

**EFFECT OF DOUBLE COLLEGE MAJOR (DEGREE)
ON EARNING IN LAO PDR**

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**A Thesis Submitted in Partial
Fulfillment of the Requirements for the Degree of
Master of Economics
School of Development Economics
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ABSTRACT

Title of Thesis	EFFECT OF DOUBLE COLLEGE MAJOR (DEGREE) ON EARNING IN LAO PDR
Author	Houngthida Phetsinorath
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There are few studies on the effect of double major (degree) and most studies concentrate on high income countries (Russell, Dolnicar, & Ayoub, 2008; Del Rossi & Hersch, 2008). These studies have found the positive relationship between double major and employment as well as earning in Australia, Singapore, and U.S. A growing number of Laos students pursue double major. However, double major (degree) actually gives graduates greater employment opportunities and earning than single major graduates has not been fully understood.

This study aims at examining the effects of double major (degree) on earning in Lao PDR. Based on Human capital theory that schooling is the main investment in human capital and playing an important role on individual future earning, through Mincer earning equations have been estimated for the Ordinary Least Square (OLS). And, data of Laos, individuals aged 15-64 years who are urban residents, which are made available by World Bank Skills Towards Employability and Productivity (STEP) Measurement program 2012, that is the labor market skills data collection. The results show that double major graduates earn 8% more, but it is statistically insignificant. Here, double majors do not affect individual earnings. One possible reason is that skill might not be the key factor to setting the pay in Lao PDR. Through statistically insignificant, double major in social science/education relate positively to earning, which is consistent with earlier results. There is only those with college/university degree double major in social science/education is statistically significant higher earning. It reflects that the combinations within the same or related fields higher the earning. Education, work experience and place of residence statistically significantly affect individual earnings, which is conceptually a function of human capital investment.

Moreover, with reference to agriculture, arts/humanities as well as



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business/economics are statistically significant earn more. These two majors are general in nature, they are always in labor market demand, as they practical to many sectors. In addition, gender difference does not affect individual earnings, especially, those who are highly educated. It seems that discrimination in the educated labor market is absent. Both males and females are very productive, so they receive better job offers and higher pays, regardless of their gender. Similarly, marital status does not affect individual earning, either. It could be due to the higher share of married workers, and productivity of both married and non-married are equally good.

It is recommended that, Laos government should place the top priority to higher education. Ministry of Education and Sports should strongly encourage students to pursue higher education by providing higher education basic information, namely, higher education institutions, admission, and its returns directly to students. Government should give direct grants to students, especially, those who from low-income families and remote areas. And there should be more scholarships for majors that give high returns (arts/humanities and business/economics) and majors that highly demanded (engineering). In addition, the academic consulting offices should be established in provincial public high schools and the academic consultant office should always coordinate with Ministry of Labour and Social welfare for the latest labor market demand. Higher education administrators should discourage students from pursuing double majors by introducing tough conditions for those who seek double major.



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CHAPTER 1

INTRODUCTION

1.1 Introduction

Over past decade, earning gap has received a lot of attention, especially the earning gap between different level of education. The earning gap between college and high school educated employees has widened (Lemieux, 2006). Lifetime annual earning of college-educated Americans (\$32,000) is more than other higher-educated graduates (Trostel, 2015). Individual earning depends on individual abilities, skills, and level of education. In addition, each entering level of schooling leads to greater productivity for individuals (Ionescu & Ioan, 2012). As it is well-understood that a large number of individuals invest in higher education for better jobs and earnings.

In additional to making a decision to pursue higher education, students must decide further what to major in. Different study majors provide skills to individuals, particularly, specific skills. For example, a student who is a business major will have skills related to running and managing a company. Clearly, their major of study directly links to their future occupation and earning. Different majors provide different skills, different job opportunities, and earnings. Engineering and business graduates tend to be employed and earn more than other graduates and the differences tend to increase over time (Rumberger, 1984). Specific skills are those required for a particular job that deem necessary for one particular job. Individuals with specific skills are well-trained labor so they get higher pay compared to others; while, education as well as arts and social work earn much less due to their general skills in nature. General skills are basic and other common skills that are productive across various jobs, so demands are high for employees with these skills as seen in Australia, United Kingdom and United States (Servage, 2009). However, a job has many different tasks that need many different mixed skills like problem solving, communication, teamwork, and others. One (general or specific) skill may not be



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good enough. An implication is that individuals better mix as many skills as they can possibly, through pursuing the double major in college.

The combination of two study majors is broadly known as double major (degree). It is defined as the requirement for students to complete two related or unrelated full majors (degrees), either in the same or different university or colleges. Double major (degree) has gained global popularity. At Washington University, United States, the double major of arts and science graduates grew from 28% in 1997 to 42% in 2011. Similarly, at Georgetown University, it rose from 14% in 1996 to 23% in 2002 (Lewin, 2002). In Australia, the double degree program has increasingly drawn Australian students, especially women (Russell, Dolnicar, & Ayoub, 2008). In addition, National University of Singapore has graduated more students with double degree or second major, from 150 students in 2010 to 340 students in 2014, for an increase of 126% (Toh & Wong, 1999). Double major provides graduates more option about career path in the labor market, as graduates gain a good mix of knowledge and skills, general skill(s) and/or specific skill(s) which are flexible for employment. In Australia, double major has a positive effect to employment (Russell, & et al., 2008), and earning for the double major in U.S is 2.3% higher than one single major (Del Rossi & Hersch, 2008).

Laos is no exception, a growing number of Laos students study double major, combining one college major as their first major and a foreign language, especially English as their second major and other combination. It is common for Lao students to study more than one major, particularly, a night program students. As the night program students have a chance to study additional major in morning and afternoon program. Also most night program are offered by private institutions and some faculty only, so the major will be limited on business and foreign language, thus, the additional major are business and foreign language majors. Double major in this study will refer to a person who is graduate from 2 different or same major whether in the same degree or different degree in higher education level as in Laos there is less double major program that a student complete two majors in one degree from a college or university.

However, there is no guarantee for double major students would get a job and earn more in Laos. Laos is a lower middle-income country, with an annual average



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growth rate of 7.8% in the past decade (World Bank, 2016). Lao economy is mainly dependent on external demand for natural resources, namely, mining and hydropower. As mining and hydropower sectors are capital intensive, only highly productive skilled labor are needed. In other words, these sectors have not generated broad-based employment and earning for Lao labor force. In addition, employers prefer skilled labor with more professional and technical skills (World Bank, 2013). With growing foreign direct investment in hydropower and mining, particularly from Thailand, Vietnam, and China. Workers with specific skills in manufacturing and technology are highly demanded.

But, investors, especially foreign investors, find it difficult to employ the specification skilled worker to serve manufacturing and technology-intensive jobs (World Bank, 2014), as Lao labor market are predominantly low skilled workers with employed person who primary school education (37.5%) and no school (21.7%) (Figure 1.1)

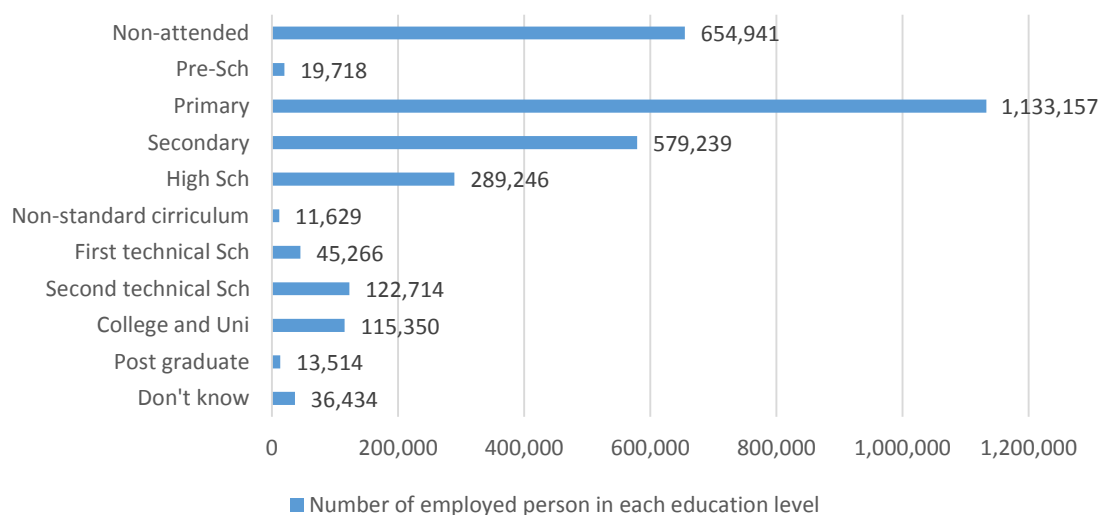


Figure 1.1 Educational Level of Employed Person

Source: Lao Labor Force and Child Labor Survey (2010)

Even though, higher education has been improved in both quality and quantity, but the improvement does not meet to the current labor market needs. Colleges and universities have a dramatic increase in enrollment rates, especially the business administration and management programs that offer less job opportunities



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compared to technical programs like construction, machinery operation and automobile repair (ADB, 2015). It reflects that skills that labor have do not match labor market demand.

Moreover, Laos graduates are viewed as skilled labor. From World Economics Forum Report 2016 on Asean Human Capital, Malaysia, Singapore, Philippines and Indonesia receive high scores on the ease of finding skilled employees. On the other hand, Cambodia, Lao PDR, Myanmar and Vietnam receive the low score. For Lao PDR, the second lowest score implies that it is very hard for business firms in finding the skilled workers (Figure 1.2). It is partly because of weaknesses in school curricula and lack of learning materials and qualified teachers (UN, 2015).

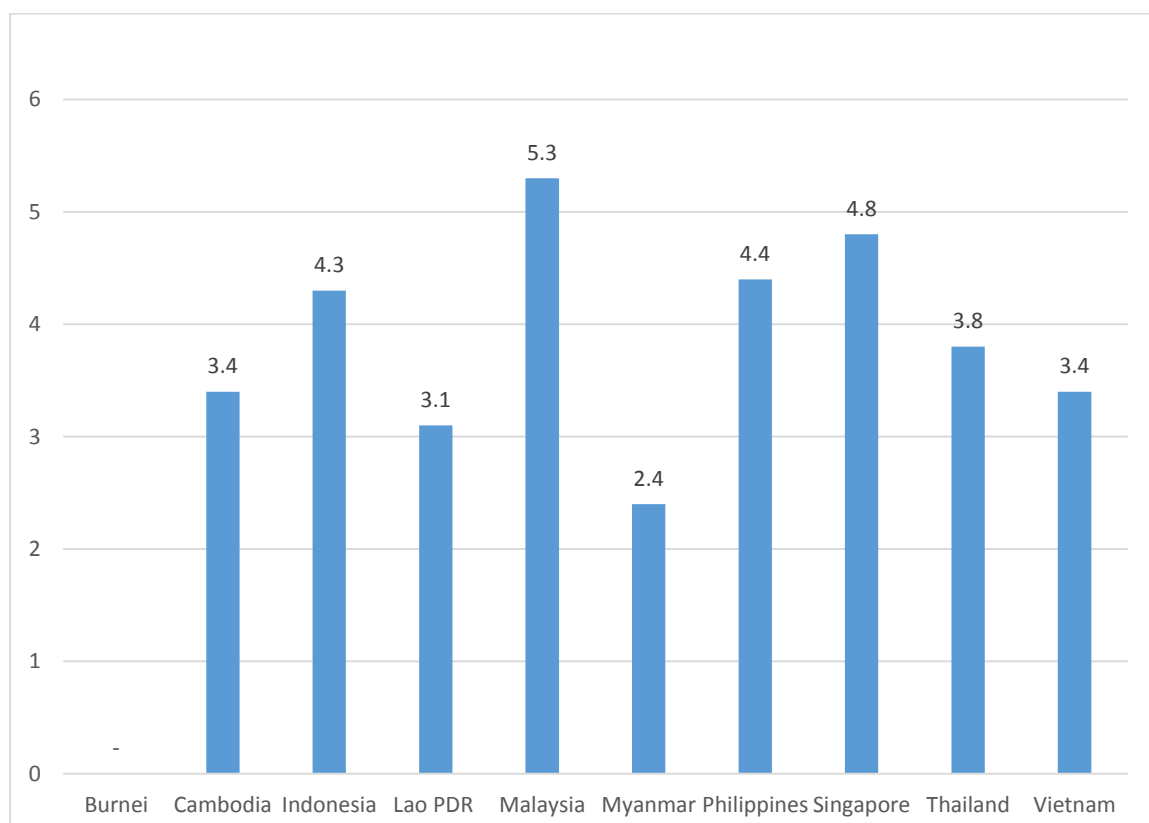


Figure 1.2 Ease of Finding Skilled and Employees (7= easiest 1= hardest)
Source: Asean Human Capital Outlook (2016), World Economics Forum

Laos higher education sector has tried hard to meet the international and region standards, as most of higher education institutions do not have the same quality



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standards as other institutions in Southeast Asia countries (ADB, 2015). Higher education curriculum cannot supply student essential competencies for employment and does not respond to labor market demand which favor semi-skilled and skilled workers. A recent survey of higher education in Lao PDR had found 50% of companies find it difficult to recruit talented local workers. As a result, a large number of private employers (74%) fill jobs with foreign-educated graduates (Duronsoy, Syvilay, & Billany 2014). As expected, foreign investors prefer foreign workers as they are more productive than local workers. Thus, to have a better job opportunity, many laos students pursue double major. They expect that double major will better prepare them for the labor market and better earning, as more diverse skills through double major would signal greater productivity to potential employers.

However, there are few studies on the effect of double major (degree) and most studies concentrate on high income countries (Russell, & et al., 2008; Del Rossi & Hersch, 2008). The studies have found that double major in Australia, Singapore, and U.S and employment as well as earning are positively related. In Lao PDR, whether double major (degree) actually give graduates higher employment opportunities and earnings than single major graduates has not been fully understood. Skills that workers acquire from their education might be viewed as low, even those with double major, and do not skills as employers demand, they end up earning a low pay. Therefore, this study will examine the effects of double major (degree) on earning in Lao PDR whether they benefit earnings.

1.2 Objective of the Study

To examine the effect of double college major (degree) on labor earning.



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1.3 Benefits of the Study

Prepare high school students in making a better choice on their college majors.
Support education institutions in offering the majors that better match labor demand.

1.4 Scope of Study

To examine the effects of double degree or major on earning and employment in Lao PDR, workers age 15 to 64 years old who are urban residents will be analyzed. Data used on individual earning, individual characteristics, (including gender, marital status, schooling, occupation), and job characteristics which will be obtained from 1) World Economics Forum's Database on education; gender and work, 2012 and 2015; 2) Asian Development Bank (ADB) 3) Skills Towards Employability and Productivity Survey by World Bank.



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CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Double major is an issue, especially the effects of double major on employment and earning. Few studies have directly focused on the effects of double major on earning. So this chapter will review related issues namely choice of double college major, and returns of double major which relate to the effect of double major.

2.1 Choice of Double College Major

The choice of college major is a major life decision for individuals as college majors build individual's knowledge and skills that are needed for their success in their future labor market (Becker, 1993; Hanushek, 1995; Robst, 2007; Carnevale, Strohl, & Melton, 2011). Different choices of college major lead to different outcomes, so choosing college major is an important decision for their future career and earning. Students' college major choices are based on expected outcome in the labor market which are employment and earning, influences of family and peers, as well as personal characteristics. Individuals will select the major which offers the greatest expected benefits and outweigh cost of major chosen, which includes books, tuition and fees, transportation cost, housing, and delayed earning.

When individuals are young, based on family income, parent's preference, and number of children in the family, their parents decide on their behalf which school for their children to attend. When individuals reach their teens, they are more independent in making their own education choice, but families, friends, and school guidance still matter, particularly, guidance on choice of study major, some students need that guidance to make an effective decision. Fass and Tubman, (2002) have found that families, and friends, suggestions on choice of college major are positively effect on student's choice of college major. It reflects, families and friends play a role in student's college major decision.



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Family background often has a strong effect on students' choice major(s) (Wildman & Torres, 2001), as parent's education level, occupations and social status are reported as factor influences in student choice of college major. Students from a business family are more likely to pursue a business major, management, accounting, or marketing, as these major are involved in business sector that they can apply to their family business. Families provide powerful emotional support to students, when they feel loved and supported by their family, they have more confidence in their own ability to make more satisfying choices in their life. Thus, Students who are in the exposure family, they have more frequent and open discussions within the family member, especially between parents and a child, influences a child's college major decision. Parents have large influence on the education, knowledge, skills and other dimensions of their children lives, they always want the best for their children, they give suggestions on what to study in college for getting a great job, good salary, and life of their children (Ma, 2009). Some children follow their parents' footsteps and some choose a business major with an eye on carrying on their family business (Dik & Duffy, 2007; Dietz, 2010). Similarly, a study on STEM career has found that children will pursue STEM major as their STEM parents, because these careers are seen as a feasible option for the (Leslie, McClure, & Oaxaca, 1998), it implies the intergenerational transfer, parents transfer their ability and skills (specific skills) to them. Regarding parental occupation, a father who is a professional is associated on their children's choice of college major, especially females as they are view their father as their role model, and father are more likely to transfer occupation-specific to their daughters. It reflects that fathers give more attention and more exposure of his occupation specific and preferences to their daughters.

On the other hand, students who are less exposed to the family, which frequent and open communication among families members being less, and /or children do not have freedom to choose and do what they decide, they will be forced to study to fulfil their parents' expectation, If they decide a major on their own, parents will withdraw their support, especially financial support, thus forcing them to follow their parents' wish (Berrios-Allison, 2005). So this group of students may not be happy and would not do well with their college majors, it may end up with quitting the course during the semester.



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In addition, family income has a strong effect on college major choice. Students with higher family income are faced with more selection on major offering, as they can afford expensive program like medicine. While students from low income families have limited major choice, they are more likely to pursue vocational and professional training, as it does not take long to graduate. Therefore, financial constraint also drives students to choose a relatively cheap major. Clearly, family income contributes to students' opportunity to participate in higher education as well as major.

Furthermore, recent studies on the peer effects, being like families as social interactions which influence human behavior as well as decision making, especially on choice of college major. Students are found to rely on their friends rather than parents or teachers to make their major choice (Steinberg & Monahan, 2007). Such role of peer effects further affects their future labor force status (Hanushek, Kain, Markman, & Rivkin, 2003; Lyle, 2007; Angrist, 2014). Teenagers are so vulnerable to peer pressure. Students usually spend their time with their friends both inside and outside the classroom. Their relationship provides positive support which directly affect their academic success as they interact with friends who are similar in their abilities, behaviors, interests, ideas, and others. These interactions can motivate students in learning especially in choosing a major, which ends up in the labor market outcomes. It implies that students would choose their major of study based on their peers.

Manski and Wise (1983) have argued that college major choice is an individual self - selection process. Students tend to choose fields of study that suit their characteristic and interests as they are surrounded in the right environment, they can share their ideas, interests, and beliefs, which ensure they get the compatible with their major choice. Self-interests is a key motivating factor for choosing a major as self-interest bring their best benefits. If individuals choose a major that fit their characteristic and self-interests, they will find it more enjoyable, to learn and develop relevant skills, so it is very much possible to end up with successful outcomes.

Currently, many factors have motivated a large number of college students to choose more than one major (double majors) for their college major choice (Lewin, 2002; Gomstyn, 2003). One, students choose one major for their future labor market



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and another major to satisfy their parents; two; it is one major for their own interest and one for their future labor market; three, they choose one major as they have to follow their family's footsteps and one from their friends. Of all previous factors, it has been found to a large extent that students choose double majors in order to prepare themselves for better labor market outcomes, both jobs and earnings (Del Rossi & Hersch, 2008; Hemelt, 2010; Zafar, 2012; Pitt & Tepper, 2012). That is, double major improves students' competitiveness in the labor market, as they are distinguished in their job applications attracting employers to hire them. It benefits current career as any career requires several skill sets, for example, a job having only communication and marketing skills would not be sufficient. Current jobs are quite complex, coming from technological and sociological change, so many other skills are needed like critical thinking, creativity, complex problem solving. Individuals believe that double majors will give them higher productivity making them more marketable in the labor market relative to those with single majors.

2.2 Returns of Double Major

The more investment in education, the more the return will be. Individuals with double major would acquire more skills which increase their productivity, and therefore, their benefits. With two majors or degrees, they have more skills than single major graduates. The return of double majors or degrees is expected to be different to the single major.

To estimate the return of double major as well as labor market outcome (earning), the Mincerian earning function is the conventional earning equation that most studies have adopted to estimate the relationship between education and earning, where logarithm of earning is the sum of linear function of year of schooling (education), years of work experience and a quadratic form of year of work experience, which refer to on the job training (Mincer, 1974b). Mincer (1974a) and Becker (1964) explain that individuals' earnings will be more, if human capital or skills increase through education and work experience. In other words, individuals who acquire more education and training will earn more as their productivity are higher. Therefore, years of schooling and experience have positively and significantly effects



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on individual earnings. Psacharopoulos & Patrinos, 2004 found that the average rate of return to one additional year of schooling is 10%. The highest returns are in low and middle income countries, return of education is high when the educated/skilled labor is scarce, and the region cannot supply. Thus, the return of education is higher in low and middle income countries. Moreover, By the level of education Montenegro and Patrinos (2014) found that the return to schooling are highest at the higher education level on average 16.8%, due to the technology change, there is high demand for high skills workers, so high skills worker is demanded and earn higher relative to other education level. This motivate secondary students to continue their education at higher education level, as the return to education of secondary level is the lowest. However, the return to primary level is 10.3% which is higher than secondary level (6.9%) it possible may be of the basic skills from the primary level still needed.

However, arguments exist in relation between earning and education is not sufficient to explain the result of the equation (Borjas, 2013). Difference in individuals earning is found to be affected by worker characteristics (age, gender, marital status and race) and abilities. Arshad and Ghani (2015) include age, gender, marital status, ethnicity, geographical location and occupational types to their Mincerian earning function to explain the earning differential in Malaysia. The results show that return to education is positively significant to year of schooling, consistent with all other variables included. Similar to many studies that there is positive relationship between levels of qualification and income. The earning for university graduates are the highest and statistically 99% significant, as university is the highest study level of study sample. Other variables that included also statistically significant.

Gender and marital status of individuals has been observed in the difference in earning return. On average, men earn more than women (ILO, 2015). Due to the intrinsic differences between sex, women have more family constraint than men, that is, they have to allocate their time to the greater family responsibilities being house works, child care, and parental care. Onphandala and Suruga (2006) and Magdalyn (2013) using Mincer function find that return to female education is statistically significant higher than return to male education in Lao PDR and Indonesia, respectively. One possible reason is that higher education allow women to gain better employment unlike traditional low paid jobs return. In addition, married workers



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seem to have higher earning than single workers, especially, married man (Onphandala & Suruga, 2006; Tangtipongkul, 2015). Because marriage increase individual's productivity, one spouse will be assigned in market production and other will be assigned to home production. Usually husbands devote more commitment to market production, so they acquire more market specific human capital, as they are able to expand more time on the job training, that leads them to higher market productivity and higher wage (Becker, 1991). But, non-married workers are found to have higher return to education than married workers, possibly because the latter have greater time and job mobility while less family commitments, they are allowed to take higher education and job training, also moving across, which advantage for their earning (Warunsiri & Mcnown, 2010).

To estimate the return to education of double college major, Del Rossi and Hersch (2008) estimate the Mincerian conventional earnings equation to examine the effect of having double major on earnings the equation included education, major of study, individuals demographic characteristics and employment characteristics. The study has found that double major increases earning by 2.3% compared to single major graduates in United States. Business and science-math major have returns more than 50% greater than the returns from single major, as those majors are complementary. When they combine, their benefits are enhanced. In addition, Hemelt (2010) has introduced additional factors, namely, university qualification variable that might affect double major popularity and earning added, to control institution difference in quality major and parental educations variable to control for the double major demand. The results are similar, that is double major earns 3.2% more than single major and the quality of institutions also gives rise to double major earning, that is better institutions earn there graduates more incomes. Jiang (2016) investigates the effects of double major on wage in short run and long run by using the 1997 United States National Longitudunal Survey of Youth. It is found that having a second major increases wage by 13.5% in the first year of labor market. However, in the long term, the return to a second major is small and insignificant, as individual earning is primary influence by the first major and the second major's values increase at the decreasing rate. so the difference between single major and double major disappear in long run. However, by the surveys in Australia, double degree benefits



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students in providing broader skills and more options to work, (Russell, & et al., 2008). As they have more skills, they have more choices for their future job and they don't have to wait long for the right job that matches their skill. Overall, the results of combination of double major are mixed some double majors are significant, but some others are not. The combination of business engineering and science/math are significant, as they are complementary, their benefits will be higher when they combined. In contrast, the combination of education major like education and business; education and science/math are not significant, the reason may be individual with single education majors are less likely to change jobs as they are satisfied with their jobs so other more major for them is useless.

A vast number of fields of study all on majors can combine into numerous doubles. Different combinations of double majors matter to individuals earnings (Martins & Pereira, 2004). Majors of study that individuals choose define set of skills that they will be applied to their labor market, either general skill or specific skill.

General skill provides students set of knowledge and skills that productive in several different firms (Becker, 1993). So individuals with general skills are able to perform generic tasks that required for production across firms. Like, individual with the service and/or communication skills is productive in a firm, and also productive in other firms. As it is general in nature, general skill seems to be used almost every firm for instance, communication skill is needed in every firm to customers and to do the business inside firm. So individuals who invest in general skill are mobile across firms. Dolton and Kidd (1998) find that the acquisition of general skills increases the likelihood of changing occupations, it reflects that individuals with general skills tends to change more job, as their general skills accommodate them to move across firms. But the acquisition of specific skills reduces the likelihood of occupation change. Because of their specialization that is productive in some firms.

In contrast, Individual with specific skills are able to perform highly specialized tasks in only some few firms, as their special skills mainly raised the productivity of an only firm that match with their special skills (Becker, 1993). They are valuable in some firms/industries, they are not mobile due to their specialization. It is hard for them to transfer their specific skills to other firms, as their specific skill is increased the productivity in limited firms. For instance, the surgery skills of doctor



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and manual skills of craft workers are worked in their particular jobs, which is surgery doctor and handicraft that productive in related sector only.

To explain the difference between general and specific skills, the labor market outcome in short and long term are often been used (Stenberg & Westerlund, 2015). In short run, the return on specific skills seems higher than that general skills explained by high demand for specific skills. As specific skilled workers appear seems to be more efficient than general skilled workers. As a result, the latter ends up earning more. Tan et al., (2004) find that specific skills are important for entry-level jobs, as it directly relates to his/her job position. For instance, individuals with accounting skills will have a better chance of being selected, and working as accountants. This accountant position mainly deals with company accounting task that is preparing, analyzing and interpreting accurate financial information like tax requirements, tax consequences, and financial risks, clearly the accounting practice is limited to this position. In contrast, De Lange et al., (2006) argue that general skills are more important for entry-level accountants. It is better for new hirings to have the basic skills like communication skills and problem solving skills enabling them to deal directly and indirectly with accounting job. As general skills are more transferable across firms than specific skills, individuals with general skills are at an advantage. They are able to learn and train as the new skills required by newer technologies. While individuals with specific skills find it difficult to switch jobs, as their skills, which are productive for certain firms, ban them from changing the jobs. Therefore, in the long run, general skills seem to benefit both individuals and the firms than specific skills.

Skills that individuals acquire through their study majors, whether specific or general skills play a role in their future occupations, which directly affect potential individual earnings (Thomas & Zhang, 2005). Currently, students combine their college majors, in a hope that their complementary double majors would raise each major's value which eventually lead to better labor market status as well as earning.



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2.3 Theoretical Framework

In 1961, Theodore W. Schultz, Noble Prize economist proposed that Human Capital consisted of individual's abilities, knowledge and skills. The investment in human capital, which is the investment in individual's abilities, knowledge and skills, directly effects their earning. The higher the investment in human capital, the higher of individual's real earning, that leads to the higher of national output. Later, in 1993, Gray S. Becker, Noble Prize economist extensively developed and defined human capital theory as knowledge, ideas, skills and health, which similar to Schultz (1961). Both Schultz (1961) and Becker (1993) argue that the main activity to improve human capital is education.

Modern human capital presents that education is a key to improve individual productivity and increase economic output (Becker, 1993). Education, especially formal education, improves individual's ability to increase productivity. As a result, better-educated individuals end up in the better jobs and get higher earning rather than less-educated individual. In addition, more educated individuals may be keen to develop new technology which would raise overall productivity. For higher productivity individuals need to investment in education, from schools and colleges. These are institutions that provide knowledge and diverse skills. Skills can be both general and specific skills (Becker, 1993). Moreover, other activities like health care, child care, migration and on the job training also raise individual's productivity. For, on the job training, by providing on the job trainings to their employees, allowing firms to secure greater outputs. However, most of trainings provided by firms are limited, in scope, valuable just for the firms that give trainings.

Investment in education, on the job training, health care, and other activities are investment in human capital. Investment in education, the leading formation of human capital, increases individual's skills, for example reading, writing, communications and management skills, all of which are basic and general skills deem productive across firms. The focus of this study is investment in education.

To estimate the return of education, earning equation or Mincerian earning equation is widely used. Mincer (1974) emphasizes the importance of education and on the job training on earnings. As there is positive relation between education, on the



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job training, and earning. It reflects that the higher investment in human capital, the higher the earnings. This earning equation is widely used to estimate the earnings of different groups, for example males and female.

Mincer modeled the earnings in natural logarithm form as function of years of education and years of potential post school labor market experience. The equation can be written as Ordinary Least Square (OLS) model:

$$\ln W_i = \beta_0 + \beta_1 S_i + \beta_2 EX_i + \beta_3 EX_i^2 + \varepsilon \quad (2.1)$$

where W_i is the monthly earning of the i th individual, S_i is number of years of completed schooling, EX_i is number of year individual has worked after their schooling years. EX_i^2 is experience squared, as the productivity of individual will be declined when they are getting older. Experience can be equal to age minus year of schooling minus six ($EX = \text{age} - S - 6$). Since Mincer (1974) assume that individuals start school at age of 6, and finished at S years of schooling, and begin working immediately after S years of schooling.

Firstly, Mincer assumed that investments in people are time consuming, so all investment costs are time costs. The flow of earnings is constant throughout working life, as after completion of schooling other human capital investments are undertaken. Each additional year of schooling reduce earning life by exactly one year. And there is zero depreciation. However, most individuals can continue to higher their skills and earning after completion of school, which is post school investment. Then the variation of earnings will be over the working life, so depreciation will be added to the analysis. Moreover, two more assumptions are added. One, working life will start immediately after completion of schooling. Two, all individuals are engaged to post school investment.

Based on Mincerian earning equation, more year of accumulated experience will increase their earning, as there is positive correlation between earning and job experience. Since job experience higher worker's productivity, as it is resulting from on the job training, that is post school investment. But there is diminishing returns, the increasing of earning is in the decreasing rate. Marginal revenue that workers obtained by adding a unit of investment is the discounted flow of future increase in



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earnings. It implies the later investments' benefit decline over time. Marginal revenue is conversely to the increasing of worker's age. In other words, older workers will have lower marginal revenue, as they have shorter periods to work and their incidence of illness is increasing compare to younger workers. Thus, the estimation of Mincerian earning equation generates Age-earning profile, which is the upward-sloping and concave curve, Figure 2.1.

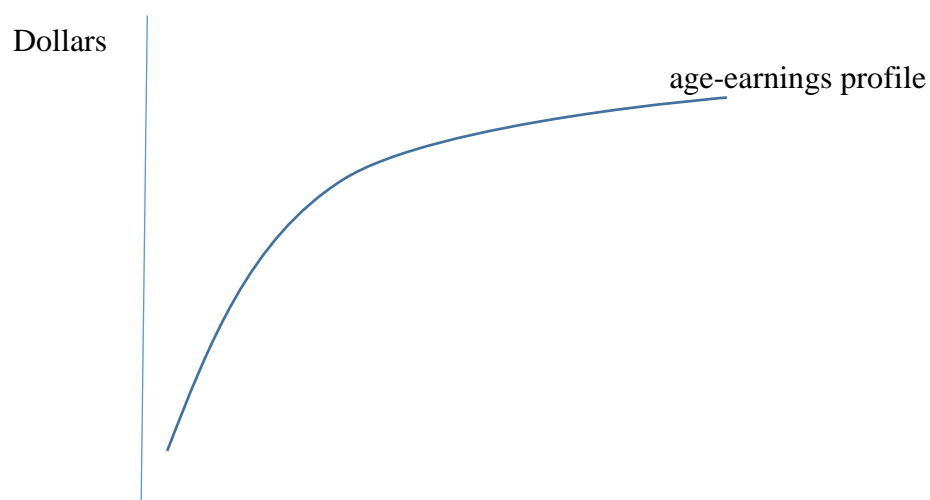


Figure 2.1 Age-Earnings Profile

How much to invest in education? Individuals have to analyze and estimate the costs and benefits such of investment. The benefit of investment in education can be pecuniary benefits, namely earning or wage and non-pecuniary benefits, may they be job security and reputation, among others. Surely, individuals who decide to invest in education, expect their benefits outweigh costs. An empirical evidence of 131 countries show that educated graduates on average get 10% higher return than high school graduates (World Bank, 2014). Even though high school graduates begin to work years before college graduates, their accumulated lifetime earnings are below those of college graduates (Figure 2.2). Worldwide students pursue on higher education level.



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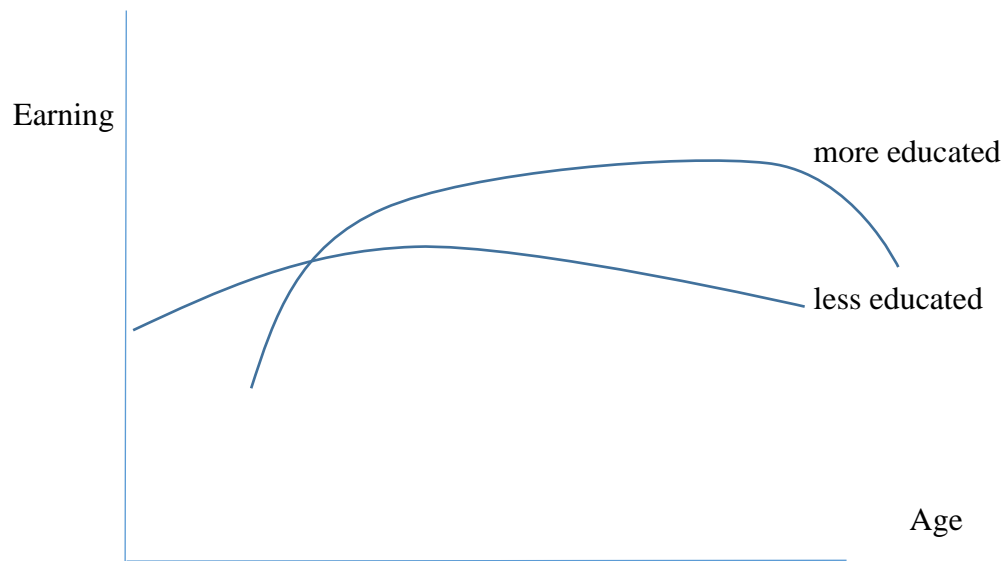


Figure 2.2 Age-Earning Profiles of Educational Investment

Education cost includes direct cost of investment, (namely, tuition fees, textbooks, transportation, and others) and indirect cost is the foregone earning that equals to what they would earn if they do not being pursue higher education. As the hope to get higher earning later, more educated individuals spent more time on their education, while they are on their education they are also spent out the labor market, so they are forced to face foregone earning. At the initial period, their earnings are lower than those less educated individual at the same age. However, when they complete their higher education, the more educated individuals earn more than less educated individuals at the same age, because the investment in education enhances their productivity that directly affect their earning.

Besides schooling, many individuals raise their productivity by acquire new skills through their jobs, which is known as on the job training (OJT). According to Becker (1993), on the job training, general as well as specific training, is an activity that increase individual's productivity which differs from investment in schooling. General training increases productivity in many other firms equally to the firm providing it, for example, the training of typing the keyboard and learning how to use a calculator, which are basic useful skills across firms. Since all firms, in competitive labor market, do not have an incentive to pay for training costs, as these skills are



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useful to many other firms. Other firms can hire these workers with their general skills without paying for their training costs, but firms that train workers could lose, if workers leave the firm after completing their general training. Therefore, firms would provide general training only if they do not have to pay for the costs. Workers who receive training would be willing to pay for the costs, since the training raises their future earnings.

Specific training increases productivity only in those firms provide the training, for example, learning how to drive army tank, as this training is useful only for soldiers in defending and protecting their territories, but not elsewhere. Specific training will be provided whenever the return from the training in the form of profits that resulting of higher productivity is larger than the costs of training. Firms will pay the training costs, if wage that firms paid to their workers are independent of the amount of training. Likewise, Earning or wage that completely specific workers can get elsewhere will be as it is independent of amount of specific training that they receive.

Turnover becomes important when training costs are imposed on workers or firms. If firms pay the costs of specific training, and workers quit their jobs after completing the training, firms would lose financially and economically. On the other hand, if workers pay for specific training costs, they would suffer from being laid off as their specific skills are not valuable in other firms. To solve this turnover problem, firms will give specific trained workers higher wage than they could get from other firms elsewhere. It reflects workers get some return from training and firms pay part of the training costs. In the end, specific trained workers have less incentive to quit and firms have less incentive to fire them.

In sum, an aggregation of investment in activities like education, on the job training, health, and migration increase individual's human capital leading to their higher productivity. In other words, individual's productivity is an increasing function of their human capital. Individuals acquire most of their human capital through schooling and on the job training, which raises their productivity resulting in higher earning.



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CHAPTER 3

DATA SET AND EMPIRICAL RESULTS

3.1 Data Set

This study is based on the data from World Bank Skills Towards Employability and Productivity (STEP) Measurement program, which being the first program to measure skills in low and middle income countries. The program collects data on labor market skills, measure the distribution of cognitive, non-cognitive, and job-relevant skills in both backward and forward linkages, (i.e., skills acquisition and education achievement) as well as social background and personality, skills acquisition and living standards, economic growth, reductions in inequality and poverty. The main objective of STEP program is to provide data that enable better understanding to policy makers about skills in labor market and support policy markers to improve the productivity and employability in their countries labor market, as well as other skills relevant issue. Similar to one of Lao PDR government's objectives, i.e., to improve their labor force quality by giving the priority to education, vocational education and training. The program started in 2012, and the data files are available through the World Bank's micro data catalog on July 2014. Target population of this survey is individuals aged 15-64 years living in private urban dwelling in the urban areas of country.

At the time of data collection based on the population census 2009 the Lao PDR total population was 5,937,867 people, 1,767,653 people (29.8%) are urban residents, 3,673,412 people (61.9%) are rural residents and 496,802 people (8.4%) are remote area residents. And the STEP program target population required minimum of 2000 complete STEP program for selected country.

Lao population overwhelmingly live in rural areas (Lao Statistics Bureau, 2009), and they will be included in the program together with urban residents, in order to be more nationally representative and capture the distribution of skilled individuals



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in the country. In addition, data collection in Lao PDR started on February 2012 and ended at May 2012, through the face to face interview, which lasted, on average, 120 - 150 minutes. The final sample of Lao PDR STEP survey is 2849 households (Table 3.1).

Table 3.1 Sample Design Counts of the Target Population by Urban and Rural Area

	Urban	Rural	Total
Population	1,767,653	3,673,412	5,441,065
Number of villages	1372	605	1977
Number of households	314,572	629,784	944,356
Number of participating households	2034	815	2849

Source: World Bank Skills Towards Employability and Productivity (STEP) (2012).

Regarding the sample selection and design a standard methodology is employed in 3 stages. All countries used the same procedure for selection the sample, and each country were assigned the result code table. The participated number in each stage weighting process depends on the result code assigned to the sample household and the selected code assigned to the selected person.

First stage sampling: the primary sample unit is a village, 188 sample which is 134 urban villages and 54 rural villages are sampling objective. The villages are selected with the probability proportional to size, which the size was the number of household in village.

Second stage sampling: the second stage sample unit is a household. The households are selected from a list of households in each selected primary sample unit by systematic equal probability sampling. Then selected households are asked the first module of the survey.

They were asked characteristics of household members (including name, age, gender, marital status and relationship with household head), as well as their dwelling characteristics (type of dwelling, size, construction materials, and sources of water and energy used).



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Third stage sampling: the third stage sample unit is an individual aged 15-64. An individual with equal probability from each selected household is selected to answer individual questionnaire in the next module of the survey:

1) Education completion: this module aims to obtain full picture of individual's lifetime skills acquisition, so the questions are about related to formal education participation and completion, that determined by diplomas and degree which awarded by educational institutions, fields of study, lifelong learning, and other types of training and certificates.

2) Health status: as health status influence individual skills acquisition, (Walker, & et al., 2007) it implies health affects individual ability to learn and work. But the main focus of STEP is not on health, the survey includes only simple indicators on health namely, height, weight, health problems, and health insurance.

3) Employment status; namely, job search, occupation, wage, salary, employment contract, working hours, and others.

4) Self-reported cognitive and job relevant skill sets (i.e, interpersonal skills, and manual skills), currently used in the labor market. The questions ask basic reading, writing, math, teamwork, customer service, physical strength at work, and other skills.

5) Personality and preferences: respondents are asked to scale their risk preference and their frequency of diagnostic behaviors on thirty-one personality given. As personality traits determine labor market and educational outcomes over individual's lifetime (Heckma, Stixrud, & Urzua, 2006). Currently, the big five taxonomy of personality traits that consists of conscientiousness, openness to experience, neuroticism, agreeableness and extraversion is widely accepted and used.

6) Languages: The questions ask the first language in the household and their fluency on the languages that they use (speaking and writing) on their current job.

7) Reading literacy: Respondents are asked to do the assessment developed by Educational Testing Service (ETS) alone. This will show the full picture of level of literacy in the country, that reflect to worker skills in the country and match to the focus of the survey.

As this study aims to examine the effect of double major in higher education



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on earning, so the dataset for this study will limit to education and employment modules of STEP survey for the total of 484 respondents. Even though, STEP survey does not contain direct questions on double major (degree), this study claims that individuals who report both a primary field and another field for their higher education are individuals which a double major (degree).

3.2 Sample Profiles

Males (55.37%) outnumber females (44.63%) of 484 respondents. Majority of sample 78.72% are married, more males sample (62.20%) than females sample (37.80%) are married. But for other status females take higher proportion compare to males, 14.46% of 484 sample are single, single females is 67.14%. and the rest 6.82% of 484 sample are divorced/widowed, divorced/widowed females is 75.76% (Table 3.2). More male married relative to female may be due to the outnumber of male sample, and surely the differences between male and female. Generally, after divorce or widowed more male tend to re-marry than female as female outlive male, so female have greater likelihood of being divorced/widowed.

Females complete middle and low diploma education 37.92% and 24.54%, respectively. which are higher than their males counterparts. On the other hand, males complete college education (24.63%), and vocational higher diploma (19.78%), more education than females. It can be said males are more educated than females. One possible explanation is females have more constraints relative to males, form household responsibilities i.e., household chores, child care, and parental care (Table 3.3).

Of 5 monthly earnings quintiles, 3 out of 10 low vocational graduates (31.19%) earn no more than 616,000 Kips. While 1 out of 4 middle diploma (25.31%) and close to 4 out of 10 higher diploma graduates (37.50%) earn 617,000 – 798,000 Kips. One fourth of bachelor (25.23%) and 1 out of 2 master graduates (52.94%) earn 1,800,001 – 50,000,000 Kips (Table 3.4). Return to education is conceptually argued to be a function of investment in education and this sample group proves that more years of education, resulted in higher monthly earning. So, one possible reason behind



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a big income gap between vocational and college graduates is that the latter are skilled labor who are largely demanded in labor market.

Close to fifteen out of 100 respondents with males (63.89%) outnumber females (36.11%). Taking double major can be regarded as an investment in education, and how much to invest depends on expected return. Over half of double major are males, indicating that males expect higher returns relative to females, especially married men. Males invest more on education in term of double major for longer working hours and higher wage (Table 3.5).

Respondents will be classified as having double major, if respondents reported his/her first and second major in any same or different degree. Almost half of double major graduates complete college education (43.06%), with middle diploma second (29.17%), and high diploma third (11.11%). One possible reason is that college has more study majors choice than other education levels (Table 3.6).

Between single and double major, 1 out of 4 single major graduates (25.49%) earn 617,000 – 798,000 Kips, while 1 out of 4 double major graduates (25%) earn 963,000 – 1,800, 000 Kips. It seems that double major earn twice more than single major. However, compared to earning in quintile 4 (963,000 – 1,800, 000 Kips), double major earning is only 23.38%, while it is 76.62% for single major. Thus, it cannot be said that double major earn higher than single major (Table 3.7), possibly because individual earning does not depend only on skills, but also other factors, e.g., experience and personal characteristics.

Out of 7 study major groups, 40.70% choose social science/education which is almost double those who choose business/economics (21.49%), and more than triple those who choose engineering (12.18%) and medicine (10.95%). Clearly, science, agriculture, and arts/humanities major are not popular as their specialized in skills that seem not productive in labor market, unlike social science/education and business/economics major. Note that these two majors are practical as they provide general skills that are productive across firms, which in turn, provide endless number of job opportunity to students (Table 3.8).

Of study majors, the highest earning major are arts/humanities and business/economics major, as 1 out of 3 business/economics (30.77%) and arts/humanities graduates (30%) earn 1,800,001 – 50,000,000 Kips (Table 3.9). One



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possible explanation is that these two majors are high in demand as many domestic and foreign investors are opening new businesses (GIZ, 2018). Furthermore, 1 out of 3 of agriculture (27.27%), engineering (27.42%) and medicine (30.19%) earn no more than 616,000 Kips (Table 3.9). For agriculture major, they might be perceived as being low productivity, so agriculture workers get low pay. In addition, Laos labor skills as whole are viewed as poor, even local engineers earn less than foreign engineers despite same job responsibilities. For health professionals, few available private hospitals prevent medical/health workers to get high pay.

Even though, combinations of double major are numerous, it is quite common for students to choose the combination of major along the same disciplines: social science/education and business/economics major (13.88%), double major in social science/education (12.5%), and double major in business/economics (11.11%). Evidently, these study majors complement each other, as one add to raise extra features to one other in a way to enhance their qualities. It reflects these usually leading to higher marginal product of labor when individual combine these majors. These majors will be better while they work together than when they work separately (Table 3.10). Business/economics (34.72%) and social science/education (30.56%) majors appear to be common to other majors, their apparent general skills are transferable to other skills that would increase the benefit of the study major. Undoubtedly, business/economics and social science/education are the leading choices for double major students, which is consistent with Hemelt (2010) who has found that students take business as one of their combinations study majors, as they expect that business combination will give them higher earnings (Table 3.8).

However, some combinations across the disciplines, are likely to acquire widely different skills or knowledge are not popular, among students. For instance, the combinations of agriculture and social science/education, social science/education and science, engineering, and medicine are rare (1.38%). Similarly, agriculture, arts/humanities and engineering as well as business/economics and medicine are overwhelmingly course requirements, as their difficulty and different course requirements that students have to spend more time and cost, which may outweigh their benefit. It discourages students to pursue these combinations (Table 3.10).



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Moreover, between Vientiane capital and other 17 provinces of the country, more reside in other provinces, (54.69%) and the rest 45.04% of 484 individuals are Vientiane capital's resident (Table 3.11). The proportion of sample in both areas Vientiane capital and other province is slightly different, almost half of sample reside in Vientiane capital, as Vientiane capital is the most urbanized area in the country that is center of culture, economic, politic, education and other.

Table 3.2 Marital Status by Gender

(unit: persons)

Marital status	Gender		Total
	Female	Male	
Single	47	23	70
<i>% row</i>	<i>67.14</i>	<i>32.86</i>	<i>100.00</i>
<i>% column</i>	21.76	8.58	14.46
Married	144	237	381
<i>% row</i>	<i>37.80</i>	<i>62.20</i>	<i>100.00</i>
<i>% column</i>	66.67	88.43	78.72
Divorced/ widowed	25	8	33
<i>% row</i>	<i>75.76</i>	<i>24.24</i>	<i>100.00</i>
<i>% column</i>	11.57	2.99	6.82
Total	216	268	484
<i>% row</i>	<i>44.63</i>	<i>55.37</i>	<i>100.00</i>
<i>% column</i>	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).



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Table 3.3 Education by Gender

(unit: persons)

Education year	Gender		Total
	Female	Male	
Vocational low diploma	53	56	109
<i>% row</i>	48.62	51.38	100.00
<i>% column</i>	24.54	20.90	22.52
Middle diploma	82	80	162
<i>% row</i>	50.62	49.38	100.00
<i>% column</i>	37.92	29.85	33.47
Higher diploma	35	53	88
<i>% row</i>	39.77	60.23	100.00
<i>% column</i>	16.20	19.78	18.18
Bachelor degree	41	66	107
<i>% row</i>	38.32	61.68	100.00
<i>% column</i>	18.98	24.63	22.11
Master degree	5	12	17
<i>% row</i>	29.41	70.59	100.00
<i>% column</i>	2.31	4.48	3.51
Doctoral degree	0	1	1
<i>% row</i>	0.00	100.00	100.00
<i>% column</i>	0.00	1.39	0.21
Total	216	268	484
<i>% row</i>	44.63	55.37	100.00
<i>% column</i>	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).



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Table 3.4 Education by Monthly Earning Quintiles

(unit: persons)

Education year	Monthly earning quintiles					Total
	Quintile 1 (0 – 616,000 Kips)	Quintile 2 (617,000 – 798,000 Kips)	Quintile 3 (799,000 – 962,000 Kips)	Quintile 4 (963,000 – 1,800,000 Kips)	Quintile 5 (1,800,001 – 50,000,000 Kips)	
Vocational low diploma	34	24	29	13	9	109
% row	31.19	22.02	26.61	11.93	8.26	100.00
% column	35.05	19.83	30.85	16.88	9.47	22.52
Middle diploma	38	41	26	25	32	162
% row	23.46	25.31	16.05	15.43	19.75	100.00
% column	39.18	33.88	27.66	32.47	33.68	33.47
Higher diploma	12	33	14	11	18	88
% row	13.64	37.50	15.91	12.50	20.45	100.00
% column	12.37	27.27	14.89	14.29	18.95	18.18
Bachelor degree	13	20	21	26	27	107
% row	12.15	18.69	19.63	24.30	25.23	100.00
% column	13.40	16.53	22.34	33.77	28.42	22.11
Masters degree	0	3	4	1	9	17
% row	0.00	17.65	23.53	5.88	52.94	100.00
% column	0.00	2.48	4.26	1.30	9.74	3.51
Doctoral degree	0	0	0	1	0	1
% row	0.00	0.00	0.00	100.0	0.00	100.00
% column	0.00	0.00	0.00	1.30	0.00	0.21
Total	97	121	94	77	95	484
% row	20.04	25.00	19.42	15.91	19.63	100.00
% column	100.00	100.00	100.00	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).



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Table 3.5 Single or Double Major by Gender

(unit: persons)

Single or double major	Gender		Total
	Female	Male	
Single major	190	222	412
% row	46.12	53.88	100.00
% column	87.96	82.84	85.12
Double major	26	46	72
% row	36.11	63.89	100.00
% column	12.04	17.16	14.88
Total	216	268	484
% row	44.63	55.37	100.00
% column	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).

Table 3.6 Education by Single or Double Major

(unit: persons)

Education year	Single or double major		Total
	Single major	Double major	
Vocational low diploma	103	6	109
% row	94.50	5.50	100.00
% column	25.00	8.33	22.52
Middle diploma	141	21	162
% row	87.04	12.96	100.00
% column	34.22	29.17	33.47
Higher diploma	80	8	88
% row	90.91	9.09	100.00
% column	19.42	11.11	18.18
Bachelor degree	76	31	107
% row	71.03	28.97	100.00
% column	18.45	43.06	22.11
Masters degree	12	5	17
% row	70.59	29.41	100.00
% column	2.91	6.94	3.51



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Education year	Single or double major		Total
	Single major	Double major	
Doctoral degree	0	1	1
<i>% row</i>	<i>0.00</i>	<i>100.00</i>	<i>100.00</i>
<i>% column</i>	0.00	1.39	0.21
Total	412	72	484
<i>% row</i>	<i>85.12</i>	<i>14.88</i>	<i>100.00</i>
<i>% column</i>	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).

Table 3.7 Monthly Earning Quintiles by Single or Double Major
(unit: persons)

Earning	Single or double major		Total
	Single major	Double major	
Quintile 1 (0 – 616,000 Kips)	89	8	97
<i>% row</i>	<i>91.75</i>	<i>8.25</i>	<i>100.00</i>
<i>% column</i>	21.60	11.11	20.04
Quintile 2 (617,000 – 798,000 Kips)	105	16	121
<i>% row</i>	<i>86.78</i>	<i>13.22</i>	<i>100.00</i>
<i>% column</i>	25.49	22.22	25.00
Quintile 3 (799,000 – 962,000 Kips)	81	13	94
<i>% row</i>	<i>86.17</i>	<i>13.83</i>	<i>100.00</i>
<i>% column</i>	19.66	18.06	19.42
Quintile 4 (963,000 – 1,800, 000 Kips)	59	18	77
<i>% row</i>	<i>76.62</i>	<i>23.38</i>	<i>100.00</i>
<i>% column</i>	14.32	25.00	15.91
Quintile 5 (1,800,001 – 50,000,000 Kips)	78	17	95
<i>% row</i>	<i>82.11</i>	<i>17.89</i>	<i>100.00</i>
<i>% column</i>	18.93	23.61	19.63
Total	412	72	484
<i>% row</i>	<i>85.12</i>	<i>14.88</i>	<i>100.00</i>
<i>% column</i>	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).



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Table 3.8 Study Major by Single or Double Major

(unit: persons)

Study major	Single or double major		Total
	Single major	Double major	
Agriculture	21	1	22
% row	95.45	4.55	100.00
% column	5.10	1.39	4.55
Arts/Humanities	10	10	20
% row	50.00	50.00	100.00
% column	2.43	13.89	4.13
Social science/Education	175	22	197
% row	88.83	11.17	100.00
% column	42.48	30.56	40.70
Business/Economics	79	25	104
% row	75.96	24.04	100.00
% column	19.17	34.72	21.49
Science	20	6	26
% row	76.92	23.08	100.00
% column	4.85	8.33	5.37
Engineering	56	6	62
% row	90.32	9.68	100.00
% column	13.59	8.33	12.81
Medicine	51	2	53
% row	96.23	3.77	100.00
% column	12.38	2.78	10.95
Total	412	72	484
% row	85.12	14.88	100.00
% column	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).



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Table 3.9 Study Major by Monthly Earning Quintiles

(unit: persons)

Study major	Monthly earning quintiles					Total
	Quintile 1 (0 – 616,000 Kips)	Quintile 2 (617,000 – 798,000 Kips)	Quintile 3 (799,000 – 962,000 Kips)	Quintile 4 (963,000 – 1,800, 000 Kips)	Quintile 5 (1,800,001 – 50,000,000 Kips)	
Agriculture	6	6	3	4	3	22
% row	27.27	27.27	13.64	18.18	13.64	100.00
% column	6.19	4.96	3.19	5.19	3.16	4.55
Arts/Humanities	2	4	3	5	6	20
% row	10.00	20.00	15.00	25.00	30.00	100.00
% column	2.06	3.31	3.19	6.49	6.32	4.13
Social science/Education	38	58	52	27	22	197
% row	19.29	29.44	26.40	13.71	11.17	100.00
% column	39.18	47.93	55.32	35.06	23.16	40.70
Business/Economics	14	29	14	15	32	104
% row	13.46	27.88	13.46	14.42	30.77	100.00
% column	14.43	23.97	14.89	19.48	33.68	21.49
Science	4	5	7	4	6	26
% row	15.38	19.23	26.92	15.38	23.08	100.00
% column	4.12	4.13	7.45	5.19	6.32	5.37
Engineering	17	12	6	12	15	62
% row	27.42	19.35	9.68	19.35	24.19	100.00
% column	17.53	9.92	6.38	15.58	15.79	12.81
Medicine	16	7	9	10	11	53
% row	30.19	13.21	16.98	18.87	20.75	100.00
% column	16.49	5.79	9.57	12.99	11.58	10.95
Total	97	121	94	77	95	484
% row	20.04	25.00	19.42	15.91	19.63	100.00
% column	100.00	100.00	100.00	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).



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Table 3.10 Double Major Combinations

Double major combination	Persons	Percentage (%)
Agriculture and Social science/Education	1	1.38
Agriculture and Business/Economics	2	2.77
Arts/Humanities and Social science/Education	2	2.77
Arts/Humanities and Business/Economics	6	8.33
Arts/Humanities and Science	3	4.16
Social science/Education and Social science/Education	9	12.5
Social science/Education and Business/Economics	10	13.88
Social science/Education and Science	1	1.38
Social science/Education and Engineering	6	8.33
Social science/Education and Medicine	4	5.55
Business/Economics and Business/Economics	8	11.11
Business/Economics and Science	5	6.94
Business/Economics and Engineering	6	8.33
Science and Science	3	4.16
Science and Engineering	2	2.77
Engineering and Engineering	3	4.16
Engineering and Medicine	1	1.38
Total	72	100%

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).

Table 3.11 Residence by Gender

(unit: persons)

Residence	Gender		Total
	Female	Male	
Vientiane capital	105	113	218
<i>% row</i>	<i>48.17</i>	<i>51.83</i>	<i>100.00</i>
<i>% column</i>	48.61	42.16	45.04
Other provinces	111	155	266
<i>% row</i>	<i>41.73</i>	<i>58.27</i>	<i>100.00</i>
<i>% column</i>	51.39	57.84	54.69
Total	216	268	484
<i>% row</i>	<i>44.63</i>	<i>55.37</i>	<i>100.00</i>
<i>% column</i>	100.00	100.00	100.00

Source: Skills Towards Employability and Productivity (STEP) Survey (2012).



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3.3 Empirical Results

Education, work experience, and place of residence significantly affect earnings. That is, more year of schooling, work experience, and Vientiane residents earn more than others, which are consistent with Onphandala and Suruga (2006), Tangtipongkul (2015) and Arshad and Ghani (2015). Education and work experience relate positively to earnings, that is, one additional year of schooling and work experience increase the earnings by 13% and 6%, respectively. On the other hand, experience squared relates negatively to earning, so the return of post school investment declines over time implying diminishing returns to experience. Note that the return of investment in schooling, i.e., investment in human capital is higher than that of work experience which is post school investment. As education is the key determinant of earning, it serves as a signal of a worker productivity. Even after schooling worker's productivity rises over time, due to on-the-job training. It is one important component of a worker's human capital accumulation. In addition, Vientiane residents earn 31% more than other residents. The difference is statistically significant, because Vientiane, like other capitals cities in the world, is the national center of political and economic activities. Vientiane residents earn higher than others as they have better job opportunities, and more well-paid jobs are available from private and international organization (Table 3.12 (1))

For gender difference, men earn 7% less than women, but it is statistically insignificant. Thus, gender difference does not affect individual earnings, especially, those who are highly educated. It seems that discrimination in the educated labor market is absent. Both males and females are very productive, so they receive better job offers and higher pays, regardless of their gender. Similarly, married individuals, though statistically insignificant, earn 7% more than single individuals, but divorced/widowed individuals earn 26% less than single individuals (Table 3.12 (1)). Obviously, marital status does not affect individual earning, either. It could be due to the higher share of married workers, and productivity of both married and non-married are equally good. Married individuals can focus on their work, without worrying about household chores, as these responsibilities half on their spouses. Thus, they productive at work. Similarly, non-married individuals increase their



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productivity by pursuing higher education level and job training as they have less family commitments.

Based on empirical result findings, consider Somsy, a Vientiane resident. She started her first job 5 years ago immediately after her graduation from college and earns 4,036,748 kips. Somsay started his work early this year with his lower vocational degree in his hometown, Savannakhet and earns 2,319,248 kips less than Somsy.

The regression results show that double major earn 8% more, but it is statistically insignificant (Table 3.12 (1)). Here, double major does not affect individual earnings, which is in contrast to other studies that have found a positive and significant effect of double major on earnings (Rossi & Hersch, 2008; Helmelt, 2010; Jiang, 2016). Unlike well-developed labor markets, say, United States where workers get paid based on their skills, Lao labor market is still underdeveloped, so workers as a whole are viewed as productively low. Due to high share of self-employed and unpaid family workers, and shortage of skilled labor, workers get low pay and skills might not be a key factor in setting the pay. Double major/degree graduates involve higher cost than those pursue single major/degree, in terms of tuition and fees as well as opportunity cost of study. It reflects that the cost of double major/degree investment outweighs the benefit of the investment, so investment in double major is not profitable.

Similar results are found for vocational and college graduates, but coefficients are slightly higher. Double major earn roughly 16% more for vocational graduates across the board (Table 3.12 (2)) and earn less 3% for college graduates (Table 3.12 (3)). Even though statistically insignificant, vocational graduates earn 8% higher than all other groups and about 20% higher than college graduates. It may due to the cost of vocational education is lower than others, as vocational education programs generally last 2 years, which is half shorter than college education.

As social science/education major are popular, they will be estimated in order to analyze their effects. Through statistically insignificant, double major in social science/education relate positively to earning, which is consistent with earlier results that double major earns more, but statistically insignificant. On the other hand, other double majors, namely social science/education and business/economics, social



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science/education and engineering statistically insignificant are negative on earning (Table 3.12 (1)). Similarly, for those with vocational degrees, social science/education majors relate negatively to earnings, through statistically insignificant (Table 3.12 (2)). It may be due to a large number of vocational students choose majors that related to technical fields, like engineering and science than social science/education major, so social science/education major combinations are quite limited, and it rarely leads to high pay. For college students, double major in social science/education are statistically significant on earnings. It reflects that pairing the same or related disciplines enhance earnings (Table 3.12 (3)).

Table 3.12 Ordinary Least Square (OLS) Results of Double Major Earning

Variable	Ln(Earning)		
	Full sample (1)	Vocational degree (2)	College/University degree (3)
Schooling year	0.1323 (0.0355) ***	0.1808 (0.0712) ***	0.1563 (0.0950)
Experience	0.0578 (0.0157) ***	0.0734 (0.0195) ***	0.0322 (0.0308)
Experience squared	-0.0013 (0.0003) ***	-0.0016 (0.0004) ***	-0.0011 (0.0008)
Double major	0.0782 (0.1348)	0.1638 (0.1991)	-0.0367 (0.1751)
Marital Status	Single is the reference group		
Married	0.0072 (0.1416)	0.0491 (0.1916)	0.0447 (0.2084)
Divorced/Widowed	-0.2683 (0.2060)	-0.1581 (0.2567)	-0.6692 (0.3941)
Gender	-0.0780 (0.0885)	-0.0154 (0.1042)	-0.3580 (0.1690)



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Variable	Ln(Earning)		
	Full sample	Vocational	College/University
	(1)	degree	degree
	(2)	(3)	
Residence	0.3111 (0.0855) ***	0.3135 (0.1033) ***	0.2229 (0.1576)
Major Combination			
Social Science/Education and Social science/Education	0.1123 (0.3270)	-0.2306 (0.4239)	0.8766 (0.5203)*
Social science/Education and Business/Economics	-0.1620 (0.5337)	-0.2156 (0.9454)	-0.0037 (0.6157)
Social science/Education and Engineering	-0.3326 (0.3891)	-0.3127 (0.5032)	-0.7017 (0.6214)
Constant	11.2805 (0.5466) ***	10.3624 (1.0362)	11.4316 (1.5169) ***
Observation	484	359	125
R-squared	0.1117	0.1061	0.1447
Adj R-squared	0.0910	0.0778	0.0615

Note: (1) *Significant at 10%,

(2) ** Significant at 5%,

(3) *** Significant at 1%,

(4) Standard errors in parentheses



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With reference to agriculture, all majors earn more. For arts/humanities as well as business/economics, it is 53% more statistically significant. As these two majors provide general skills to students, they are exposed to wider range of occupations and higher pays. For example, graduates of arts/humanities can work as English teachers, translators, or tour guides. Business/economics graduates can work as officers, accountants, or secretaries. These jobs are always in demand, especially, arts/humanities (English) graduates because of many foreign investments in the economy.

Earnings of medicine, science, engineering, and social science/education graduates are found to be statistically insignificant to agriculture graduates, (Table 3.13 (1)). Medical doctors earn low possibly due to few private medical care centers in Lao PDR. As medical care centers in Lao PDR are predominantly public hospitals, a large number of doctors are civil servants and their salary is depended on their service rank, which are generally low. Science graduates earn higher, though statistically insignificant, possibly due to the fact that few science jobs are available in Lao labor market and are filled largely by foreigners. In contrast to other studies, (Finnie, Ross, & Frenette, 2003; Thorson & Park, 2003; Carnevale, & et al, 2011), the opposite is true for this study. Even though engineers are in high demand, as construction and manufacturing sectors have been growing (GIZ, 2018), but their skills are below what the labor market demands. They earn low and must be retrained. Those who do not want retraining would choose the jobs that require lower skills than what they have, so they end up earning less. Similarly, as almost all social science/education graduates work in the public sector where the pay is low, so they earn relatively low compared to other majors.



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Table 3.13 Ordinary Least Square (OLS) Results of Study Majors Earning

Variable	Ln(Earning)		
	Full sample (1)	Vocational degree (2)	College/university degree (3)
Agriculture is the reference group			
Arts/Humanities	0.5302 (0.2879)*	0.5699 (0.4073)	0.4301 (0.4526)
Social science/Education	0.1275 (0.2095)	0.0651 (0.2436)	0.2786 (0.3978)
Business/Economics	0.5333 (0.2187)***	0.4731 (0.2555)	0.6566 (0.4107)
Science	0.2012 (0.2699)	-0.0160 (0.3365)	0.4426 (0.4586)
Engineering	0.1751 (0.2312)	0.1324 (0.2648)	0.4935 (0.4743)
Medicine	0.2479 (0.2363)	0.2283 (0.2681)	0.6032 (0.5378)
Constant	13.505 (0.1987)***	13.4780 (0.2304)***	13.5966 (0.3803)***
Observation	484	359	125
R-squared	0.0342	0.0329	0.0431
Adj R-squared	0.0220	0.0165	0.0056

Note: (1) *Significant at 10%,
 (2) ** Significant at 5%,
 (3) *** Significant at 1%,
 (4) Standard errors in parentheses.



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CHAPTER 4

CONCLUSION AND POLICY RECOMMENDATIONS

4.1 Conclusion

Of all 484 respondents, 15% pursue double major (degree), as they expect that it will bring them higher earning relative to single major. Almost half of double major graduates complete college education (43.06%), with middle diploma second (29.17%), and high diploma third (11.11%). It may be a case that colleges, in general, offer more study major choices. The popular double major are business/economics (34.72%) and social science/education (30.56%). These majors appear to be complement to other majors. Their apparent general skills are transferable to other skills that would increase the benefit of the study major.

Empirical findings reveal that education, work experience, and place of residence significantly affect individual earnings. Education is positively related to earning, that is, it leads individuals to good and well-paid occupations. Work experience is positively related to earning as well. Experienced workers are highly productive as they accumulate their human capital. One additional year of schooling and work experience increase individual earnings by 13% and 6%, respectively. Individual earning is conceptually a function of human capital investment that more years of education and work experience result in higher earnings.

Double major can be regarded as an investment in education. As students pursue one more major, they incur additional cost (i.e., tuition, fees, and opportunity cost) very much the same as they invest more in their years of education. The effect of double major on earning is that double major raises individual earning higher by 8%, but it is statistically insignificant. Here, double majors do not affect individual earnings, which is in contrast to other studies that have found a positive and significant effect of double major on earnings (Rossi & Hersch, 2008; Helmelt, 2010; Jiang, 2016). Unlike other well-developed countries, Lao PDR is a developing



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country, workers get low pay and skills might not be a key factor in setting the pay, due to high share of self-employed and unpaid family workers, and shortage of skilled labor. Different double major combinations give different returns, double major in social science/education, social science/education and business/economics, social science/education and engineering pairing are estimated. Only those with college/university degree double major in social science/education is statistically significant. It reflects that the combination within the same or related fields earns more.

Moreover, with reference to agriculture, all majors earn more, especially, arts/humanities as well as business/economics earn statistically significant 53% more. These two majors are general in nature, so they are always in labor market demand as they are productive in many sectors. Skills that students obtain from these majors are general skills, leading them to wider range of occupations and higher pays.

In addition, individuals who reside in Vientiane capital earn 31% more than other residents. As Vientiane is the national center of political and economic activities like other capitals cities in the world, Vientiane residents have better job opportunities, and more well-paid jobs available from private and international organizations.

4.2 Policy Recommendations

The study shows a piece of evidence that the return to education in Lao PDR is high compared to World Bank (2014) study. Laos government should place the top priority to higher education as it provides individuals with skills and knowledge deemed valuable to modern economy. However, many students decide not to pursue higher education, as attending higher education incurs additional costs relative to incomes. Ministry of Education and Sports should strongly encourage students to pursue higher education. One, Department of Higher Education should provide higher education basic information, namely, higher education institutions, admission, and its returns directly to students while they are in their last year of high school in order to encourage high school graduates to attend colleges/universities. Two, higher education should be subsidized. Government should give direct grants to students,



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especially, those who from low-income families and remote areas. It will help them to reduce their private costs of education. And there should be more scholarships for majors that give high returns (arts/humanities and business/economics) and majors that are highly demanded (engineering) to fulfill labor market shortage.

The choice of college major is one difficult decision for students, as well as double major/degree decision, as it will stay with them for years. Before making the decision, students should seriously weight its costs and benefits by discussing and asking for advice from guidance teachers. Ministry of Education and Sports should have academic consulting offices in provincial public high schools. As labor market is rapidly changing, in order to provide better guidance to students, the academic consultant office should coordinate with Ministry of Labour and Social welfare for the latest labor market demand on a regular basis. And, higher education administrators should discourage students from pursuing double majors by introducing tough conditions for those who seek double major. To do it, students must earn the minimum grade point average of 3.50 for their core subjects in both majors and their cumulative GPA must be at least 3.00 for both majors as well.



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BACKGROUND

EXPERIENCES



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