certification, at present, the NOSS consists of 5 levels of competency. It also could be used in working environment such as for workers performance evaluation, job modification, job description, career development/planning and basis for wages/compensation.
The NOSS development basically based on job title and the number of the job title developed so far is 750 and it covers about 7000 training programs throughout the country. The NOSS-based training system has enjoyed impressive growth to establish itself as the dominant system for pre-employment training in the country. Its progress continues to be driven by the government through the efforts of the NVTC (MLVK, 2005a). However, there is a mismatch between training programme and the industry requirements (Yogeesvaran, 2005) that results in low productivity.

Along the way, drastic technological changes and increasing complexity of work processes in industry have resulted in new requirement of skilled and dexterous workers. The government on the 19th May 2004, decided to implement the National Dual Training System (NDTS) by the year 2005. The NDTS that exposes the apprentices to the actual practice in the industries was introduced to produce k-workers\(^1\) under a comprehensive and advanced training system, to meet the industries prevailing requirements. NDTS will resolve the issue of skilled workers being produced but not meeting the needs of the industries.

The NDTS is a training concept involving training at two locations that is 70%-80% of the industries and remaining 20% - 30% at the training institutes. The types of training program under the NDTS will be determined by the industries concerned in collaboration with the training institutes, whether it is to be day-release or block-release, convenient to the industries. In the day-release program, students are trained at the industry 4-5 days a week and the remaining 1-2 days at the training institutes. In the block release program, trainees undergo training for 4-5 months at the industries and 1-2 months at the training institutes. The training period is about 2 years of four semesters (MLVK, 2005b). The NDTS implementation of training and its assessment in the industry and training institute is based on the National Occupational Core Curriculum or NOCC that is developed by the industry for specific training occupations.

The NOCC is applied in teaching and coaching process, used as the basis in preparing teaching materials, as a standard for levels of achievement and skills quality of the apprentices and as a reference for preparation of the Learn And Work Assignments or LWA (MLVK, 2005c). Nonetheless, the number of NOCC developed so far is far from sufficient\(^2\). Thus, something has to be done to overcome this problem.

The dual training system has attracted many parties in our country. During the Eight Malaysian Plan (2000 to 2005), 20.6 percent of the development allocation was allocated to education and training, reflecting the priority given by the government to

\(^1\) k-worker is known as a skilled worker in Germany.

\(^2\) Only 4 NOCCs were completely developed since 2005.
human development. Nevertheless it was found that the increased investment in human capital by the government is not sufficient in creating a responsive and effective education and training delivery system in meeting the market requirements (Zaharaton, 2003). For that reason, the development of skilled human resource as required by the country is expected to be reinforced in the Ninth Malaysian Plan (2006 to 2010). Hence, the study is to ensure that the curriculum for the NDTS programs is developed accordingly in fulfilling the needs of industries. This is vital to achieve the aspiration of the nation to produce knowledge-workers and to become a developed industrial country by the year 2020.

The dual system of training in Germany where this system originated has become a key inspiration for vocational training reforms around the world. Countries such as France and Britain see the German system of vocational education and training as “a model to copy” (Hamilton/ Lempert, 1996; Senker, 1995). The dual system is frequently held up as the “centrepiece of vocational education and training in the Federal Republic” (Raggatt, 1988) and goes back to a long-established tradition of apprenticeship, which still stands for a pattern of qualifying young people for the world of work that is unique within Europe. The concept of “recognized skilled occupations” represents a crucial part of the German tradition of in-company training, although the first qualification standards only date back to the 1920s (Benner, 1987). It is commonly acknowledged that recognized and standardized training may result in the benefits of marketable and transferable skills.

Anyhow, should both training systems run simultaneously in Malaysia, they will raise confusion among the training providers and industries on why should we use two different standards and managed by the same coordinating body and eventually award the same certification. These concerns have spurred a number of suggestions including by the Director General of the NVTC to make use of available resources particularly the existing NOSS to be incorporated into the NOCC. By doing so, it will eliminate some of problems faced by NVTC\(^3\). It might be possible but to what extent this suggestion could be implemented is still a question. A careful study must be carried out before formulating the incorporation of the NOSS into the NOCC and the development of the NDTS curriculum.

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\(^3\) MLVK, Management Meeting, 2005.
2. PROBLEM STATEMENT

The rapid development of technology and increased competition in the world market has placed human resources development as a critical element in the establishment of policies and strategies of the country. High quality human resource is a key ingredient in moving forward into a knowledge-based economy, enhancing competitive edge and building a resilient nation. Therefore, the strategy in the human resource development will be focused on strengthening the education and training delivery system to increase the supply of knowledgeable and highly skilled manpower (Zaharaton, 2003).

According to Spöttl and Becker (2006), the fast developing industry in Malaysia requires comprehensively trained skilled workers or k-workers. The Competency-Based-Training (CBT), as derived by the NOSS which is rather oriented towards an adaptive qualification and functions according to the English model, seems to be less and less adequate for this aim. The NOSS based curricula describe very narrow fields of tasks (Duties) and highly fragmented tasks (Tasks), which are no longer able to cope with the ranges of tasks of skilled workers in modern production and service concepts. Spöttl states that:

“The high risk linked to this approach is that the instruction process is split in a similar way resulting in a “Tayloristic” method of teaching which reflects the Tayloristic division of labour of the “old production concepts” in factories” (Spöttl 2002, S. 20).

This is partly due to the concentration on “learning outcomes” during the instruction design, which can be more easily realised by precisely defined and closely delimitated work and learning steps. On the other hand, teachers and trainers involved in the instruction design then lack information on the work processes and the work coherences that had not yet been assessed with the procedures of “job” and “task analysis” and therefore could not be taken into consideration for the curricula. In addition a systematic teacher training is necessary to enable the teaching staff to transfer work process oriented curricula into didactical concepts. As a result of that, Yogeesvaran (2005) claims that there has been a presence of skills mismatch in the NOSS-based training programmes where the qualifications of unemployed were not relevant to the requirements of manufacturing sectors where the graduates from the training institutions fail to perform the given task that resulted in loss of productivity.

The latest initiative in enhancing Malaysia’s skill delivery system is to implement the NDTS from the year 2005 onwards. The implementation of the new training approach will be coordinated by the NVTC (Fong, 2005). Problems that arise in the human resource development currently can be categorised as follows.
The development of the present curriculum for the NDTS program was started in April 2005 by the industry with the guides from experts and facilitators for specific training occupations. To date, only 4 NOCCs have been completed out of 200 or so training occupations that result in serious scarcity in curriculum in the market. This is mainly because the development of the NOCC merely relied on experts’ and facilitators’ guides. There was no proper curriculum framework that could be utilised during the development process. Unfortunately, there were only few capable facilitators that can give guidance in developing dual training curriculum. Therefore, due to this shortage, only limited number of NOCC could be developed at one time. Apart from that, those newly-developed NOCCs did not include or incorporate local factors that can effect the curriculum development such as training and economic sectors (Adam/ Blumenstein/ Boehm/ Ebeling/ Gronwald/ Schade, p 11, 1999). Hence, it is indispensable for the NVTC to develop a holistic and comprehensive curriculum framework for the NDTS curriculum development.

Despite of offering Malaysian Skill Certificate Level 3 qualification, the NOSS based training system and the NDTS are separate entities. Many have questioned about the differences between the two systems in terms of training programme outcomes, awarding of certificates and participation of the private training institutions. More importantly it looks awkward for one country to have two different training systems running at the same time. In this regard, it is best addressed by designing the framework, which can encompass both training systems.

3. RESEARCH STATUS

Nowadays, they are many approaches in designing and developing a curriculum models or frameworks that have been developed by people who are expert and experienced in their respective disciplines of studies. Through their endless efforts and endeavours, various methodologies of designing and developing a curriculum models or frameworks have been available to suit our needs and perspectives particularly in the field of technical vocational education and training (TVET). According to Glossary of Terms used in Curricular Work, the curriculum is a systematic training guide that incorporates the general conditions such as competences imparted (training concept) and the didactic and methodological preparation (pedagogic design) are selected for specific target groups. The form and scope are designed in line with the general conditions and target groups. The target group context, prior education and the requirements of the labour and goods markets are brought into relation with each other. Whereas, the curriculum concept is about the compilation of the different components of the competences to be imparted with the related contents and methodology. These three factors are combined in typical
learning and working tasks (Adam/Blumenstein/Boehm/Ebeling/Gronwald/Schade, 1999).

3.1 Curriculum development approaches

In order to develop a new curriculum framework that suits the needs of the dual training system in Malaysia, the researcher will study three appropriate curriculum development approaches from the literature.

3.1.1 Curriculum Framework based on learning fields

The key purpose of learning fields is to link the curricula and ultimately the learning processes to the work activity and simultaneously promote action learning at the curricular level. Action learning in VET schools has to be holistic, situated and relevant and should support experience making. Therefore, the reference to the learning process via learning fields is related to a complete work activity with self-directed planning, execution and evaluation of the action while also taking into account interdisciplinary aspects (e.g. technology, economics, ecology, law, etc.). The main activity is to identify occupational situations which are significant for the work activity and also have a potential for learning (Bauer/Przygodda, p 24, 2003).

The new curricular framework is derived from occupational fields which represent the area of working, related to work and business processes and competence based. The learning fields and their contents are structured in a logical way. The new curricular framework is developed based on three following elements:

- **Analysis**: the occupational fields, working and business processes are analysed through a focus on developing curricula.
- **Transformation**: the empirical results are transformed into curricula for competence development. The transformation process is conceptualised through the use of educational, pedagogical, psychological and societal criteria.
- **Systematisation**: the elements (learning fields) and the content of the curricular elements are arranged to support competence development. This requires a competence model to describe an appropriate method of learning.

The main principle here is the linking of the empirical analysis of work with a competence model. This model is based on Dreyfus/Dreyfus’ (1986) novice-expert paradigm with the assumption that competence is acquired by the successful performance of a task. A macro-structure is assembled which is derived from the novice-expert paradigm with four knowledge and competence levels. Finally, the core tasks are systematised within these four learning sectors (Spöttl, 1997, Rauner, 1999, Spöttl/Rauner, 2002). Through this
concept, core tasks are identified for the industrial occupations and organised them according to their competence model.

<table>
<thead>
<tr>
<th>sector of learning</th>
<th>sectors of working</th>
<th>work performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4) Experience-based</td>
<td>How things can be explained in detail and problem solved?</td>
<td>Un expected Working tasks</td>
</tr>
<tr>
<td>In depth knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Knowledge Of details and function</td>
<td>How things can work like this and not otherwise?</td>
<td>Problem based special working tasks</td>
</tr>
<tr>
<td>(2) knowledge of context</td>
<td>Why are things connected like?</td>
<td>Systematic Working tasks</td>
</tr>
<tr>
<td>(1) Knowledge of orientation and overview</td>
<td>What is the occupation mainly about?</td>
<td>occupational oriented working tasks</td>
</tr>
</tbody>
</table>

**Figure 1: Macro-structure for the systematisation of core tasks.**

**Comments:** According to Rauner (2003), this curriculum approach is comply with the *Beruf* concept since the vocational training is construed as a qualification for work processes based on occupational profiles, then the key issue is to analyse vocational work processes and vocational activities in order to reveal a detailed picture of qualification requirements which finally form a basis for vocational curricula. The subject of the work analysis was recording and evaluating operational work processes in a tayloristic organisation of work processes. Particular importance is attached to labour and activity analysis in constructing occupational training regulations, for it is assumed that it is possible to determine the elementary building blocks of vocational work behaviour by reference to the types of activities and the jobs performed. Apart from that, it also takes the school-work place relationship into the approach in analysing the vocational work processes and vocational activities.
3.1.2 CURRENT approach

According to the authors, curricular work is a dynamic process, which requires ongoing revision and on-the-spot customising. They proposed general guidelines as showed in Figure 5 that guide the process of developing of curricular work. Competencies embrace abilities, skills, knowledge and patterns of behaviour which are necessary in order to perform an activity. Traditionally a distinction is made between specialised, methodical and social competencies. The distinction between the major vocational competencies as required for training then results in the categories of technical/craft, business/entrepreneurial and environmental competencies which imply specialised, methodical and social competencies respectively. The curriculum should include learn and work tasks which combine congruent contents and methodical components that are tailored to the labour and/or goods market. The learn and work task that comprises craft, small-scale business and general competencies should be developed concurrently.

The learn and work tasks tell teachers, instructors and learners in concrete terms what should be done during training and how this should be organised. They thus encourage a practice orientation which is not achieved merely by listing learning objectives or competencies. Learn and work tasks, which may include the production of simple products, can be presented in the form of sketches or drawings. The learn and work tasks can be disseminated with the curricula in the form of flexible components. A distinction is generally made between open and closed curricula, the former do not specify everything, but leave some leeway for teachers and learners to decide on contents and methods. Not infrequently closed curricula are called for on the grounds of the lack of competence of teaching staff. It is however impossible to "cover" a closed curriculum with learn and work tasks. The learn and work tasks should rather be used as examples, to give teachers and earners ideas on the basis of which they can develop their own tasks in line with local conditions and possibilities. The curricula are not static, but rather as a process type development in which teaching staff, learners, employed individuals and "users of manpower" (employers and self-employed small and micro entrepreneurs) should be involved on an ongoing basis. This is the only way of ensuring genuinely employment-oriented training, that not only takes into account the dynamics of the working world, but actually helps to shape this. It should be pointed out to those curriculum planners who find this too demanding that in the informal sector in particular workers are constantly shaping their own working world, since they do not enjoy the legal provisions and social safety net of the formal sector for economic reasons alone (Adam/ Blumenstein/ Boehm/ Ebeling/ Gronwald/ Schade,1999). The German system differentiates between the training regulations, the framework teaching plan and the syllabus. The occupational profile, part of
the training regulations lays down briefly the major typical activities involved in performing the relevant occupation. While the framework-teaching plan contains the competencies and contents to be imparted in as brief a form as possible, the syllabus itself would offer additional methodical pointers, and learn and work tasks. Since the learn and work tasks link the level of objectives and contents of the curriculum with the didactic and methodical level, opinions will vary as to whether learn and work tasks should be an integral part of the curriculum, or exist as an extension thereof. Framework teaching plan should be kept as brief as possible and complemented by learn and work tasks, which are elaborated either on a decentralised basis at the individual training institutions, or at central level by the ministry or by a vocational training institute (in the form of guidelines). General competencies too, in so far as they are related to vocational competencies should be considered part of the curriculum. By contrast the learning matter distribution plan should not be incorporated in the curricula but should remain the responsibility of the instructors. In general it is not advisable fix time guidelines to the analytic breakdown of competencies and contents in the curriculum such as spending one period on handling tools and the next on handling materials, while obviously these are parallel in practice, since tools are always used on materials.

The learn and work tasks make it possible to acquire different competencies simultaneously. The break-down of the individual competencies as learning objectives in the curricula should not thus be misunderstood as a temporal break-down. Time guidelines may, however, be given for the learn and work tasks. They can also be used as examination questions as well as curriculum modules, which facilitate the above process-type development, with individual learn and work tasks being added and other, obsolete, ones removed. This helps to avoid making curricula, once published, into national monuments which automatically slip into obsolescence and lose their relevance for the world of work. It is important to ascertain whether the curricula is to be used locally, regionally, nationally, or even supranational. Look at the possible cooperation partners and start the analysis of the framework conditions, then combine the results with ideas for change in the form of a curriculum concept before finally drafting the curriculum (see Figure 4). Investigate the status quo ante and any normative directions such as laws and previous decisions made by the cooperation partners on labour and goods market or enterprises sizes, which determine employment potential. The exploration of work processes should be the focal point of these business studies, which normally take into account target group of training or trainees and training sector such as the institutions, organisations, businesses and people who are to implement training, i.e. the end user of the curriculum (Adam/ Blumenstein/ Boehm/ Ebeling/ Gronwald/ Schade,1999).
The Development of a New Curriculum Framework for the NDTS in Malaysia

Figure 2: CURRENT curriculum design and optimisation
Comments: This beruf based approach includes and considers every aspect that is most likely needed in designing and developing the curriculum as well as optimising it for the dedicated country in need. In addition, this approach also spell out how to accommodate the specific requirements corresponding to specific sectors of sosio-economy and training in the specific country. This perception is clearly inferred as shown in Figure 4.

3.1.3 Competency based approach

The training system in Malaysia has been adopting the competency-based approach. The standard that has been churned out of this approach is known as the National Occupational Skill Standard (NOSS). Then, the NOSS-based training system is developed in such a way that characterised by the following features (NVTC, 2001):-

- Competencies to be achieved in training for a particular job are identified by expert workers and practitioners, and clearly spelt out as NOSS;
- Competencies are clustered around ‘duties’ in the NOSS so that training, as well as assessment and certification, can be more flexibly packaged and undertaken;
- Assessment of competencies emphasises actual performance based on specified criteria; and
- Self-paced and self-directed learning increasingly becomes the norm in training, in which trainees progress at their own best rates, rather than be dictated by the instructor or group.

![Diagram of competency-based model for skills training in Malaysia.](image)

**Figure 3:** A competency-based model for skills training in Malaysia.
In order to align the new NOSS system towards meeting the actual needs of the Malaysian economy, the competency-based approach was adopted to strengthen the link between training and industry. In facilitating the shift towards competency-based approach, a model or framework for the development of NOSS was developed and used as shown in Figure 5. During its early years in the 1950s, the competency-based approach was ‘behaviourist’ in character (classified as level 1) but since then, has evolved into other forms such as ‘additive’ (level 2), ‘integrative’ (level 3) and the most recent, ‘holistic’ (level 4) (ibid). Training systems which have adopted the competency-based approach including the NOSS-based training system in Malaysia are widely regarded as following the Anglo-Saxon model epitomised by the National Vocational Qualification (NVQ) system in Britain.

**Comments:** The strongest critiques of NOSS and its competency-based foundation surfaced recently and were mainly directed at its tayloristic approach in defining narrow sets of skills and tasks which are said to be more appropriate for the divisive job structures in industrialised work systems of past years, rather than for today’s fast-changing workplace environment (DSP, 2003; Spöttl, 2000; 2004). Opponents claim that the competency-based approach is “excessively reductionist, narrow, rigid, atomized, and theoretically, empirically, and pedagogically unsound” (Kerka, 1998) Its proponents, on the other hand, argue that it should not be written off yet since the notion of ‘competency’ itself is often misunderstood and it is also not static but evolving over time.. In studies on the historical development of European vocational training systems, Greinert (2004; 2005, p.12) labels such training as the ‘liberal market economy model’ or market orientation model, and distinguishes it from another two basic European training models, namely the ‘state-regulated education-driven model’ of France and the ‘dual-corporatist model’ of German-speaking countries. Each of the models shows distinctive characteristics as well as underlying ideological and theoretical underpinnings. Thus, the state-regulated model is regulated by bureaucratic control and oriented towards academic principle as its dominant didactic principle, whilst the dual-corporatist model is regulated by both the market and bureaucracy and oriented towards the vocational or occupational principle as its predominant didactic principle (ibid, p.13-16; Deissinger/ Hellwig, 2005, p.314).

### 3.2 Relationship between school and work based learning

The study of the NDTS in Malaysia would require inquiry into the constructivism theory, a modern learning theory that focuses on the effective transfer of learning from the school to work settings, since it involves workplace learning which is essentially constructive in nature (Kerka, 1997). Strategies used for realising constructivism include student-centred teaching, project-oriented instruction, problem-based learning, and contextual teaching.
and learning (Brown, 1998). Guile and Griffiths (2001) have suggested that greater thought needs to be given in general education and in VET on how to support students in relating their ‘vertical development’ more readily to their ‘horizontal development’ (Beach and Vyas, 1998; Engeström, 1996). The concept of vertical development is located in ideas about intellectual development which have been the cornerstone of most cognitive development theories (Gick, 1995). This entails that: intellectual development consists of making progress through a hierarchy of knowledge and skills and away from the specifics of human practice (Beach/ Vyas, 1998). The movement towards greater levels of abstraction and decontextualisation constitutes the hallmark of developmental progress, distinguishing true ‘development’ from ‘mere’ learning (Gick, 1995). The intellectual development normally occurs through formal study in an educational context, such as a school or university as well as in the dual learning system where work based learning offers the similar opportunities.

By contrast, the concept of horizontal development, which arises from more recent developments in socio-cultural theory, refers to the process of change and development which occurs within an individual as s/he moves from one context (such as a school) to another (such as a workplace). Thus, at one level, it could refer to the changes in an individual’s sense of identity as a result of the experience of working in a school, factory or community centre. At another level, it could refer to new mediating concepts that enable one to cope with the demands of working effectively in different organisational settings (Engeström/ Engeström/ Kärkkäinen, 1995). Thus, the inclusion of this element in the study is indispensable and becomes the backbone in selecting the most suitable approach.

3.3 Conclusion

With regard to the VET programme optimisation, Spöttl and Becker (2004) suggested that, any method or procedure to be followed should be streamlining and leading to the different and specific training solutions of the country in need, however, with common contents and structures for the curricula. This does not mean that the curricula themselves should be identical in all countries. Its aim is to take into account all the influences and qualification needs for the sector on the one hand, and the necessary competencies to perform the tasks in the identified work processes on the other hand. According to them, an approach for this is made in the GTZ project CURRENT (1998) as explained in 3.1.4. On top of that, they also proposed the following process / analysis framework (Figure 6).

\[\text{\footnotesize\textsuperscript{4}}\text{ such as in curriculum design and development}\]
for the use of methods for the optimisation. Therefore, the researcher has decided to adopt this approach in carrying out this study.

![Diagram](image_url)

Figure 4: Procedure and methodological framework for curriculum design

4. **THEORETICAL FRAMEWORK**

It is very important to have actual information about the sector in which the skilled workers are doing their jobs. The situation of the actual work is one indicator for necessary competencies of learners who want to reach a profession in this sector. Independent from the different education systems and the very differing sector structures in the partner countries we can find little and big companies, different work organisations and an involvement in initial and continuing training (IVT, CVT) of manufacturers, training institutions and so on. The analysis of such issues ensures the necessary information for planning of representative work process analysis. With this analysis the characteristic work tasks for skilled workers and the necessary competencies for them will be identified (Spöttl/Becker, 2004). Hence, the researcher will carry out the study by basing on the framework for preparing and designing the curriculum as shown in Figure 7, which is derived to fulfil the research questions through designated research methodology.

For the purpose of this research the target population is to the 159 companies that already agreed to participate in the NDTS program and for the training institution, 32 public institutions were selected. For the program, only automotive mechatronics training occupation will be studied. Since the study involves investigating different approaches in
designing and developing curriculum for NDTS, dedicated to preparing skilled workers for employment, it would have to consider the context of the workplace, particularly relating to changes and development taking place in industry and enterprises from the perspectives of technology, work organisation, job structure and content, and employment practices (Mainguet, 1999; Spöttl, 2000).

Generally, the main parts of the study as inferred in Figure 7 are identification of industrial needs and additional factors influencing the curriculum development, selection of curriculum model or framework as well as curriculum model modification in context with its application in Malaysia.

**Figure 5: Procedural and methodological framework for preparing curriculum.**
4.1 **Identification of needs of industry and additional factors**

In identifying the needs of industry and additional factors for the curriculum design and development, the main instruments are interviews, and questionnaires, empirical and case studies, work process and sector analyses as well as expert/skilled workers workshops.

4.2 **Selection of curriculum development approach**

For selecting the best model or framework to be used in Malaysia, the instrument of determination would be literature studies of criteria selection.

4.3 **Modification of curriculum development approach**

In order to identify the required modification to the selected model or framework, the instruments that will be used are legal and policy studies as well as workshops of legal and vocational training experts.

5. **RESEARCH QUESTION**

The research will be conducted based on this focal question:

What is the curriculum framework that can elevate the issues of the NDTS curriculum shortage, training mismatch and overlapping of skill training systems that create confusion among training providers and public at large in Malaysia? In order to obtain the best result out of the study, the following questions will be utilised to guide the researcher.

5.1 **What are the needs of automotive industries in Malaysia?**

In order to ensure that the proposed study on national skills training system fits within the actual context of the Malaysian industry, the inquiry would extend its scope to take into consideration changes and developments taking place in industry and their repercussions on human resource development and training. However, in order to ensure that the investigation can be undertaken with sufficient depth, only one specific industry sector will be selected, namely the automotive industry. The choice of the automotive industry for this study is due to several reasons:- (a) the automotive industry has been part of the NOSS system since 1975, and it is also among the earliest to be included for NDTS implementation; (b) the first group of 3 companies taking part in the NDTS are all automotive-related organisations; (c) the pioneer group of 71 apprentices for the NDTS are undergoing training for the training occupation called ‘Automotive Mechatronics’; and (d) the automotive industry in Malaysia is likely to face fundamental changes due to the recent introduction of the National Automotive Policy on March 22, 2006 which aims to transform and integrate the Malaysian national automotive industry into regional and global industry networks (Malaysia, 2006a, para 6). In carrying out the study, the
researcher will undertake four case studies at different main players of automotive industry namely National Automobile Industry (PROTON), United Motor Works that assembles Toyota cars in Malaysia, NAZA Motors that manufactures Naza cars and Daimler Crysler that assembles Mercedes cars in Malaysia.

5.2 What are the additional factors in the development of curriculum for dual training system in Malaysia?

“Curriculum development is shaped by the requirements of the country in question, which will in turn depend on the socio-economic, technical, organisational and cultural fabric of the country. We have attempted to describe many of these influencing factors in order to give curriculum planners an overview and thus allow them to select the criteria that are relevant for their own terms of reference” (Adam/ Blumenstein/ Boehm/ Ebeling/ Gronwald/ Schade, 1999). According to them, additional factors, which can affect curriculum development, are as follows:

- Various economic and training sectors which is essential to understand the special nature of work in the various economic sectors and training sectors of any given country, so as to pinpoint differences and interfaces.
- Development status and prospects throughout all economic sectors of a specific country. The development status and prospects in developing countries could vary enormously both from one country to another. It consists of technical development and work organisation, spectrum of occupations and fields of activity, goods market, marketing and marketing opportunities as well as customer expectations and needs.
- Fields of application of the curriculum such as geographical scope, target groups, work and sector context, scope of competence transfer/ occupational profile as well as location and duration of training.

In obtaining the information, the researcher will conduct semi-structured interview with the right officials or personnel of the relevant agencies.

5.3 Which is the best model of curriculum for dual training system to be used in Malaysia?

Curriculum development is an extremely complex and intricate process involving many decision situations. Decisions must be made about policy statements, procedures for setting priorities, educational program and course selections, standard and many other aspects of the total curriculum. Although decisions are made at different levels in educational system, decision making influences the total curriculum regardless of the level at which a decision is made. Therefore, a strategic planning process would be used to
provide the necessary organizational framework needed for decision that must be made affecting all segments of the training system (Finch/ Crunkilton, 1993).

The researcher will be carrying out a study of literature of available models of curriculum development for dual training system in order to select the best one to be applied in Malaysia. The selection will be mainly based on the inclusions of the above-mentioned decision situations, compatibility of the system and the flexibility in the application in Malaysia offered by the selected model.

5.4 What are the modifications to be made on the selected curriculum model before it can be used in Malaysia?

Once the selection has been decided, the researcher has to investigate further to ascertain that the model is truly applicable in context of Malaysia. Certainly, there are many adjustment and modification to be done in adaptation for the use in the country. The most likely parameters that need the modifications are:

- Requirements of automotive industry in Malaysia including equipment, work place, current market situation etc.
- The National Economic Planning Unit and The National Industrial Policy which streamlining the efforts in consolidating the automotive industries.
- The National Assessment and Certification System that designates levels of competence for training upgrading and employment purposes.
- Contemporary scenario and situation of automotive industry in the country.

6. RESEARCH METHODOLOGY

This research is designed in such a manner to develop a framework of the NDTS curriculum to be used in Malaysia. The activities of development are mainly based on the framework as shown in Figure 7. However, the elements of activity are not restricted, depending on the latest scenario and discovery in the context of the curriculum development world wide.

Research Design

The study will be utilising mainly quantitative research because it is best fit with the main objective of the study works that is to design and develop a curriculum framework for dual training system from the selected approach with additional local factors and designated modifications for the use as a national skills training system in Malaysia. According to Punch (2000, p4) and McMillan and Schumacher (1989, p14) simplify the
description of quantitative research as empirical research where the data are in the form of numbers. It is indirect and abstract and treats experiences as similar, adding or multiplying them together, or 'quantifying' them. McMillan and Schumacher (1989, p12) describe quantitative research as a hypothetic-deductive approach. It makes deductions from theory and thereafter identifies a hypothesis. The hypothesis is then tested, by means of the data to confirm, reject, or modify the theory. Thus, empirical and case studies will be widely used in the research.

Nonetheless, the researcher will also exploit qualitative research to complement and supplement in gathering the required data and information. According to Winberg (1997, p3), qualitative research is a research that produces descriptions of how and why people do certain things. Hence, the goal of research is defined so as to describe and understand rather than to explain and predict human behaviour. The focus of qualitative research is thus rather on the processes involved than on the outcomes. Therefore, interviews and questionnaires would be the additional instrument to be used by the researcher. The most coherent distinction between qualitative and quantitative research, according to Blaxter, and Hughes (2001, p65), is that qualitative research investigates behaviour in an unstructured way, while quantitative research focuses on facts that cause social phenomena.

Blaxter and Hughes (2001, p67) agreed when they point out that a researcher may use the families, approaches and techniques that represent different dimensions of the research process. The researcher may use alternatives from the different dimensions in combination as appropriate to the study. The multiple uses of data collection are called triangulation. The use of triangulation, according to Punch (2000, p247) is to check the findings of one’s study against the findings of another. For example, the results of a qualitative investigation might be checked against those of a quantitative study. The aim is generally to enhance the validity of the findings. Therefore the researcher will utilize the triangulation approach which includes quantitative and qualitative methods to ascertain more valid findings.

6.2 Population and Sampling

The total population of industry in Malaysia, according to the 2005 Labour Department statistic is about 540,000 companies, but for the purpose of this research the target population is the 159 companies that already agreed to participate in the NDTS program. For the training institution, out of the total population of 1200, based on the involvement in both agreed to participate. For the program, only one specific industry sector will be selected, namely the automotive industry (as justified in 4.1).
The target population for the study comprises of stakeholders involved in the development and implementation of the NOSS-based training system and the NDTS, encompassing: (a) the NCTC as the implementing agency for NDTS; (b) employers and industry groups; (c) public and private training providers; and (d) trainees or graduates of related training programmes. For the inquiry, the key respondents would include a small but highly representative group of senior and medium level officers (and ex-officers) mainly from the NCTC, numbering about 20 people, who can collectively provide wholesome insights into either the NOSS-based training or the NDTS, or both the systems. The study will also involve 32 public training institutions, which had been selected to participate in the NDTS and for this purpose about 200 of their instructors had attended special NDTS courses conducted by the German-Malaysian Institute. Thus, the directors and relevant instructors of these institutions represent another vital group of target respondents for this study.

In carrying out the study, the researcher will undertake five case studies at different main players of automotive industry namely National Automobile Industry (PROTON), United Motor Works that assembles Toyota cars in Malaysia, NAZA Motors that manufactures Naza cars, Daimler Crysler that assembles Mercedes cars in Malaysia, and Tractors Malaysia that assembles heavy vehicles. Thus, the main target respondents would come from two levels, namely key persons from the industry and relevant authorities to provide the overview; and personnel directly involved in the day-to-day management and operation of automotive-based companies encompassing the management and planning, as well as operative and shop floor levels.

6.3 Collection of data
The main part of this study is curriculum framework development, therefore empirical and case studies, survey and face-to-face interviews will be employed to collect quantitative and qualitative data for the enquiry on the curriculum design and development

6.4 Instruments
The main instrument will be case studies and semi-structured interview for the qualitative data and survey questionnaires for the quantitative data as well as observation with check list. Questionnaire served as a tool for gathering information and formulating the statements used in this research.

Information individual interview also will be gathered through in-person and telephone interview. Answers to the survey questions, while also providing a range of useful and interesting data, would provide the starting point for a more in-depth discussion
in individual interviews. In order to validate the curriculum model, a focus group of expert and stakeholders will be utilized.

6.4.1 Empirical and Case studies

These studies are to investigate the reality of skilled work at the workplaces. Depending on the size of the sector and the different kinds of companies, different numbers of cases will be selected so that the results reflect real situations. Case studies are essential research instruments not only for researchers but also for teachers to detect working fields for car mechatronics and the main qualification needs to fulfil these tasks. One advantage for teachers is to recognize the actual problems at the car, the used tools, the methods, the work organisation etc. This gives ideas for problem oriented learning situations and motivating learning arrangements (because pupils detect the practice of their work in the garage). It is useful to combine case studies in companies with case studies in training institutions to compare the qualification needs with the contents and quality of the present training and education practice (Spöttl/ Becker, 2004). In carrying out the studies, the researcher will undertake five case studies at different main players of automotive industry namely National Automobile Industry (PROTON), United Motor Works that assembles Toyota cars in Malaysia, NAZA Motors that manufactures Naza cars, Daimler Chrysler that assembles Mercedes cars in Malaysia, and Tractors Malaysia that assembles heavy vehicles.

6.4.2 Interviews and Questionnaires

The qualitative data will be supplemented by the collection of quantitative data, especially when the enquiry involves larger target population such as instructors from training institutions who have been selected for the NDTS program and who also have prior experiences of the NOSS-based training program. For this purpose, the study will employ self-administered questionnaire sent out for gathering data.

Key stakeholders will be identified and selected based on their level of involvement in the respective training system. They will be contacted through telephone, e-mail and/or letter in order to be informed of their selection. Their participation will then be confirmed before they are interviewed based on a structured interview frame.

At the preliminary stage, some work will be devoted to develop the research instruments, including pilot-testing the various questionnaires and interview frames to be used. Results from the pilot testing, and feedback from experts in the areas of training systems and survey research design, including from universities, will be used to revise items for the final research instrument.
Since much of the study is of historical and exploratory nature, the face-to-face research interviews will be employed as the main instruments to collect qualitative data. The subjects will be identified and selected based on their level and extent of involvement at the decision-making or operational level in the respective training system. The interviews will be conducted using a semi-structured interview frame in order to ensure that the requisite areas are covered, whilst allowing for the respondents’ own perspective to come out ‘into the open’ (Hannabuss 1996, p.22). Besides, the study will employ self-administered questionnaire survey for gathering data. Work process analysis

There are two main processes that may be implemented in order to design training situations within the zone of proximal professional development: cutting-out sub-tasks and uncoupling sub-systems. Beyond these processes, the development of work process knowledge sufficient to deal with complex cases requires the range of the training situations to be expanded. The learn and work tasks will be formulated and evaluated by using the work process analysis to know as exactly the character of the main working tasks for the automotive training occupation. First part of the step is to execute the work process analysis and then the second part of the step that is to evaluate the results of the work process analysis. Evaluating is been done from expert skilled workers via questionnaires. Usually work process analysis will be done during the case studies. It is important to select companies and skilled workers who represent “best practice” in the sector. Indicating for work process analysis is a deep view and reflection of the skilled workers plots (Spöttl/ Becker, 2004).

6.4.3 Sector analysis

The researcher will focus on the results of sector analysis of the motor vehicle sector in the VET Optimisation project and the meaning of the determined criteria and data for optimisation of training programmes and curriculum revision and design. The following data and information will be compiled through a sector analysis.

**Sector structure**
- Employment in the sector
- Occupations/job profiles working in the sector
- Number of companies
- Size of the companies
- Character of companies
- Employees in the companies
- Business fields of the companies

**Products and services**
- Number of vehicles in the country / per inhabitant
o Share of the different vehicle types
o Technology trends for motor vehicles
o Customer needs

Training institutions and responsibilities
o Kind of training institutions responsible to “deliver” work force for the sector
o Number of the different kinds of training institutions
o Graduates of the training institutions
o Associations supporting the sector and their role
o Law and rules as well as government regulations for training

For all of these criteria, it is very helpful to have not only the actual data but also the history of the figures. With the available information it is possible to estimate/assess the challenges for the sector and the trends for the need of qualified personal. In this guidebook we want to give some practical notes on how to draw conclusions for the curriculum work (Spöttl/Becker, 2004).

6.4.4 Work process analysis and workshops

According to Spöttl (2006), the expert-skilled-worker-workshops aim at a very careful vocational education scientific analysis of skilled work in order to identify vocational work tasks. Direct involvement of the target group of the curricular decisions i.e. the skilled workers and key persons of the companies is mandatory. These persons are actively involved in the support of the analyses of skilled work and the incorporated practical know-how and skills during expert-skilled-worker-workshops and thereby legitimise the results of the analyses for the curricula. At the same time, the ranking and the relevance of the findings are evaluated in expert-skilled-worker-workshops by including skilled workers, representatives of companies, curriculum developers and teachers. Thus, workshops for skilled workers and experts in various disciplines would be held to get inputs for the research, which will cover all aspects of training, legal and policy currently in practice in Malaysia and particularly answer research question no: 1 and 2.

6.4.5 Literature studies

Literature will be mainly used to fulfil the research question no.3 which is to select the best curriculum model or framework for the study.

6.4.6 Pilot tests

Pilot tests or this trial run will help the researcher to decide whether the study is feasible and worthwhile continue. It provides opportunities to assess the appropriateness and practicality of the data collection instrument. A number of public accredited centres will
be chosen to attempt the pre-test questionnaire. Results from these pilot testing, will be used to revise items for the final research instrument. In case there are ambiguities in the questionnaire, the instruments could be rearranged or reformatted accordingly (Ary/Jacob/Razavieh, 1990).

6.5 Analysis of data

The data will be analysed using descriptive and inferential statistics. Quantitative data will be analysed using the Statistical Package for Social Science software (SPSS). Data collected will be organized according to parameters established in the theoretical framework and the research questions. Qualitative analysis will be undertaken using available software package such as NUDIST in order to speed up the research process in aspects such as summarising, classifying, coding and displaying data (Rouse/Dick, 1994, p.59). On the other hand, quantitative data collected through the survey questionnaires from the selected instructors of training institutions will be analysed using the SPSS software. The main focus here is to provide relevant descriptive statistics to support the insight unravelled through qualitative research means. Data collected will be organized according to parameters established for analysing and reporting data, which in turn will conform to the analytic framework used for this study.

6.6 Organisation of study

I shall undertake the study in six main stages as outlined in Table 1, whilst the milestone chart for the main research activities is shown in Table 2.
Mohd Yusoff Bin Abu Bakar
The Development of a New Curriculum Framework for the NDTS in Malaysia

<table>
<thead>
<tr>
<th>Stage</th>
<th>Research Focus</th>
<th>Main Activities &amp; Writing</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>DEVELOPING RESEARCH PROPOSAL/ EXPOSE</td>
<td>Developing research proposal/expose Finalising research Short papers on rationale and theoretical framework Review of literature</td>
<td>Dec. 2006 (Research proposal / expose approval)</td>
</tr>
<tr>
<td></td>
<td>Literature review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>DEVELOPING FIELD RESEARCH</td>
<td>Developing and finalising field research - obtain access to field - develop pilot test - finalise procedures - prepare questionnaire and interview-guideline Finalising conceptual/ theoretical chapter Drafting of methodology</td>
<td>Jan. 2007 (Field research is developed)</td>
</tr>
<tr>
<td></td>
<td>Literature review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>UNDERTAKING FIELD RESEARCH</td>
<td>Carrying out field research - undertake research - complete field research Short papers on field research Write-up of research procedures</td>
<td>June 2007 (Field research fully undertaken)</td>
</tr>
<tr>
<td></td>
<td>Literature review Empirical/ Case studies Workshops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>ANALYSIS AND EVALUATION</td>
<td>Drafting and finalising analysis and findings chapters Drafting of conclusions</td>
<td>Mar. 2008 (Analysis &amp; findings concluded)</td>
</tr>
<tr>
<td></td>
<td>Literature review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>REVISION OF THESIS</td>
<td>Finalising chapters Refining thesis Seminar/conference papers</td>
<td>June 2008 (Thesis fully refined)</td>
</tr>
</tbody>
</table>

Table 1: Organisation of the Research
### Table 2: Milestone Chart for the Research

<table>
<thead>
<tr>
<th>SEMESTER</th>
<th>2005/06</th>
<th>2006/07</th>
<th>2007/08</th>
<th>2008/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2</td>
<td>Dec.05-Mar.06</td>
<td>Apr-Jun.06</td>
<td>Dec.06-Mar.07</td>
<td>Apr-Jun.07</td>
</tr>
<tr>
<td>S3</td>
<td>Apr-Jul.06</td>
<td>Mar-Oct.06</td>
<td>Apr-Jul.07</td>
<td>Oct-Dec.07</td>
</tr>
<tr>
<td>DURATION</td>
<td>4 mths</td>
<td>3 mths</td>
<td>4 mths</td>
<td>3 mths</td>
</tr>
<tr>
<td>LOCATION</td>
<td>Malaysia</td>
<td>Germany</td>
<td>Malaysia</td>
<td>Germany</td>
</tr>
</tbody>
</table>

**MAIN ACTIVITY**

- **Registration**
  - Developing research proposal
  - Finalising research proposal

- **Literature review**
  - Literature review
  - Literature review

- **Conducting field research**
  - Developing field research
  - Conducting field research
  - Empirical/Case studies Workshops
  - Empirical/Case studies Workshops
  - Empirical/Case studies Workshops

- **Analysis**
  - Empirical/Case studies Workshops
  - Empirical/Case studies Workshops
  - Empirical/Case studies Workshops

- **Finalising thesis**
  - Refining thesis

- **Journal**
  - Seminar
  - Journal

- **Submission**
7. **EXPECTED RESULTS**

The purpose of the study is to develop a new curriculum framework for the NDTS in Malaysia to produce better training outcomes. Specifically the objectives of the study are:

a. to identify the needs of automotive industries in Malaysia.
b. to find out the additional factors in the development of curriculum framework for the dual training system in Malaysia.
c. to decide the best model of curriculum for the dual training system to be used in Malaysia.
d. to figure out the modifications to be made on the selected curriculum model before it can be used in Malaysia.

The outcome of the study is an advanced NDTS curriculum framework. This framework enables the coordinating agencies to manage the programmes effectively and avoiding unnecessary misunderstanding and confusion among industries and training institutions as well as public perception. This study on Malaysia’s national skills training system is particularly significant because the country has just entered an important stage of its nation-building, that is the halfway mark in its thirty-year (1991-2020) endeavour, known as Vision 2020 to achieve the developed nation status. Human capital development is today a national priority as evident from the emphasis given to it in the Ninth Malaysia Plan, 2006-2010, unveiled by the Prime Minister on March 31, 2006 (Malaysia, 2006). In this regard, the country’s national education and training delivery system is expected to play a leading role. Therefore, it becomes vital to make the said curriculum framework for the national training system available with regard to meeting the country’s skilled workforce requirements. This study can certainly offer better efficiency and effectiveness on the country’s skills delivery system. Obviously, such a curriculum framework impacts greatly on the implementation of training throughout the country considering that it involves a large network of existing training providers including about 400 public training institutions and 700 or so private training centres (NVTC, 2005c), whilst the NDTS itself has been targeted to double up its intake every year from 500 apprentices in the year 2005 to about 16,000 apprentices in the year 2010 (NVTC, 2005b).
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