

Construction Process of Pakse Urban Area's Infrastructure Improvement

Secondary Towns Urban Development Project

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Summary

My overall objective of the paper is to depict the urban planning development in Laos. Secondary towns urban development project is an arrangement for the infrastructure of the urban services and urban utilities in an urban area. Towns or cities can not exist without an infrastructure system, of which the road construction and drainage system are important for the cities' or towns' existences. The development programme 1996 to 2000 of the Lao People's Democratic Republic has a programme to improve the infrastructure of the country towards a general improvement of the quality of life of the population of the whole country.

Pakse town is one of the four towns in the country, which is included in the secondary town urban development project. During many years ago Pakse town still lacked a good infrastructure system. The existing infrastructure conditions as road and drainage systems were primitive and not in good condition for the urban services and urban utilities.

This paper is attending the planning process of implementation strategies for the urban development, especially, the improvement of the roads and drainage systems of Pakse town. Many actual problems are presented and proposals are given by the personal experience of the author in the International Construction Management 2000 course.

Introduction

Aim of the Paper

After the Government has the instituted economic reform and divided to change towards a market oriented system. The Lao Government's policy is opening to the world and has more facilities for co-operation with different developers and investors. The result of this economic reform is the activating to many development projects. One of these is the secondary towns urban development project, which will be implemented in four towns of the country: Louangprabang, Thakhek, Khanthaboury and Pakse. The main goal of this project is to construct, improve and maintain urban infrastructure and services. The objective of this paper is elucidating and analysing the construction process and construction management of roads and drainage. Another aim of this paper is tries to

present the road condition and speciality of the urban development planning from one side of the project and giving some constructive proposal to the reform on secondary towns urban development project at the end will be compared by ICM course.

Facts about the Actors

- Loan donor = Asian Development Bank
- Board = Ministry of Communication, Transport, Post and Construction (MCTPC)
- National level co-ordinated = Project Steering Committee (PSC), under vice Minister's chairmanship of MCTPC
- Project executing agency (EA), client = Department of Housing and Urban Planning (DHUP)
- Implemented by = Project Manager Unit (PMU)
- Implementation assistance at local level = Project Implementation Unit (PIU)
- Consultant Company designers supervisors assistance PMU&PIU = IGIP-BCEOM-BETURE in Association with S.K Consultant-SMED
- Contractor = assigned on August 2000

Facts about the Project

The scope of the project is:

- Improving conditions of the road surface.
- Improving the functioning of the stormwater drainage system by the creating of interconnected drainage networks for all major catchment of the urban areas.
- Improving the main primary and secondary channels following catchment design.
- Re-constructing of existing earth, gravel and laterite road.
- Creating access to indicated area as development area.
- Creating and maintaining network of tertiary road side drainage.
- Building the new road.

Another aim of the project is that the drainage system of the road also protects the population of the urban area from floods.

Geographical Facts

The Lao People's Democratic Republic (Lao PDR), a landlocked country is located in Southeast Asia. It has an area of 236,800 km². The country is divided into three geographical areas: the Northern, the Centre and the Southern areas. Over 70% of the country consist of rugged mountains and plateaux .Two thirds of the country is forest, but only 10% are considered suitable for agriculture and the total population is about 4,8 million. Pakse town is situated on the eastern bank of the Mekong River in extreme south of Lao PDR, about 160 km north of the border with Cambodia. The topography of the town and surrounding area is undulating with level varying about 15 metres within the urban area and 25 metres in the rural area. Many of the low areas are below the 5-year-flood level of the Mekong River. The population in Pakse urban area is about 48.000,the number of people in active employment represents around 77% of the potential labour force or 47% of the total population, the sectional analysis of employment in the urban area shows that the tertiary sector dominant.

Activity sector	Char of total population
1. Agriculture	22,6%
2. Secondary sector (private)	11,2%
3. Tertiary sector (private)	54,0%
4. State sector	12,2%

The annual monsoon cycle give two distinct seasons: from the early May to the end of September it is rainy season and from October to April it is the dry season, the temperature highest is about 38°C occurring between March and May and lowest average is approximately 15°C occurring between December and January.

Economic Situation

Over the period 1994 to 1997, Lao GDP economic growth rates average over 7%. Despite the “Asian Crisis”, in 1998 was 6% and 7,5% in 1999. The Lao economy is an agriculture one, 51,5% of GDP originated from agriculture, fishing and forestry. Laos has rich natural resources including river suitable for hydro electric power, timber, tin, gold, gypsum, gemstones and other underground resources. Per capita income per year is US D 828 in the Pakse urban area, the media household income is Kip 292.000 (317 US D) per month and the poorest section (up to the 20 th percentile) has household income of less than Kip162.000 (176 USD) per month. The average household expenditure per month is Kip 230.000 (250 USD). Pakse urban area is a moderate-income area, which it is not easy to solve and also is a difficult problem in the urban development process. The “KIP” is Lao national currency, USD1=7.520 Kip (March 28, 2000).

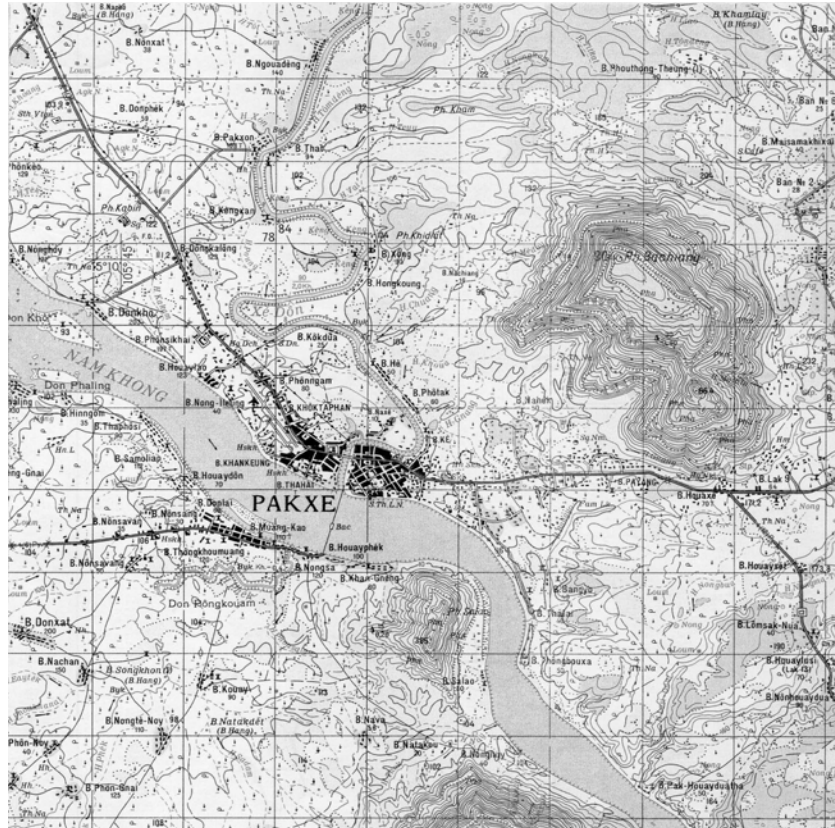


Figure 1: Pakse situation

Culture and political

Around 85% of the Lao people believe in Buddhism and the remaining 15% are Christians, Animist or Spirit Cult. The official language of the Lao PDR is Lao as spoken and written through out the country.

Thanks to the clever and flexible policy of the present Lao Government, Lao people started a decade ago to open itself to outside market when finding out that lessons learned from eastern countries did not help the country to develop satisfactory. Therefore, after the collapse of the World Socialist system, Lao people still continue to develop progressively its country without any obstacle even assistance from the former USSR and Eastern European countries was cut out sharply.

Design Stage

Project Organisation

Generally, the project organisation in the construction process consists of 4 part: Project owner (client), Project manager, Designer (or consultant), and contractor. The organisation chart below shows the structural working: (figure 2)

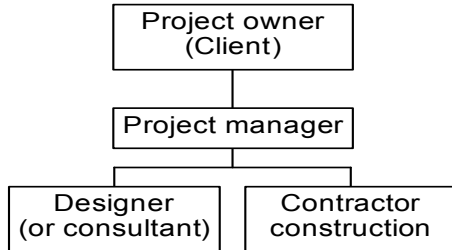


Figure 2

For the secondary towns urban development project will be co-ordinated at national level through local situation level of the project. So, in this case the Board of the organisation structure will be the Minister of Ministry Communication, Transport, Post and Construction. The Board have had assisted by PSC and EA. The PSC(Project Steering Committee) under vice Minister’s chairmanship of Ministry of Communication, Transport, Post and Construction (MCTPC), was helped by a representative from Ministry of Finance (MOF), Committee of the State Planning and Co-operation and Department of Public Administration and Management. The PSC is responsible carry out policy, strategies and technical guidance. The EA (Executing Agency) that mean is a project owner (Client), will be Department of Housing and Urban Planning within the Ministry of CTPC, the EA is responsible to implement counsel and control on all the project, which are passed on to the project manager unit (PMU) for implementation. The project manager is responsible for managing, reporting, preparation equipment and running cost with assistance from consultants. The Project Implementation Unit (PIU) is an assistance project manager for implementation at local level and responsible coordinated with local authorities, contractors, supervisors and works progress report when the project activities done. The organisation chart below show: (figure 3)

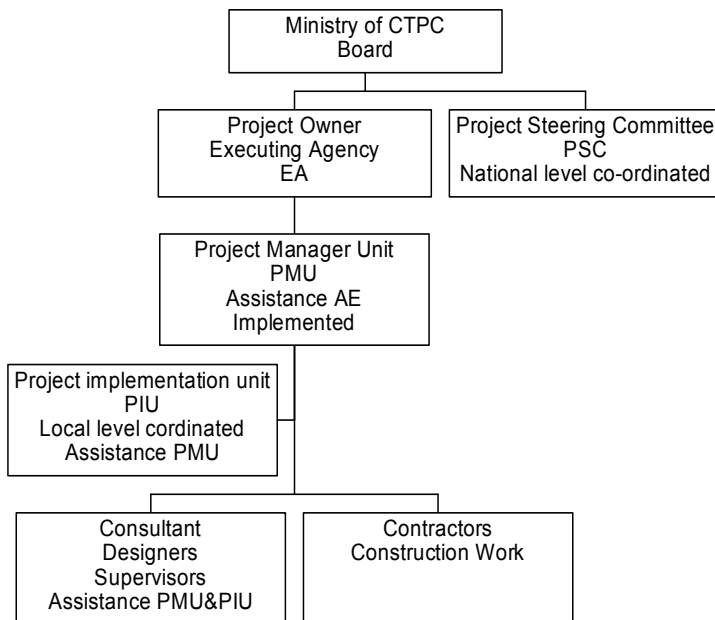


Figure: 3

Procurement – Contracting

The procurement is required after having all project documents and the budget effective. It is essential to understand who is responsible for procurement. The Ministry of Communication, Transport, Post and Construction, as owner of the project, was assisted by a representative from Ministry of Finance (MOF) and from Committee of the state planning and co-operation has responsibility in preparing the specification and tender document for consultant procurement. That is a government institution confided with the duty set up the procurement schedule, publish the advertisement, valuation the pre-qualification, the bids and award the contract if it is approved by the ABD (Asian Development Bank) who gives the loans.

Certainly, the project funded by ADB loan together with the Government's own budget contribution must be procured by international competitive bidding (ICB) and international shopping (IS). The procurement process must be done in accordance with the procedure set out in the loan agreement, which incorporates the ADB procurement guideline. In the past project have been procured only consultant services by one contract, but the contractors haven't yet. As following terms reference in the tender document the contracting is fixed price contract and lump sum type for the consultant services. However the contractors will be procuring on August this year.

Project Planning

The main purpose of the planning is to prepare appropriate final design, basic and working drawing, cost estimate, production information, tender document with specification, term and condition, method of construction and monitoring process, whole of these have been preparing by consultant company. So the Consultant Company have a responsibility the work are normally carrying out in this stage:

- Surveying existing area.
- Making data, updates and assess.
- Preliminary scheme design
- Detail design
- Working drawing and technical specifications
- Bill of quantities
- Preliminary production program with time schedule
- Quality assurance
- Financial analysis and control
- Tender document with term and condition

Time schedule of the project planning are:

- Study feasibility started January 1996, completed July 1996
- Design stage started December 1998, completed January 2000
- Production stage started February 2000, to complete August 2000
- Construction stage will be starting on November 2000, will be completing on June 2003

The project components are shown on the appendix at last paper. (See Appendix)

Drawing

The number of drawing needed depends on the complexity of the structure, special for the road and drainage construction it is required more than engineering and structural including a limit of site plan and more details. The site plan should show where the road and drainage should be proposed on the existing or new places and how many things should be removed for construction comfortable, the technical and material specification should clearly show how each activity should be executed.

Time Scheduling

It is a necessary tool to plan and prepare the execution of a project. The schedule should cover the entire construction period and all sub-activities, so that it is possible to anticipate and avoid potential disturbances. There are number of external factors that affect the schedule, some places and works it is not possible to build during rain periods. Usually, marking a schedule the designer defines time Critical Path Method (CPM), through the arrow method as a graphical way of working. The schedule is then presented in a Gantt diagram form.

Cost Estimating

Together with time, cost has a very great influence on a project, quantity surveyors or engineers depending on the works to be carried out usually do cost estimating in the project. Methods used for estimating are the unit method, the cube method and the approximate estimating method. The basic of the rate is usually on a previous similar project. Estimates usually carried out in:

- The preliminary cost estimate which is used the scheme design to obtain a probable cost of the project.
- A detailed estimate prepared by the bill of quantities and usually submitted to the project manager and project owner (Client) to check and give approval for the implementation.

Project Financing

Annually, the Government also has invested more of the national budget in construction and improvement for the infrastructure of the country. Owing the new policy of Lao government moving country towards a market economy, the country has increased its participation in regional and international agencies. Most significantly, in July 1997, the Lao PDR became a full member of the Association of Southeast Asian Nation (ASEAN), and the Asian Free Trade Agreement. In addition there is always some grant and loan funds from international organisations together with the Government's own budget in operating for many projects. As also Pakse urban area infrastructure improvement there are two main sources of the financing namely:

- Government financing 10% for civil works and
- 90% from loan of the Asian Development Bank

Budget and Budget Control

The financing of the project has two main sources. Certainly, the loan from ADB haven't problem to pay, but the government budget some time have a problem, because the financial of the Government haven't standby for to pay in all the project. Year by year the project owner (or project manager) has a responsibility to make an annual plan how much money needed. This plan with accordance of the Minister is submitted to the national Assembly to apply the budget. The budget applied is often reduced and sometime is not allowed, since the national budget is always limited. Therefore, only project seemed to be in priority are approved.

The budget control is necessary in order to construct works project within estimated budget and agreed time limits as well as in accordance with quality standards, bills of quantities. Particularly true in order to control construction cost, it is also necessary that they be checked regularly and at the same times with actual budget compared to estimate budget. According to the decentralisation of the Government, this role is given to the Department of CTPC of the municipality, local authorities and project owner who have a responsibility. The Ministry of Finance and the State Planning Committee take a responsibility for the budget control of all project committee. Other hand, some time we will have two parts joint together for the budget control are:

- The auditors from ADB and
- The auditors from Ministry of CTPC

The aims of such budget control are:

- To provide information on the budget of the project at periodic interval.
- To establish and locate the differences between the estimated and the actual budget.
- To find and explain the causes of these differences
- To make measures to construct the remainder of the works within estimated budget
- To make prognosis of the final works budget and
- To establish the effect of budget revisions on the quality standard of the construction.

Table 1: Project budget (USD thousand)

No	Item	Total	Government	Loan ADB
1	Road	1,664.00	166.40	1,497.60
2	Drainage system	1,396.00	139.60	1,256.40
	Total	3,060.00	306.00	2,754.00

Information Technology

The information technology in the civil works in Lao is low, especially, in local level. Only owing to the Government or local authority policy of market economy, all design and companies are reviving the information technologies there is crucial competition between them. Therefore, most of these companies recently started using computer support like the CAD programs and other software programs for designing and calculating of project. However on the construction site there are no computer support for daily routines like CAM programs for economic control, production planning, material, administration and management. Furthermore, until now the Internet and E-mail system are not used on the large scale in Laos.

Conclusion

The design stage is important phase of the construction process, affecting a lot of factors. To ensure optimum standard, relevancy and economy of design, the following procedures will be observed:

- Designers improve connection drawing among difference specialists, in other words, map compatible drawings
- Client improve investment system, solving problem as suppliers, definitions at the time needed
- Designers should make more effort on detail design and shop-drawing
- Computer aided planning and management technique should be seriously applies in country's construction process
- Information technologies should be increased concerning construction process
- Delegating decision and responsibilities and creating participation and commitment should develop the modern leadership.

Production Stage

Tendering

The tendering process in the project is going on, which, it is the responsibility of the consultant to draft all documents necessary for the tendering process, such as drawing, bills of quantities, technical specification and a draft of construction contract should be provided as well. However, the project funded by ADB loan together with the Government's own budget contribution, a pre-qualification process is required. Certainly, not all contractors have an opportunity to participate in the competition for bidding. A maximum of seven companies are selected and invited to buy tender document

Usually, three main factors are used to pre-qualification or to check whether tenders are responsive or not. These are:

- Financial condition
- Technical qualification
- Experience

The scoring system for the evaluation of the pre-qualification questionnaire for the project is based on the illustrative scoring system of ADB for large and small contracts and the evaluation criteria of the Ministry of Communication, Transport, Post and Construction.

Finally, the company which is given the highest score (proposed the lowest construction cost) will be selected and awarded the contract.

Contract

Contract is very important document used as a guide for implementation certain work that are involved at least two persons in this process. Some time it is necessary to be connected to some relevant both local and international laws. Reference, the project loan agreement the client should be made two contracts, one for the consultant (design stage) company and one for construction companies (construction stage). The point of view like tries to use the standard approach method, so as was explained in the lecture, but in fact

the infrastructure construction is a difficulty in using the standard approach method because, the infrastructure construction have many difference the places and parts of the works, the contract may be have more than one, but not over three contracts. So the standard approach method should be a suitable for the building contract, because all of the works are included on the same place.

Generally, the big state project standard contract condition are adopted from the FIDIC form and revised accordingly to the kind of project works and depends on whether the contractor is local or overseas company. However, the overall content of the contract are:

- Scope of works
- Relevant law to be used in case of dispute.
- Responsibilities and duties of every person involved in the contract.
- Time schedule
- Payment
- Inspection
- Cancellation or delay and
- Certificate of completion.

In order to make the contract be coming more efficient the ISO 9000 should be applied in this project and all country:

Production Planning

Certainly, the purpose of the production planning is for successfully of the construction project within the agreed limits of cost, time and quality. So the detailed time schedule should be of course logical in accordance with the available resources of the contractor. In addition, the contractor is also required to provide monthly implementation planning. At the end of each working month, should be to check the previous planning to find out whether there are some items that could not be implemented or completed. In this case, the cause of such mistakes or delay should be informed and prepared the implementing planning for next month. At the same time, site organisation should be included all temporary and permanent construction works and the supply of all equipment, the co-ordination of contractors and the general supervision it is very important to prepare and execute the construction project.

The three main issues are availability of construction material, equipment and transport. Since the availability of certain construction material and equipment is often uncertain, it can be wise to procure them early, but the import can take a long time to arrive, some time happen that when they are required, they are running out, additional time is needed for the order from abroad. Other hand, it happen that roads are often impassable during rain periods or many roads and bridges can not support heavy truck. Therefore careful planning and early attention to procure are thus.

Quality Management

The quality management in the construction process is vital as the end of product, which should be satisfy the client in being of the required standard, worth and the resources spent. In Laos, most of the peoples are talking about quality of products, but when talking about money to pay for quality control systems nobody cares or does not want to take a responsibility. There are a few project controls both of quantities and qualities, especially project invested by the Government's fund together with the World Bank or Asian Development Bank. For these projects, the client are required to provide qualified project manager, engineers and architects for managing, supervising and inspecting the construction site system in order to force the contractor to control continuously their work. The basis quality control is enforced by the inspection of works that ensures that the contractor employs all required resources in carrying out the works accordance with contract.

Periodically, the inspection of work will be a random to take samples for independent testing thus ensuring that quality is maintained. Once the last inspection has been realised the project owner (Client) may issue a certificate of completion to the contractor and star to use the properties. In general, 10% of the total cost of the construction quoted in the contract is deducted when paying to the contractor. After finishing the period of warranty the remaining money will be paid to the contractor. However, most of accomplished works are not too satisfied. Structurally, there is no big problem since testing of material is available before used. Unsatisfied works are mostly architectural works, especially

finished works that required skilled and experienced workers. This is a very big problem in the labour market in Laos.

Economic Control – Budget Review and Reconciliation

It is very important for both private and government project. In case of project invested by the Government's fund together with the Asian Development Bank, before paying to contractors in the production stage. Project owner (client) should appoint a commission inviting representatives from the Ministry of CTPC, the Ministry of Finance and the State planning Committee to take in the inspection on site and give approval document for payment. Usually, the payment process is undertaken after the production progress achieves gradually 30%, 70% and 100% of total works or depend on the contract.

In addition, after implementation and payment for project having political meaning and high financial level, the central committee could appoint its special inspection commission to check accurately again, the qualities, quantities and transparent of payment. In case it found out that any participant of the project frauds or makes an unreasonable mistake there would be a penalty and a punishment according to the laws.

As a result of high inflation, delays of budget allowance and lack of budget, and some government project are whether not completed on time or until the next year budget is available. On the contrary, if the available budget is not used on time it would be taken backs and must be applied again, but things like this, of course rarely happen.

The procurement regulation issued by the Ministry of Finance quoted that in case of high inflation, only for project having implementation period longer than 12 month, a variation of pries during the contract period would be allowance accordance with the commission appointed. As a part of regulation, for the project funded by foreign grant or loan, the payment for contractors is paid only 40% of the total project cost in foreign currency and 60% remaining in local currency.

According to the finance rule, every 6 month the cabinet of each ministry and institution should submit a report of the summing up of the plan completion and the budget review to the Finance Ministry and the State Planning committee.

Conclusions

In the production stage, the more important tools for quality control are shopdrawing and technical specification, the time schedule, including quantities of materials and manpower needed is necessary financial, material supply and time control. For this stage, not only skilled workers and professionals are needed, but the skill of a project manager is strongly needed as well. In Laos, the necessary things like this are now not satisfactory yet. So in the production stage all participants of the construction process should pay more attention in some point:

- National level quality control policy is needed to formulate
- ISO 9000 should be gradually adopted
- Contractors follow drawing best as possible without unnecessary change decided by themselves
- Contractors could exactly execute each detail as it quoted in the technical specification

Property Management

Life-cycle Economy

In Laos, the property management is a relatively new concept. Nevertheless the Lao Government now makes effort to manage properties and investment, however, understanding about the life cycle economy among designers and investors is also relatively low. As a result the local investors and project designers in Lao often seem to have vague ideas about the meaning of property management. Only in case of the large investment from overseas the investors or the fund donors, systematically hire financial analysts to make a feasibility study and market analysis including the life cycle economy for project. Especially, the infrastructure improvement in Pakse urban area have had calculated an Economic Internal Rate of Return (EIRR). The capital cost includes physical contingencies and excludes estimated taxes and duties. Annual stream of costs

and benefits are prepared for 30 years at constant June 1996 prices. A sensitivity analysis was also carried out using four key variables namely, 10% percent increase in capital costs, 10% percent increase in O&M (Operating Maintenance) costs, 10% percent decrease in benefits and if project benefits are delayed by one year. The base EIRR and the result of sensitivity test applied is summarised in table 2

Table 2: Summary of EIRR and sensitivity analysis (%)

	Base		Sensitivity			
	EIRR	Case 1	Case 2	Case 3	Case 4	
Drainage System	58,5	44,3	57,5	41,8	24,8	
Road	51,2	48,3	51,0	47,7	40,2	

Case 1 = 10 percent increase in capital cost

Case 2 = 10 percent increase in O&M cost

Case 3 = 10 percent decrease in benefits

Case 4 = Benefits delayed by one year

It is important to understand that the economy of a property is in contrast to most other investments controlled by the time. There are many methods to use for economy analysis and there are also the economical and technical life of a property. The life a fixed asset can either be calculated based on its technical or economical life. Properties can generally be seen go through two different cycle of life, the first one is the life cycle of the objective, which starts when it is used and end when it is demolished. The second one is the life cycle of the object that is depicting the property to the user. Different users have different knowledge and different objectives for using the property. As a result, this gives different patterns of investment during the life of the property.

Maintenance Planning

Certainly, the expected life span of a structural presupposes that some basic regular maintenance will be provided during its service period. In normal practice, structural also tends to be exposed to unexpected deterioration, thus requiring repair in addition to routine maintenance. The main purpose for maintenance planning it is tacked a property long life. As a result, it is the responsibility of the Ministry or Department concerned, with the property to be requiring budget for maintenance it's in each year. This sum of budget, however, is very limited and not enough for requirement, so the all participation who are users these property should be involved in the properties' maintenance system too.

Connection to the Design Stage – Feedback

The property management is considered as the longest part the construction process after the design and production stage. These first stage influence continuously on the construction operation phase. Decision made in the design stage are obviously of great importance for the future property management, there is also still a lot to be done about the bringing back of experiences from the operation phase to the design phase.

As mentioned earlier on the procurement of the design stage, the project have been finished only detail design, but the construction operating haven't yet. In the pass, it has also actually happened in the road and drainage system construction that some public and private properties without earlier careful market analysis. Finally, the project owners not have enough budgets for these property benefits. It is essential that one be able to estimate in the planned as summed over the entire economical life of the investment that is made. Therefore, it is very important in the design stage, to take into consideration the dominating factors that affect the further operation of the completed project. This take it possible to obtain reliable information regarding future budget during the property management stage, to maintain economic Control during the designing of a civil engineering and the choose sensible between alternative solutions during both the designing stage and the property management stage. Unfortunately, understanding about the importance of property management is relatively low in Laos.

Conclusions

The property management is very important that the objectives are carefully designed and are continuously updated to the current market situation. Therefore, the following this programmes, are required to be implemented by the consultants, designers and the Government:

- Construction techniques and economics should be carefully, which it is a affect with the property.
- Strategies plan with shorter perspective and operational plan should be made.
- Taxes regulation should be improved
- Maintenance implementation and budgeting will be a prerequisite to approval of all development project.

Experiences to be Used in the Future

- Encourage the exchange of regional and international experience of the best practices of design construction and facilitate the transfer of information technology
- Safety, health and environmental concerns with project.
- Promote and organic an association or organisation for professionals in order to manage and make them to follow the construction regulation issued.
- Encourage support research and studies to formulate the construction law, improve design regulation, technical specification, Unit cost, standard of road and drainage system.
- Programs for creating a national capacity in management of construction process need to be introduction. Special emphasis should be put on strengthening the capacity of small and medium scale contractors.
- Make a special training program on the property management for architects, engineers and other specialists concerned to deepen their knowledge of this aspect.
- In the Government's infrastructure development programs, the important attached to new entire construction vis-a-vis preparing and upgrading of existing infrastructure.
- Use a model of analysis for property management in the design of project.
- Undertake the life cycle economy for the economic Control during the designing of construction process.

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