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NOTE: IT=Information Technology

ENG=Engineering

BA=Business Administration

GEL=General Education and Languages

Multidimensional Perspectives on Readiness in Dual Cooperative Training at Lao-German Technical College for Heavy Equipment Program

Vacki Wangyeng

Department of Technical Education
Management, Faculty of Technical
Education

King Mongkut's University of
Technology North Bangkok
Bangkok, Thailand
vackilove@gmail.com

Sobsan Utakrit

Department of Technical Education
Management, Faculty of Technical
Education

King Mongkut's University of
Technology North Bangkok
Bangkok, Thailand
sobsan.u@fte.kmutnb.ac.th

Nattakant Utakrit

Department of Technical Education
Management, Faculty of Technical
Education

King Mongkut's University of
Technology North Bangkok
Bangkok, Thailand
nattakant.u@fte.kmutnb.ac.th

Abstract—This research aims to investigate the readiness of the Dual Cooperative Training (DCT) program to be used as a guideline for the future implementation in the DCT project particularly in the heavy equipment field at the Lao-German Technical College (LGTC). The study examined the facilities and conditions of the LGTC and enterprises by focusing in Vientiane area in Lao PDR. The target groups were five executives and five teachers at the LGTC, and ten managers and ten trainers from medium and large private and public enterprises by using the interview questions. The results found that almost the respondents agreed on the cooperation DCT program. The setting program criteria included the preparation of the workshops, materials, tools and equipment. In addition, the LGTC and enterprises were satisfied with the DCT concept which can be implemented in the future. The positive results of this research can ensure the readiness of the forthcoming DCT program in the heavy equipment field at the LGTC.

Keywords—perspectives, readiness, dual cooperative training, heavy equipment

I. INTRODUCTION

The Technical Vocational Education and Training (TVET) of Lao PDR has 22 public vocational schools and an institute under the Ministry of Education and Sports (MoES). 30,221 vocational learners were registered in public TVET schools and institutes in 2015 [1]. The TVET learning process has been stipulated into three learning forms, which are School Based Learning (SBL), Competency Based Training (CBT) and Dual Cooperative Training (DCT). In particular to the third form, the DCT is described as a combination of the learning theory with some elementary practical hours at school and the practical work experience in the enterprise. According to the Education Reform Strategies phase II and TVET Development Plan 2016-2020, the MoES has given a special high priority to TVET. The reform agenda focuses on infrastructure, legal framework, management, curriculum, teacher, teaching-learning development and the other related programs [2]. In 2014, TVET law was adopted to run these programs, which specific to the DCT program as one major form of TVET in Lao PDR. In 2016, the MoES has approved the DCT concept and guideline book for supporting TVET schools in

implementing the DCT program regarding the occupational readiness. The DCT plays a fundamental role in enhancing efficiency and quality of employment oriented vocational education and training in order to meet the social and labour markets needs of the growing economy in Lao PDR. The integration of major economic sectors and key enterprises in TVET is indispensable and has to be seen as one key factor to ensure the envisaged economic, which is high potential and steadily growing [3]. Therefore, the public and private partnerships are the main starting points to build the workers' competences to the workforce needs; TVET schools should have a secure direct network with enterprises for implementing the DCT program. Lao-German Technical College (LGTC) is one of the vocational education and training where the school offers six learning programs including heavy equipment, agro-machinery, electrical-electronics, automotive, welding-plumbing, and metal mechanics. The students who have graduated from the college can work directly in their field to support the labor market needs in Lao PDR. In particular to the heavy equipment program, the course has been started since 2014 by using the School-Base, to conduct the 12+2 curriculum in Diploma level as shown in Fig. 1.

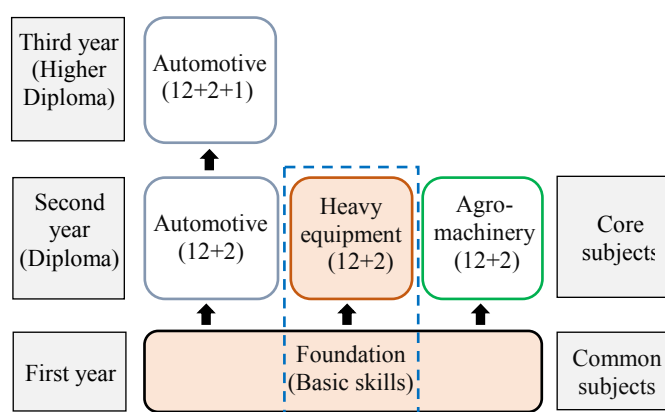


Fig. 1. The learning pathway in automotive, heavy equipment and agro-machinery fields

The learning course of heavy equipment at the LGTC is provided for the students who have graduated in grade 12 to continue in the 2 year-course (12+2) that consists of 4 semesters (64 weeks) and 8 weeks for the internship in an enterprise. The outcome of the heavy equipment course in the last 2 years was similar to the automotive course. It lacked tools and equipment in the college, limited practical workshop, and less related work in the heavy equipment field. Furthermore, this occupation is the first start in Lao PDR and has only one location in the LGTC [4]. Nowadays, workers in the heavy equipment are needed increasingly to the labor market because the business in the heavy equipment is growing up. Regarding the number of registered enterprises at the Enterprise Registration and Management Department (ERMD), Ministry of Industry and Commerce (MIC), the total number of the wholesale of other machinery and equipment is 604 enterprises nationwide. There are 485 enterprises in Vientiane; these include more than 20 medium and large enterprises [5]. Therefore, it is a good opportunity to investigate the readiness for implementing DCT program in heavy equipment field at the LGTC. Also, the project can improve the learning process to meet the labour market's needs in the current situation and build up the extent to the other learning fields in the future.

A. Objective

To investigate the readiness of LGTC stakeholders and heavy equipment enterprises to be used as a guideline for the future implementation of the Dual Cooperative Training (DCT) in the heavy equipment field at the Lao-German Technical College (LGTC).

B. Research Questions

- Are the LGTC stakeholders and heavy equipment enterprises satisfied with the DCT concept?
- Is the DCT program suitable to the heavy equipment field at the LGTC?

C. Scope of the Research

This study examined the readiness of stakeholders in the LGTC and heavy equipment enterprises for the possibility of implementing the DCT in the heavy equipment field. The scope of study covered LGTC facilities and teacher conditions, enterprise facilities and trainer conditions. The study focused in Vientiane Capital area because it is the main business location surrounded by many heavy equipment industries.

D. Benefits of the Research

The benefits of this research are highlighted as follows:

- The possibility of this study can be prepared for the appropriate DCT model in the future.
- The successful research can be used as a recommended guideline and database for future study to implement the DCT in other learning fields within LGTC and may be in other TVET schools.

II. LITERATURE REVIEW

The dual system aims to transform the skills during school based with learning elements on the job and real work experience. This concept, is well-known in Europe especially Germany, requires two cooperative parties between school and enterprise [6]. The dual system in Germany has a long history from craft and trade associations and has regulated as apprenticeship program within many enterprises. A formal form of training in school-enterprise and the master craftsman training were developed from occupational regulations. While the industrialization began, the industries adopted the concept of craft training and adapted it to their needs. Vocational school also has a long tradition when looking back to the 16th and 17th centuries [7]. The German dual system is popular for producing the workers to supply the labor market needs. Therefore, many countries such as Slovakia, Italy, Spain, Portugal, Latvia, Greece, and in Asia covering India, China and Vietnam have adapted their TVET programs in line with the German dual system [8]. The Latin America also have adapted the dual system into their program as an apprenticeship successfully. Most of apprenticeships in the dual system were supported by private sectors according to the policies and law of the government for dual system implementation. The success apprenticeship program of the dual system in each country could summarize into the main key characteristics regarding the regional countries [9].

TABLE I. THE KEY CHARACTERISTICS OF AN APPRENTICESHIP IN DUAL SYSTEM IN DIFFERENT COUNTRIES

Countries	Youth	Adults	Duration (Year)	Employment contract	Wage			Incentives employers (Tax Breaks)
					Employers	Government	Subsidy	
Germany	✓	✓	2-3.5	✓	✓			
Austria	✓	✓	2-4	✓	✓			
England	✓	✓	1 up	✓	✓			
France	✓	✓	1-3	✓	✓		✓	✓
Peru	✓	✓	2-4	✓	✓			
Turkey	✓		2-4	×	✓			✓
Malta	✓		2-4	✓	✓	✓		✓
USA	✓	✓	1-6	✓	✓			✓
Brazil	✓		2	✓	✓		✓	✓
Canada	✓	✓	2-5	✓	✓			✓
Chile	✓	✓	0.5-2	✓	✓		✓	
Colombia	✓	✓	2	✓	✓			
Mexico	✓		1-2	×		✓		
India	✓	✓	0.5-4	×	50%	50%		
Australia	✓	✓	2	✓	✓			

The current form of the DCT program in Lao PDR shares several of its main elements with the German dual system, but it needs to be complied and adjusted to the local conditions

and requirements of Lao PDR's economic, social and cultural system [10]. So far, this program has launched the learning occupations to meet the demand of the social-economics in Lao PDR. It has been built up by the cooperation of the Vocational Education in Lao (VELA) project and the MoES with TVET schools and enterprises. The DCT program has been implemented to learn 2 days at school and 3 days at work, or 3 days at school and 2 days at work on a weekly basis. The program takes 2 or 3 years to graduate depending on the selected field of study. There is similar to Thai Dual Vocational Training (DVT). From the study of Naiyagongsiri [11] on the integration of teaching in enterprise with the dual vocational training developed model showed that the agreement on the informants to the DVT program was at high level. The study of Chinajiphan on satisfaction of the dual program also showed that school and enterprises were satisfied with the DVT concepts at the high level [12]. The dual education program was found to have a positive impact on students in gaining an in-depth knowledge, and teachers also felt that the program helped in establishing higher standards in the coursework about their career satisfactory [13]. Based on the lesson learnt, the dual program also supporting the development of a positive relationship between school and enterprise in career development. The study of Jiri and Milan [14] stated that the successful operation of the dual system has a consequence in the reduction of youth unemployment. According to several literature studies, the basic requirement for implementing the DCT program are readiness and willingness of the school and enterprises to implement the program [3]. Therefore, the conditions at LGTC include the management and facilities of the training infrastructures, teachers' performance, tools and equipment, curriculum, and the readiness of LGTC to cooperate with enterprises. The conditions at enterprise include the satisfaction of the employer in DCT concept and facilities of the training infrastructures, in-company trainers' performance, tools and equipment, and willingness of enterprise to participate the DCT program according to the requirement of the LGTC.

III. METHODOLOGY

This study examined the conditions of the LGTC and enterprises that are related in the DCT process of heavy equipment field by focusing in Vientiane area in Lao PDR. The research methodology outlined the research process as shown in Fig. 2. The target groups were five executives and five teachers at the LGTC, and ten managers and ten trainers from medium and large of private and public enterprises. The face to face individually interview was used to gather the information. The technique has implemented alongside the philosophical reflection of the existing research paradigms to remains a perfect tool in qualitative, and even quantitative studies [15].

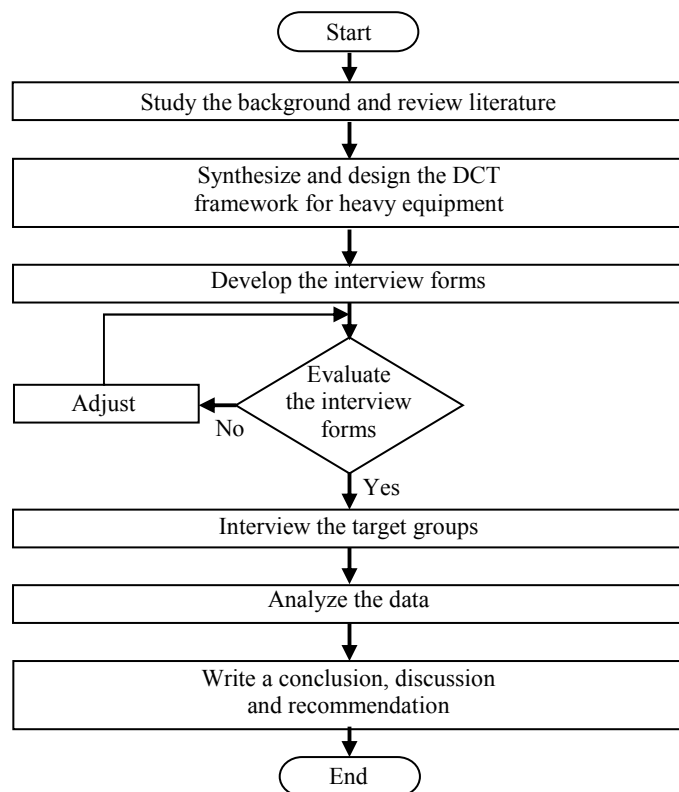


Fig. 2. The process for studying the readiness of LGTC stakeholders and heavy equipment enterprises in the DCT program

The DCT conceptual framework in Lao PDR [3] was synthesized and designed for heavy equipment in the eight main strategies for implementing in LGTC and can be seen in Fig. 3.

The establishment of the regular exchange between LGTC and enterprises includes the identification of enterprises and LGTC environment, training infrastructure, discussion of potential cooperation by identifying specific occupational needs of enterprise, and assessing whether the portfolio of the respective LGTC matches the requirements of the enterprises. The initiating procedure of signing memorandum of understanding (MOU) includes the identification objectives regarding to the fields of cooperation responsibilities in both the LGTC and the enterprises. The curriculum adjustment includes definition of training duration per qualification level, structure of the curriculum and training contents in heavy equipment.

The next step is training the trainers in the enterprises to ensure that the program can be organised accurately based on the principles of DCT. The enterprises and LGTC have to jointly select the qualified the learners who have appropriate hard and soft skills. For the DCT contract, which is similar to a regular working contract, covers the agreed training period. The DCT contract template form will be given by LGTC in order to inform the parties about the training conditions; the DCT contract shall be signed by the respective learner and the respective enterprise and witnessed by the respective LGTC.

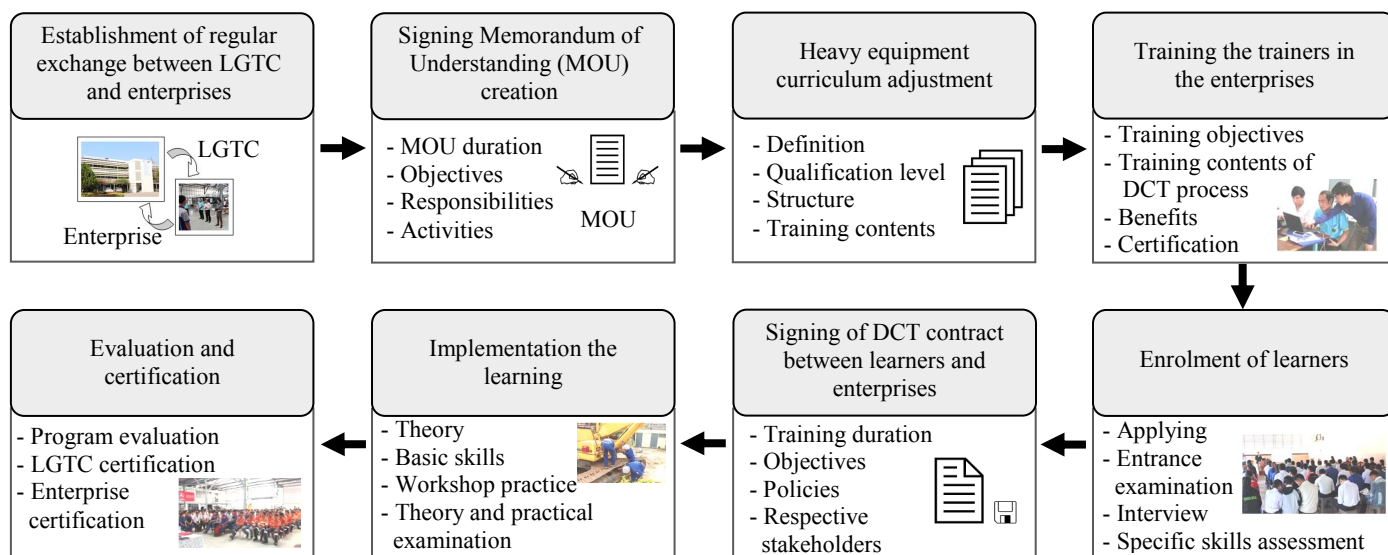


Fig. 3. The proposed concept for DCT implementing process in heavy equipment at LGTC

The implementation of the DCT program can be organized between daily, weekly or monthly arrangements, as long as it fulfils the requirement of the in-company training. For the final DCT examination, it is strongly recommended to work out and conduct the practical assessments corroboratively with technical experts from TVET institutes and enterprises. The learners should pass the occupational assessment.

The interviews forms were evaluated by 3 experts from the TVED at the MoES and Vocational Education Development Institute (VEDI) and VELA project. The Index of Item-Objective Congruence (IOC), initiated by Rovinelli and Hambleton, was used to evaluate the interview forms. The IOC value that is lower than 0.50 will be revised or else reserved [16]. The results found that the IOC score was at 1.00 at each item, which represent its validity. This research conducted the qualitative methodology using the interview method. The researchers conducted the interview during December 2017 to January 2018. The data analyzed by using the constant comparative method [17]. This method allows the researchers to repeatedly compare the responses with previous responses in an attempt to discover new relationships [18]. The data were identified into themes of significant statements were discussed below.

IV. RESULTS AND DISCUSSION

The data of interviewing were categorised into the following criteria: 1) the satisfactions of the participants about the DCT concept, 2) basic requirement of the DCT program, 3) college facilities, 4) enterprise facilities, 5) teachers' performance, and 6) in-company trainers' performance.

A. Results

Criteria 1 represented the satisfactions of the participants about the DCT concept. Twenty-eight interviewees agreed on the DCT program setting with satisfactory feedback on the DCT concept as seen in the example of the enterprise manager interview is shown as follows.

Question: "According to the Government policies and Development Plan 2016-2020 of TVED (MoES) with your enterprise's policies, is it good or not? If LGTC cooperate with your company to implement learning course in both sides, such as learning theory and basic practical skills at college then learning practical skills in the enterprise workshop."

Answers: "Yes, we are strongly agreed to the DCT concept. It would be good for us in order to develop and select the workers."

Question: "Do you think that you will be able to cooperate with LGTC for implementing the DCT program in the future to develop employees' skills?"

Answers: "We are appreciated to cooperate with the LGTC for implementing the DCT program in the future."

While, three executives stated that, most of the enterprises did not clearly understand the DCT process and had experience in dealing with the internship. Twenty-seven interviewees were able to cooperate and apply the DCT program in the future implement at the heavy equipment field.

Criteria 2 involved the basic requirement of the DCT program. The LGTC executives answered that the top of the basic requirements at the enterprise were the in-company trainers, followed by the training infrastructure, and related tools and equipment. The basic requirements at the college were teaching aids, the training packages, the Memorandum of Understanding (MOU) for DCT implementing, and the DCT coordinators of both parties. The most important needs for the enterprises understand the program were the DCT process and assessment, target and objective, and training benefits of the DCT program. In addition, one of the executive recommended that the willingness of enterprises for supporting the learners was the main factor to establish for implementing the program. The example of the executive and DCT expert interview is shown as follows.

Question: "What is the most DCT important factor needed for the enterprises to acknowledge and understand clearly about DCT program?"

Answers: "There is a DCT process including assessment of learning program, supervision the learners, and clearly understanding in the DCT objectives and goals; in which these are considered as the most important willingness of the enterprises to support the learners during the training course."

Criteria 3 represented the college facilities. The LGTC executives and teachers answered with the expectation that the workshops, materials, tools and equipment were ready to use. The example of the executive interview is shown below.

Question: "Do you think that the workshop, materials, tools and equipment are ready to use for DCT implementing?"

Answers: "The tools and equipment were ready to use although they were not enough. That is why we need to cooperate with the enterprises."

According to the research investigation, the facilities provided at the LGTC provided 6 theoretical rooms, 5 workshops area, a hydraulic room, an electrical-electronic room, a store including consumable and special tools, a forklift, a bus, an excavator, approximately 10 engines of heavy truck, and other spare parts in heavy equipment for learning and teaching. In recently, there were 80 learners in heavy equipment study. 54 learners were studying in year one and 26 learners were studying in year two. They were all agreed in the readiness of LGTC to cooperate with enterprises.

Criteria 4 indicated the enterprise facilities. The enterprise managers answered that the students had been in the internship program with them. The internship students were from the LGTC and other vocational institutes. Most of the students studied in the automotive field because heavy equipment field has only one location at LGTC. The example of the enterprise manager interview is shown below.

Question: "Where did your heavy equipment employees graduate from?"

Answers: "Most of the employees graduated from the Lao-German Technical College, which is in the automotive field."

The current workers and technicians of enterprises were also from the automotive field. From the conducted interviews, seven of nine enterprises were able to cooperate with LGTC for implementing the DCT program in the future and two enterprises were not able to make a decision because there is a branch of the external enterprises. In overall, the enterprises have shown a good facility with the appropriate workshop areas, tools and equipment for servicing and training. The example of the enterprise managers and in-company trainer interview is shown below.

Question: "Are there enough tools and equipment for training?"

Answers: "Well, our business aims to service after the sale. The in-service tools and equipment are enough for training. If the LGTC would like to take the DCT program, they totally need some simulation or training set up."

Besides, these enterprises were familiar with the pair workers including the learners who have the internship with them. The manager and trainers expected that, the tools and equipment with the facilities for training were enough; even through, one manager suggested that they would need some related simulators. Beside this, enterprises are also accepted the learners at approximately 4-5 persons in each enterprise. One enterprise manager said that, they are able to accept the learners to learn as in the DCT program at approximately 5-10 persons regarding to the servicing and building capacity.

Criteria 5 represented the teachers' performance. According to the teachers' interviews, most teachers graduated from the vocational teacher institutes in the field of automotive. For the teachers' backgrounds, they were trained in the heavy equipment work related. One teacher said that, training is a teacher's preference. The example of the teacher interview is shown below.

Question: "How long and how often do you get training?"

Answers: "It is up to the teacher preference to get training, then they can inform the LGTC's executives or enterprises for upgrading their work experience"

The teachers believed that they were able to provide the lesson plans, structure or form to be used of in the practical subjects, as well as support the coordinators and the trainers with the identification of the training contents. It could be seen that most teachers were able to respond the core competency modules regarding to the curriculum and recommendations of the trainers or enterprises.

Criteria 6 represented the in-company trainers' performance. From the interviewing of the supervisors/in-company trainers of the enterprises, they were graduated from vocational schools in the field of automotive. Most of supervisors/in-company trainers have experiences more than 10 years in heavy equipment field at enterprises and could provide the working plan, transfer skills to the learner regarding to the realities in the workshop. The example of the in-company trainer interview is shown below.

Question: "Could you provide some working plan for the practical subject?"

Answers: "Yes, the working plan in a routine service and some contents that are related, I expected that our supervisors could be able to apply it to the learners"

However, two of the enterprise supervisors could not really provide all working plans to the learners and teachers according to the restricted law, brand and license of the products at the manufacturing enterprise.

B. Discussion and Implication

The researchers found that overall, LGTC stakeholders and heavy equipment enterprises felt the DCT concept had a positive impact on supply and demand of the college and enterprises. The interviewees satisfied with the DCT concept, which is similar to the studies [11], [12] on satisfaction of the participants at high agreement level and positive impact in establishing higher standards [13] in dual program.

Based on the results of the respondents expected, the college and enterprise facilities were ready for dealing with the DCT program. Even though, it would take some time for changing the learning process. In addition, most of enterprises familiar with the internship program. The teachers have good backgrounds in teaching experiences but they would need to see the real work process of the enterprises which are exchanging between teachers and in-company trainers. The trainers had good work experiences but less experience in learning assessment and teaching skills. Therefore, those who involved in the program should be trained in the DCT process. Especially, the trainers and the teachers should understand how to deal with the learning process. The theory and practical linkage should meet the learning outcome regarding the curriculum and requirement standard in the heavy equipment.

The research findings from this study reflects a good image for the future study to set up the existing program to support the DCT process and model.

V. CONCLUSION

This research conducted the multidimensional perspectives on readiness in dual cooperative training at Lao-German Technical College for heavy equipment program. The research result showed the readiness of all key stakeholders in terms of the heavy equipment curriculum, infrastructures, tools-equipment, teachers and trainers. The target groups' aspects were favorable to the college and enterprises. Based on the LGTC's Development Plan 2017, the college is very supportive in offering the DCT program. At the beginning of the collaborative project, all related parties and especially the enterprises may need the strong compromise and engagement. The DCT program itself may also require some adaptation to suit the enterprise and college situations.

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