การพัฒนาสมรรถนะแกนกลางสำหรับอาชีพช่างซ่อมรถยนต์ของประเทศไทย:
กรณีศึกษาด้วยกระบวนการมีส่วนร่วมของสถานประกอบการ

วีระยุทธ สุดสมบูรณ์[1]

บทคัดย่อ

การเพิ่มขีดความสามารถในการแข่งขันของช่าง ซ่อมรถยนต์สถานประกอบการจำเป็นที่จะต้องพัฒนา และสนับสนุนให้ช่างซ่อมรถยนต์เข้าใจเกี่ยวกับสมรรถนะ แกนกลาง เนื่องจากความสามารถในการปฏิบัติงานที่ สอดคล้องกับความต้องการของสถานประกอบการจะเป็น ปัจจัยส่งเสริมในการเพิ่มขีดความสามารถในการแข่งขัน ให้กับสถานประกอบการได้อย่างยั่งยืน วัตถุประสงค์ของ การวิจัยครั้งนี้เพื่อพัฒนาสมรรถนะแกนกลางสำหรับช่าง ซ่อมรถยนต์ของประเทศไทยด้วยกระบวนการมีส่วนร่วม ของสถานประกอบการ ระเบียบวิธีการวิจัยที่ใช้ในครั้งนี้ เป็นการวิจัยเชิงคุณภาพ โดยมีขั้นตอนการดำเนินงาน 2 ขั้นตอน ดังนี้ ขั้นตอนที่ 1 ผู้วิจัยใช้เทคนิคการสังเกตการณ์ แบบมีส่วนร่วมและการศึกษาขั้นตอนการปฏิบัติงานร่วม กับช่างซ่อมรถยนต์ จำนวน 5 คน ในสังกัดบริษัท มิตซู ออโต้ซิตี้ จำกัด และ ขั้นตอนที่ 2 ผู้วิจัยใช้เทคนิคการ สนทนากลุ่มร่วมกับผู้จัดการฝ่ายฝึกอบรมและครูฝึก อบรม จำนวน 6 คน ของบริษัท มิตซูบิชิ มอเตอร์ส (ประเทศไทย) จำกัด การเก็บข้อมูลในขั้นตอนที่ 1 ประกอบด้วยแบบฟอร์มการวิเคราะห์งาน แบบฟอร์มการ สัมภาษณ์เชิงลึก และแบบสังเกตการณ์การปฏิบัติงาน การเก็บข้อมูลในขั้นตอนที่ 2 ประกอบด้วย แบบสัมภาษณ์ ชนิดปลายเปิด แบบบันทึกการสนทนากลุ่ม ผังดาคัม และแบบฟอร์มการหาความเที่ยงตรงเพื่อกำหนด สมรรถนะแกนกลาง การวิเคราะห์ข้อมูลด้วย การวิเคราะห์ เอกสาร การวิเคราะห์งาน และการวิเคราะห์เนื้อหาเชิง คุณภาพ ผลการวิจัยพบว่า มี 8 พิสัยหลักที่จัดเป็นสมรรถนะ แกนกลางที่จำเป็นต่อการพัฒนาความเป็นช่างยนต์มือ อาชีพ และสมรรถนะที่จำเป็นสำหรับการปฏิบัติงาน จำนวน 25 สมรรถนะ ผลของการนำเสนอผลงานวิจัย ครั้งนี้เป็นประโยชน์ต่อการส่งเสริมรูปแบบการพัฒนาขีด ความสามารถของช่างซ่อมรถยนต์โดยมุ่งเน้นการสร้าง ความยั่งยืนเพื่อสอดรับกับความต้องการกำลังคนของ สถานประกอบการ

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ช่างซ่อมรถยนต์ สมรรถนะแกนกลาง

[1] อาจารย์ คณะเทคโนโลยีอุตสาหกรรม มหาวิทยาลัยราชภัฏนครศรีธรรมราช โทรศัพท์ 0-7537-7439, 08-9477-6487
อีเมล: weerayute_sud@nstru.ac.th

Core Competencies Development for Thai Automotive Service Technicians: The Stakeholder-Driven Consensus Approach

Weerayute Sudsomboon[1]

Abstract

In order to increase automotive service technician competitiveness, companies have an ongoing need to develop and foster core competencies for automotive service technicians. Because of an appropriately competent workforce, is crucial to an effective sustained competitive advantage. This study was to develop core competencies for Thai automotive service technicians with the stakeholder-driven consensus approach. The research methodology in this study was conducted by qualitative method. In order to successfully achieve, this study was divided into 2 phases: Phase 1 employed the on-site observations technique, with 5 practitioners to achieve a consensus in exploring skills and task analysis on retention from Mitsuauto City, Co., Ltd. and Phase 2 involved the Focus Group Discussion technique with 6 training manger and instructors from the Mitsubishi Motors (Thailand) Co., Ltd. In Phase 1, data were collected by task analysis form, in-depth interview form, and work instruction sheet. In Phase 2, data were collected by open-ended interview form, DACUM chart, and validating the core competencies domains form. Data were analyzed by the document analysis, task analysis and content analysis. They are used to illustrate and further analyze these findings. The competencies required in Thai automotiveservice technicians included 8 domains; competencies were 25 applied to provide the potential training program for Thai automotive industry sectors. The results obtained those social demands, breakdown of competency elements and faculty requirements for sustainability in workforce capacity development.

Keywords: Competitiveness Advantage, Automotive Service Technicians, Core Competencies

[1] Lecturer, Faculty of Industrial Technology, Nakhon Si Thammarat Rajabhat University, Tel. 0-7537-7439, 08-9477-6487, E-mail: weerayute_sud@nstru.ac.th

1. Introduction

In order to increase Automotive Service Technicians (AST) competitiveness, companies have an ongoing need to develop and foster core competencies for AST. Because of an appropriately competent workforce, is crucial to an effective sustained competitive advantage. Today's core competencies have required fundamental essentials in the profiles of workforce development, which basically stemmed from the rapid growth of automotive industries in Thailand. For countries to increase their capability and capacity in this competitive world, they need to improve the quality and number of qualified technicians entering the local workforce [1].

The challenge for the industrial sectors is to recognize and develop training opportunities to assist and support rapidly developing countries to achieve the improve in the most cost effective way possible. There currently exists a skills shortage in relation to the automotive industry [2]. Therefore, the opportunity exists for improving the AST to provide training to practitioners studying in core competencies who would like to equip individuals as the competency framework are faced with a dynamic, technically advanced work environment, think critically and reflectively [3]. In regard, the core competencies identified to assist practitioners' focuses on demands that are applicable across whole domains of knowledge, skills, and personal attributes.

The report of the National Education Commission, TVET at risk [4] stated alarms regarding insufficient and ineffective attempts to foster competencies in automotive industry sector including knowledge and essential skills are: numeric literacy, information technology literacy, communication literacy, problem solving, reporting, and attitudes, respectively. As a result, research indicates those automotive industry sectors need the effective competency in the aspects of communication literacy, essential skills, problem solving, and self-regulation [5].

The finding is as related to the UK National Vocational Qualifications (NVQ's) [6] regarded core competencies namely 6 key skills as a framework for productive workplaces including communication, application of number, information technology, improving one's own learning and performance, working with others and problem solving. In short, the ability to improve and conduct core competencies is emphasized rather than merely possessing it.

In the point of view, it is crucial for practitioners' candidate to conduct core competencies along with the ability to develop sufficient for the needs of the work. Thus, one key aspect of this research concerns the development of AST core competencies, a skills-based set of criteria who need then apply the core competencies for highly achievement and preparing for the challenges to improve the qualities and competencies of professionalism.

2. Literature Review
2.1 Nature of the Work

AST is performing inspect, maintain and repair automobiles and light trucks that run on gasoline, diesel, electricity, or alternative fuels such as ethanol. The functional of AST mostly responsibilities have evolved from simple mechanical repairs to high-level technology-related work. For increasing sophistication of automobiles, requires workers who can use computerized shop equipment and work with electronic components while maintaining their skills with problem-solving skills [7].

2.2 Points of Knowledge Worker

AST must continually adapt to changing technology and repair techniques as vehicle components and systems become increasingly sophisticated. Therefore, formal automotive technician training is the best preparation for these challenging technology-based jobs [8].

Foran [9] explained "automobile is becoming

far more complex with the release of each new model, which is complexity arises in the form of new mechanical devices, electronic devices and nowadays software components" (p. 8). Furthermore, Butler [10] described several as automotive technology becomes more sophisticated the ability to troubleshoot and identify a malfunction becomes a more difficult and complex task.

According to Antory, [11] study: Continued advancement of vehicle features creates complexity that restricts service technicians' ability to understand how the vehicles are meant to behave and how to diagnose problems.

2.3 What is Competency?

Competency is conceptualized as an individual's inner attribute that can propel the individual to perform in a manner that is in accordance with the responsible criterion [12].

Competency, according to Spencer and Spencer [13], described that competency as "an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation". The underlying characteristic means the competency is a fairly deep and enduring part of a person's personality and will be able to predict attributes in a wide variety of situations and job tasks.

Competency is often defined in terms of relationships of knowledge, skills, and personal attributes affecting operation. It can be assessed and compared to standards. It can be enhanced by means of practice and development [14],[15]. It is the quality within an individual that regulates the behavior of that person towards the goal under an organizational environment. Hence, competency also motivates the personalized investigation the best practice towards the required outcome and ability to outdo others.

Likewise, professional competencies are relatively to development; both education and

training are the most performing to enhance these ability.

2.4 Why Must be Core Competency?

Core competencies identify the skills, knowledge, and attributes that competent employee should demonstrate in a particular job classification. Core competencies include the skills and abilities employees are expected to have or develop, as well as the processes required to achieve success [16]. A review of the literature indicates that the core competencies in many countries have given importance to stipulating the scope of competencies for information as the criteria to accredit the qualities in the field of AST.

The Australian National Center for Vocational Education Research [6], refers to key competencies for effective participation in the emerging patterns of work and work. These 7 core competencies include collecting, analyzing, and organizing information, communicating ideas and information, planning and organizing activities, working with organizing activities, using mathematical ideas and techniques, solving problems and using technology.

Moreover, the UK National Vocational Qualifications (NVQ's) [6] regarded core competencies namely 6 key skills as a framework for productive workplaces including communication, application of number, information technology, improving one's own learning and performance, working with others and problem solving.

The Department of Innovation and Advanced Learning of Canada [17] describes a variety of applications of essential skills as core competencies for AST. The essential skills inventory is: technical reading, document use, numeracy, oral communication, computer use and writing.

Although core competencies are widely used in education, many community and professional organizations also have developed core competencies as the foundation for human resource actions and staff

development efforts relative to staff positions in their organizations. They are what all practitioners are expected to be capable of doing to work efficiently, effectivel and appropriately in the field [16].

2.5 Rationales

Sudsomboon and Anmanartakul [18] found that most real-world automotive jobs include a complex of problems that vary in the active role of problem solver confronted as well as the solution strategies require. Therefore, in automotive training, the goal is always for the practitioners to transfer what they have learned to new situations. In the Thai context, trainers concentrate only on the well-structured problem solving procedures and fail to identify and teach the moderately-and ill-structured problem solving.

This often leads to practitioners who are able to perform many small routine job tasks to response while conditions change or a new problem is encountered. According to Sudsomboon et.al [19] found that the important issue on the appropriateness of automotive technology education curricular content through competencies as perceived by training instructors of automobile company in Thailand. They have found as follows:

1. Training instructors perceived the cognitive domain competencies as more important benefits of automotive technology education program than competencies in the affective and psychomotor domains;

2. The knowledge domain of automotive technology education program completers to: 1) identification of automotive hand tools set; 2) identify to use mechanical, electrical and electronics precision/measure equipment; and 3) knowledge to select information guide to solve problems.

3. The main issues of automotive technology curricular content suggest to: 1) develop the problem solving skills in Automotive Electronic Control Systems; 2) decision making through service

information seeking; 3) identify and use scan tools for diagnosis; 4) identify and use electrical and electronic instrument for analyzing the electrical and electronic parts; and 5) identify and use measuring/ precision tool for analyzing the mechanical parts.

3. Objective

This study was to develop core competencies for Thai automotive service technicians with the stakeholder-driven consensus approach. The research question was raised: what is the core competencies observed across various specialties?

4. Research Methodology
4.1 The Research Process in Phase 1

The research process in Phase 1 is shown in Table 1.

4.2 The research process in Phase 2

The research process in Phase 2 is shown in Table 2.

5. Results
5.1 What is the Core Competencies Observed Across Various Specialties?

In Table 3, the core competencies revealed results that included 8 domains; competencies were 25 applied to promote the potential training program in Thai automotive industrial sectors. The essential core competencies described 6 knowledge domains, 10 skills domains, and 5 attribute domains. The results obtained those social demands, breakdown of competency elements and faculty requirements for sustainability in workforce capacity development.

6. Discussion and Conclusion

The establishment of domains of core competency plays the role of competency-based performance and experience in workforce

development. The purpose of this study was to identify the core competencies for developing workforce capacity in Thai AST setting. Although studying the distinctions between the types of knowledge is somewhat of a technical endeavor, many experts would argue that it is necessary in order to efficiently plan and implement competency-based performance.

Table 1 The research process in Phase 1

Design	Procedure	Participants	Process	Instruments and Data Collection	Data Analysis
5 days in October 2010	1. A review of literature to identify existing core competencies resources relative to the use of core competencies of Australia, UK, and Canada. 2. From the list of practitioners, researcher identified a highly achievement representative panel composed of 5 practitioners; separately 1 mater technician, 1 diagnosis technicians and 3 repair technicians from the Mitsuauto City Co., Ltd. and selected by snowball sampling technique. 3. The workplace observation is conducted by on-site observation and involved of 5 days per specialties. Researcher included job description, problem-solving efficiency, knowledge acquisition and service policy. 4. Examination of these documents revealed considerable variability in both content and application. After they analyzed the documents, practitioners were confident that a comprehensive list of core competencies developed by researcher representative panel would be a useful resource in Phase 1.	$N = 5$	1. Fieldnotes for identifying core competencies [20]: 1.1 purpose of the system (represented as production flow models, system objectives) 1.2 abstract functional model of the system (represented as casual structure or information flow typology) 1.3 generalized functions of the system (standard functions and processes and control loops) 2. Diagnosis faulty systems and take direction with workplace-based 2.1 Procedural demonstrations 2.2 Domain knowledge 2.3 System/Device knowledge 2.4 Strategic knowledge 2.5 Experiential knowledge	1. Unstructured text data and pictures taken during observations by researcher 2. Observation role of participants 3. Short-answer questions 4. In-depth interviews 5. Audiovisual materials	1. Interview protocol 2. Document analysis 3. Content analysis [21]

Table 2 The research process in Phase 2

Design	Procedure	Participants	Process	Instruments and Data Collection	Data Analysis	Validating the Core Competencies Domains
2 days in April 2011	1. Prior to convening a 2-day meeting to draft the list of core competencies. 2. Participants were 6 training manager and instructors from the Mitsubishi Motors (Thailand) Co., Ltd, who were involved in curriculum development/ training program development and selected by purposive sampling such as academic achievement and expertise's. 3. Researcher oriented panel members to the research. The orientation included discussion of project goals and an introduction to the Developing a Curriculum (DACUM) process, the methodology selected for developing the core competencies. 4. DACUM uses a facilitator to direct panel members in analyzing their job-related tasks through a brainstorming process. 5. The result is a list of competencies that describes the specific duties and tasks of competent workers in a specific job classification. 6. Although the DACUM process stipulates that core competencies for a specific job classification be identified by individuals in that job classification, necessary to modify the DACUM process to be sensitive to the needs of AST without compromising the integrity of the process.	N = 6	1. Analysis of current, trend and issues of AST. 2. Discuss and recommendation the result revealed in phase 1. 3. Brainstorm, select, and judgment the topic of core competencies domain for AST. 4. DACUM workshop	1. Open-ended interview form 2. Transcribe 3. Audiovisual 4. Focus group discussion format 5. DACUM chart 6. Competency analysis profile	1. Take interview notes 2. Interview protocol 3. Responses to questions on a questionnaire 4. Task analysis 5. Content analysis [21]	1. Researcher conducted DACUM workshop with expert's in each of the panel states to validate the core competencies identified by the expert panel. 2. Prior to the workshop call, expert's individually reviewed the draft list of core competencies. 3. Using a focus group discussion format, researcher invited each expert's to share him thoughts and reactions to each core competency area as well as the specific core competencies associated relate to many countries with each broad core competency area. 4. Across all calls, the expert's concurred that the list of competencies was accurate and complete. They also suggested a number of changes to improve clarity of wording and write down into DACUM chart. 5. Researcher conducted a final workshop call with panel expert's, who revised the list of core competencies based on AST input with the competency analysis profile.

Table 3 The core competencies domains and summary definition

Definitions of Core Competencies	Competencies	Description
1. **Business foundation** is defined as the analytical context of economic, social and technological changes.	Knowledge	1. Analysis the impact of economic, social and technological changes on an automotive technology, in accordance with the organization policy and workplace demands.
	Knowledge	2. Analysis the parts control and product inventories necessary to meet customer and business requirements in accordance with easy access and inventory accountability.
		3. Implement a business process for developing the customer satisfaction in accordance with criteria specified on the Assessment instrument (Customer Service Indicators: CSI).
	Skills	4. Identify basic procedures in the automotive technicians' cycle in accordance with acceptable professional practices.
		5. Maintain compliance with the global automotive testing standards and government laws and regulations in accordance with documented policies/laws/regulations.
2. **Communication skills** is defined as the method of successfully sharing meaningful information with people and team work by means of an interchange of experience that able to communicate effectively and improve performance.	Skills	6. Explore the locate, organize and reference written systems information from various sources in accordance with acceptable Thai and English language arts for providing the technical reports.
	Knowledge	7. Deliver formal and informal presentations that demonstrate organization and delivery skill in accordance with acceptable the customer on demands.
	Skills	8. Use the information technology (e.g., electronic mail, multimedia, intranet, internet) for supporting the communication in the organization and worldwide.
3. **Problem-Solving Skills and Reasoning** is defined as the state-of-the-art in identifying almost experiences, realistic and integrating the knowledge to construct the wisdoms of solutions.	Knowledge	9. Employ critical thinking and problem solving skills independently and in teams to formulate solutions to problems in accordance with criteria specified on the assessment instrument.
		10. Combine critical thinking and interpersonal skills to solve problems.
	Skills	11. Apply mathematical principles and formulas to automotive systems problems in accordance with academic mathematical number, scientific theory, precision instrument, measurement, data analysis and data interpretation standards.
	Skills	12. Analysis the troubleshooting on fault diagnosis with the malfunctions set, scan tools, and computer programming to confirm problems.
		13. Interpret a mental model for make a good decision and cognitive skill to solve complex problems and advanced technology.
4. **Leadership and Team working** is defined as the interpersonal skills that contribute to positive leadership and teamwork for developing continuous productivity improvement.	Attributes	14. Analysis the interpersonal skills that contribute to positive leadership and teamwork.
	Skills	15. Demonstrate the ability to work on a team and recognize the importance of teamwork and its impact on business in an organizational environment.
	Skills	16. Resolve conflicts to maintain a smooth workflow balancing organizational goals with personal needs.
5. **Legal and Ethical** is defined as resolve applicable government regulations and codes of conduct.	Attributes	17. Perform duties according to laws, regulations, contract provisions and policies.
	Attributes	18. Perform with applicable governmental regulations and codes of conduct as specified in those government standards and codes of conduct.
6. **Information Technology Applications** is defined as performing with technology.	Skills	19. Perform computer-based technology in accordance with the respective on AST operation specifications.
	Knowledge	20. Employ information technology applications.
7. **Safety, Health and Environmental Aspects** is underlying to aware safety and environment under policy and interpersonal views.	Knowledge	21. Maintain general safety in accordance with government regulations, health standards, company policy, procedure and practices.
	Skills	22. Demonstrate practices that contribute to a safe workplace environment.
8. **Technical Skills Development** is defined as career professional development in AST.	Attributes	23. Explore the performance skills of career path in accordance with the career field standards for AST.
	Skills	24. Identify basic tools and equipment appropriate for AST.
	Attributes	25. Identify appropriate personal protective equipment according to established safety practices and procedures.

The effects of the competencies required in automotive service technicians practice included 8 domains; competencies were 25 applied. On the other hand, when respect to the core competencies effectiveness aspect, skills domain has been required. However, the results were consistent with Australia, UK and Canada core competencies would interact with ability context in performing achievement. Whereas no difference due to strategy was immediately detected for working in the knowledge domain ability to improve skills domain; for example, problem-solving, English language, safety and knowledge sharing [6] ,[17].

In term of skills that are mostly perform has focused on specific profession, leadership, legal and ethics, code of conduct and service technician education program stilled the potential training provider. In overview, practitioners are involved in the elements or something "hands-on," procedural knowledge (Skills cluster) is being used.

For this reason, experts' seems a core competence is a bundle of skills that enables an organization to provide a particular benefit to customers. For each core competency listed in inventory, identify the customer benefit that results from that competency. However, the business foundations were the first one that important under decision of companies. The second were communication skills, problem-solving and reasoning, leadership and teamwork much more important underlying the social context and the workplace environment [18], [22]. Hence, they have proposed essential to provide automotive technicians' competency in Thai setting.

In logic, the competency is not core if it cannot be associated with a customer benefit or a significant contribution to the performance standards of the organization will be provided:

".....Use the fundamental organizational competencies listed previously to identify the skills needed to enable your organization provide its products and/or services. Combine these skills into organizational competencies..... Organizational competencies are bundles of skills possessed by a number of individuals many times across functional lines. They are more than the skills of a single person…"

Moreover, Sudsomboon et.al [19] described that the essential knowledge domain of automotive technology education program completers to: 1) identification of automotive hand tools set; 2) identify to use mechanical, electrical and electronics precision/measure equipment; and 3) knowledge to select information guide to solve problems. The results were becoming the well-structured to guide for increasing sophistication of automobiles requires workers who can use computerized shop equipment and work with electronic components while maintaining their skills with traditional hand tools [22].

Additionally, the activities and/or hands-on experiences are often methods that integration are used to up skills practitioners practice or demonstrate declarative knowledge [23], [24]. In this case, Sudsomboon [25] have been indeed implicated, it means that the traditional automotive service technicians will be changed. Experts' requirements will be considered in the start of professional competencies. Practitioners can get systematic competences, which are fitted industries and social demands needs, through above framework [26]. This would more effectively reduce industries and social demands complain.

7. Implications

An implication of this study is that collaborative core competencies with other companies, which researcher found to conduct only about a group of Mitsubishi training, can be recommended as an effective educational practice for practitioners at all levels of Thai AST ability. The methodology used in this study differed somewhat from other related

researches designed to identify core competencies for use in AST education programs.

This study used a peer nomination process to identify state coordinators to serve on an expert panel and followed the DACUM process for developing the list of competencies. Contrasting with the professional competency development research, the involve of TVET educators focus groups for this study provided opportunity for discussion as part of the validation process, which not only resulted in the validation of Thai core competencies standards, but also revealed literacy issues that researcher would otherwise not have addressed. In a prior study of core competencies was substantially different from the procedure, which used in the current study.

The limitation of this study is that a prototype reported outcomes data rather than empirical data. Further research on collaborative core competencies as a summarization strategy should gather and analyze in the large group of practitioners interacting as they perceive summarizes in core competencies and the DACUM formats. Observations of the roles adopted by practitioners with different levels of competence in formal and non-formal ability groups would be especially useful in explaining the results reported here.

The further research suggested that the core competencies and educational framework would be conducted for enhancing an interprofessional approach to training and learning in the area of automotive technology. This suggest have sought to value professional expertise and stimulus awareness and respect for the benefit of the office of vocational education commission, institutions, universities, and companies.

8. Suggestions for the Next Research

1. In order to make this framework successful, it also emphasizes to deliver Thailand Vocational Qualifications (TVQ) framework in the future for supporting competency standard.

2. The result was to enhance these automotive training areas, whereas emphasize on practical session.

3. The company can be promoting through employ domains of core competencies to enhance workforce preparation and training setting.

4. For the future research, should be surveying factor affecting on the effectiveness of domains of core competency in automotive areas and others field on vocational and technical education.

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