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Challenges of Implementing Performance Based Maintenance Contract (PBMC) on National Roads

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Abstract

The application of Performance Based Maintenance Contract (PBMC) is a kind of updated innovation which recently applied conventional contract. The maintenance contract performance based was applied by the General Director of Highways (Bina Marga) to replace conventional maintenance contracts. The contrast between conventional contracts and PBMC lied on The maintenance system conducted. Conventional contract maintains the input and maintenance, however PBMC maintains the output and the outcome. The contractors independently determined the maintenance work will be conducted. In shake of fulfilling users intentions, the contractors will raise the value added for the maintenance process with fully creative and innovative. PBMC application training has been conducting since 2011 by director of highways, however the rapid overloading described that the condition of national roads application isn't yet ideal, the provision of infrastructure is unstable and preservation handling isn't quite assertive and hasn't completely conducted. In line with the well management principals, they are planning and organizing the PMBC application. The way to handle broken and failed infrastructure. There are some topics being discussed in this paper, such as the deception of PBMC contracts based on management principals, gap between field technically and basic concepts. Some challenges destroyed over the concept of PBMC in improving the maintenance of national roads near future. In line with the well management principals, they are planning and organizing the PMBC application. The way to handle broken and failed infrastructure. There are some topics being discussed in this paper, such as the deception of PBMC contracts based on management principals, gap between field technically and basic concepts. Some challenges destroyed over the concept of PBMC in improving the maintenance of national roads near future. In line with the well management principals, they are planning and organizing the PMBC application. The way to handle broken and failed infrastructure. There are some topics being discussed in this paper, such as the deception of PBMC contracts based on management principals, gap between field technically and basic concepts. Some challenges destroyed over the concept of PBMC in improving the maintenance of national roads near future.

Keywords:*Performance Based Maintenance Contract (PBMC), Value Added, Maintenance, Output and Outcome*.

PRELIMINARY

Transportation is the lifeblood of socio-cultural, economic, defense, national security and politics whose role is very important in national security. To support regional development, economic development, mobility of people, goods, and services, a reliable transportation system is needed with effective and efficient network capabilities and high structural carrying capacity. The reliable transportation system is certainly greatly influenced by road infrastructure in order to be able to increase the economic development of a region. In Indonesia, road infrastructure is a primary need in order to improve the transportation system because it is based on real data in the field that road infrastructure serves about 92% of passenger transport and 90% of freight transport. National road infrastructure assets play a role in reducing transportation costs, the total capitalization value has exceeded two hundred trillion Rupiah. If road infrastructure continues to be developed to be reliable, then of course Indonesia will be able to compete in the regional and international economy. The National Economy is certainly supported by many fields, especially the transportation system which will facilitate the flow of distribution of people, goods and services.

From a macroeconomic perspective, road infrastructure will be able to increase the marginal productivity of private capital, improve the quality of life and improve human welfare, achieve macroeconomic stability and increase real prosperity, namely the increasing number of credit services, fiscal sustainability and the labor market in line with the 3 strategies. economic development, namely pro jobs, growth and poor. From a micro-economic perspective, road infrastructure will be able to reduce transportation costs which result in lower production costs, increase labor productivity, increase consumption values and the wider labor market which will provide a multiplier effect on the local and regional economy to provide the greatest

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opportunities for people. workforce. The road network as a distribution infrastructure as well as forming the regional spatial structure must be able to provide transportation services smoothly, safely and comfortably. The productivity of the community who will develop products to become more competitive can later be facilitated by the existence of a road network which is part of the interaction of space and a good transportation system based on socio-economic and environmental aspects so that the pro-green concept launched by the government can be implemented properly.

As a road operator, the Directorate General of Highways faces a challenge, namely the addition of the length of the national road which is getting heavier. Bappenas (2014) explained that the Directorate General of Highways for the 2015-2019 period had the main goals of increasing the travel time of the main corridors, reaching 98% of steady roads, and increasing the level of roadworthiness and safety. To achieve this main goal, (performance based maintenance contract - PBMC) is the right way because this performance-based maintenance contract emphasizes on achieving performance through output or outcome parameters, which have been clearly and measurably defined. In contrast to the conventional contract system which emphasizes the input and process. The form of contracts in Indonesia can be distinguished based on Yasin (2004): (1) Fixed Lump Sum and Unit Price for cost calculation; (2) Service Fees, fees plus services and fees plus definite services for the calculation of Services; (3) the payment system is carried out on a monthly basis for achievements and full pre-funding by service providers; (4) conventional, turnkey and EPC (engineering procurement and construction) contracts are aspects of the division of tasks carried out. The form of employment contract between service users and service providers is binding in the short term. This is done so that the accountability for the implementation of the work during the physical implementation can be properly carried out, for example if there is damage to construction that is not in accordance with the agreement so that it can be continuously repaired. (3) the payment system is carried out on a monthly basis for achievements and full pre-funding by service providers; (4) conventional, turnkey and EPC (engineering procurement and construction) contracts are aspects of the division of tasks carried out. The form of employment contract between service users and service providers is binding in the short term. This is done so that accountability for the implementation of work during physical implementation can be properly carried out, for example if there is damage to construction that is not in accordance with the agreement so that it can continue to be repaired. (3) the payment system is carried out on a monthly basis for achievements and full pre-funding by service providers; (4) conventional, turnkey and EPC (engineering procurement and construction) contracts are aspects of the division of tasks carried out. The form of employment contract between service users and service providers is binding in the short term. This is done so that the accountability for the implementation of the work during the physical implementation can be properly carried out, for example if there is damage to construction that is not in accordance with the agreement so that it can be continuously repaired. The form of employment contract between service users and service providers is binding in the short term. This is done so that accountability for the implementation of work during physical implementation can be properly carried out, for example if there is damage to construction that is not in accordance with the agreement so that it can continue to be repaired. The form of employment contract between service users and service providers is binding in the short term. This is done so that the accountability for the implementation of the work during the physical implementation can be properly carried out, for example if there is damage to construction that is not in accordance with the agreement so that it can be continuously repaired.

In terms of quality of work, Performance Based Maintenance Contract (PBMC) is used later to improve the quality of the work of service providers, while in terms of maintenance, service providers will be able to maintain the agreed minimum conditions. Both sides are in the form of design and implementation of work efficiently so that service providers can be held accountable. This study is intended to provide an overview of how the concept of Performance Based Maintenance Contract (PBMC) can provide great benefits in the implementation of roads, especially in the maintenance phase, and aims to evaluate the implementation of PBMC in Indonesia and provide input for the implementation of PBMC related challenges. in the future.

METHOD

This writing is the result of a study conducted using a literature review methodology in the form of lessons learned from the implementation of PBMC in several countries also based on observations and experiences experienced and carried out, so that problems that occur and proposed developments in the future can be mapped, especially in their implementation in Indonesia. . The framework (Figure 1) is based on the national road management system, especially at the maintenance stage, which has been based on the conventional contract system. Several experiences have been carried out in various countries as well as in Indonesia during the last few periods. However, the implementation was not as easy and successful as expected. This study set out to see and find the existing problems.

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Figure 1. Framework

RESULTS AND DISCUSSION

National Road Management System

In the national road management system (Figure 2), the road network master plan plays an important role in the national transportation system, which is the national infrastructure system in the service of cultivated areas in the national spatial plan and the road system that carries out the distribution of goods and people to ensure integration and sustainability.

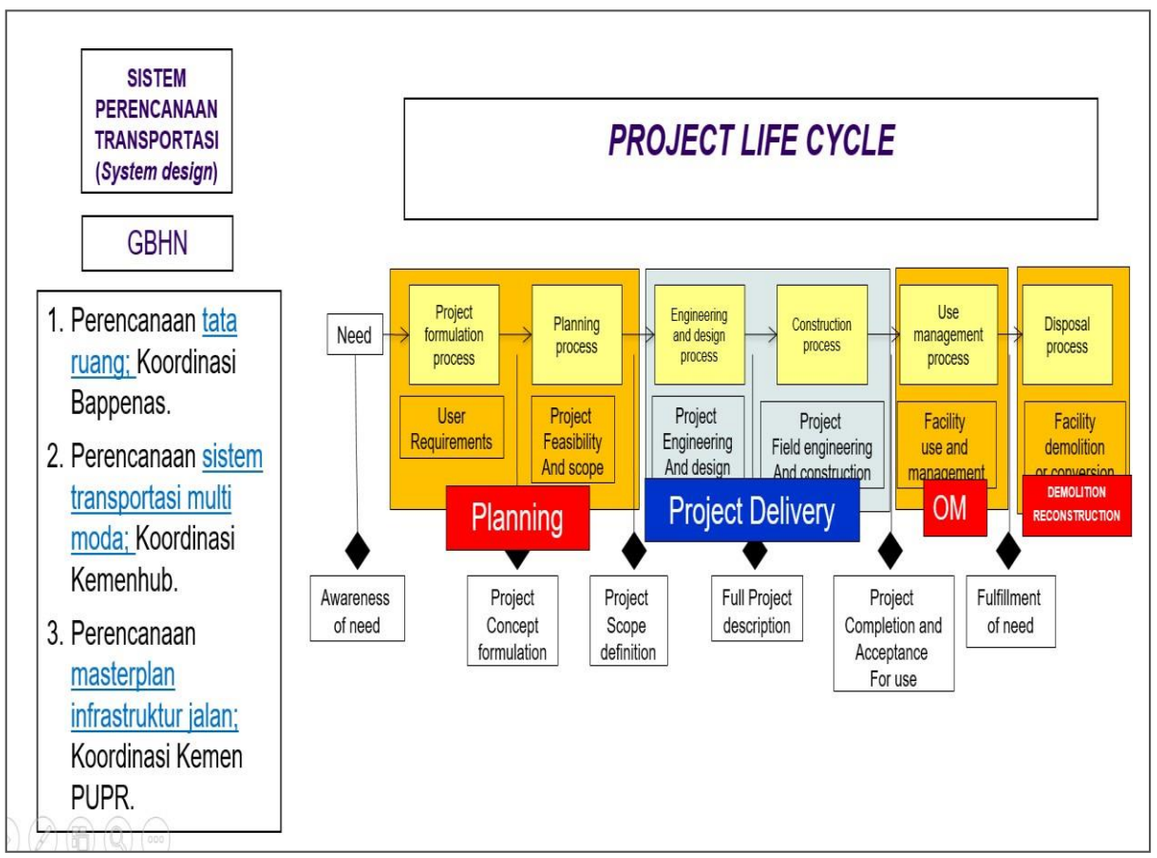

Figure 2. National Road Management System (Tamin, et.al., 2010)

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The schematic above shows the Project life cycle, which is an approach taken in the national road management system, starting with a needs analysis to the rebuilding process in order to minimize costs.

National Road Organizing Institution

A public road is a road intended for general traffic. There are several public roads, the first being national roads, provincial roads, district and/or city roads, village roads. Of all these public roads, there are parties who organize public roads. Based on Government Regulation Number Government Regulation Number 34 of 2006 concerning Roads, road operators are parties that carry out the regulation, guidance, development, and supervision of roads in accordance with their authority (Implementing Team for Research and Development Center for Roads and Bridges, 2006). The authority to administer public roads rests with the government and local governments. The main thing to do is to build a road network that connects the production center and the area that is the marketing destination, not only that, Road construction is also prioritized to strengthen the unity of the national territory to remote areas in order to realize a harmonious life of the people with the same level of progress, equitable, balanced and effective and efficient for national defense and security efforts. The implementation of national roads in Indonesia is organized by the Directorate General of Highways, the Ministry of Public Works and Public Housing. The Directorate General of Highways has the task of carrying out the formulation and implementation of policies in the field of road administration in accordance with statutory regulations. In relation to this topic of discussion, the institution directly related to road maintenance is the Directorate of Road Preservation, Directorate General of Highways. (Figure 3 and balance and efficiency and effectiveness of the national defense and security efforts. The implementation of national roads in Indonesia is organized by the Directorate General of Highways, the Ministry of Public Works and Public Housing. The Directorate General of Highways has the task of carrying out the formulation and implementation of policies in the field of road administration in accordance with statutory regulations. In relation to this topic of discussion, the institution directly related to road maintenance is the Directorate of Road Preservation, Directorate General of Highways. (Figure 3 and balance and efficiency and effectiveness of the national defense and security efforts. The implementation of national roads in Indonesia is organized by the Directorate General of Highways, the Ministry of Public Works and Public Housing. The Directorate General of Highways has the task of carrying out the formulation and implementation of policies in the field of road administration in accordance with statutory regulations. In relation to this topic of discussion, the institution directly related to road maintenance is the Directorate of Road Preservation, Directorate General of Highways. (Figure 3 and The Directorate General of Highways has the task of carrying out the formulation and implementation of policies in the field of road administration in accordance with statutory regulations. In relation to this topic of discussion, the institution directly related to road maintenance is the Directorate of Road Preservation, Directorate General of Highways. (Figure 3 and The Directorate General of Highways has the task of carrying out the formulation and implementation of policies in the field of road administration in accordance with statutory regulations. In relation to this topic of discussion, the institution directly related to road maintenance is the Directorate of Road Preservation, Directorate General of Highways. (Figure 3 and Figure 4).

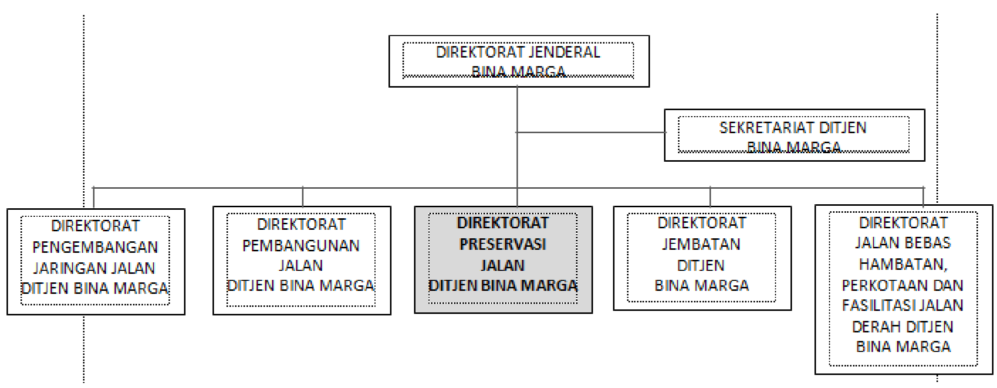

Figure 3. Organizational Structure of National Road Management at the Directorate General of Highways, Ministry of Public Works and Public Housing (Directorate General of Highways, 2015)

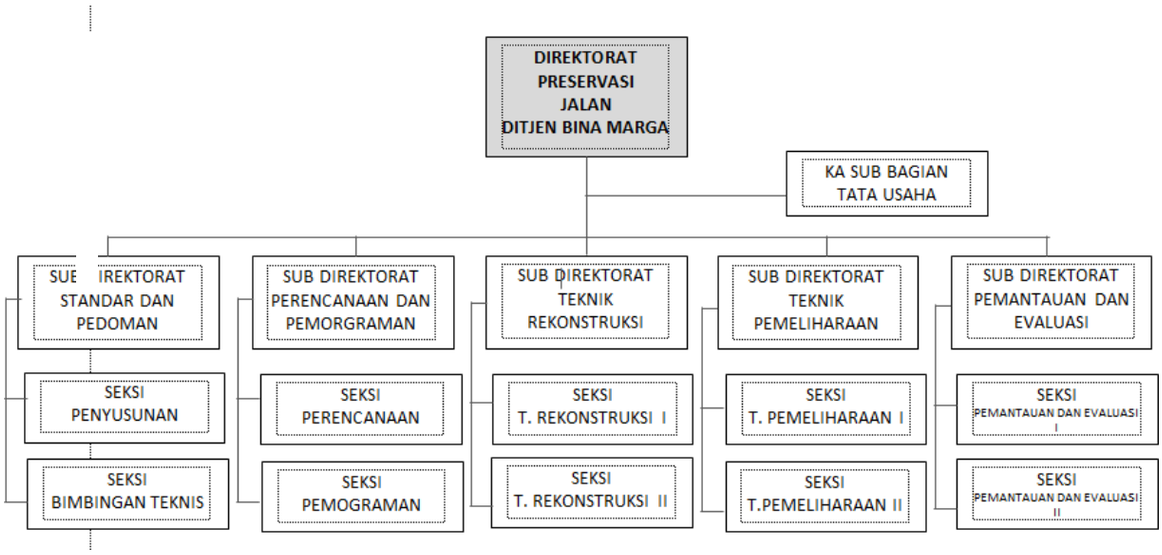

Figure 4. Organizational Structure of the Directorate General of Highways Road Preservation (Directorate General of Highways, 2015)

National Road Handling Problems

The construction of national roads has decreased since the global economic recession caused a decline in GDP or Gross Domestic Product worldwide. This has an impact on the increasing unemployment rate due to a decrease in the production of goods and services, and a decrease in the price of goods and services in the market due to a decrease in the number of requests. The increase in world oil prices has also triggered problems in road construction, this has an impact on the level of production that uses oil as a production factor or also uses oil as a means of transportation.

Problems-1 Unique Natural and Environmental Conditions

One of the problems of road construction in Indonesia is the state of nature and the environment. With the proportion of land and sea ratio of 30:70, it causes the utilization of land space and land transportation routes to be limited. The territory of Indonesia is located on the equator between Asia and Australia, causing 2 seasons so that the uncertainty of this season causes roads to be easily damaged and hinders the implementation of road and bridge construction in disaster-prone areas because there are tectonic faults (Java, Sumatra, Bali), the Sirkum fault. Mediterranean (Nusa Tenggara Islands) and Pacific circum (Maluku Island, Papua, Sulawesi Islands).

Climate Change Problems

Climate change is also a problem in the road construction process, this is due to global warming and climate change with the frequency and intensity of extreme climates. Global warming has resulted in an increase in the volume of sea water which continues to flow to land which causes damage to roads. In addition, the increase in the frequency and intensity of the climate also causes heavy rain which will cause flooding and landslides in some areas which will damage roads and even cut off road networks.

Problems-3 Uneven Development Levels and Population Density

The pattern of movement (generation and attraction of movement) and the growth of regional development are influenced by the uneven distribution of the population, the area and the diversity of the existing topographical conditions.

Problems-4Unintegrated Transportation Network System

According to Bappenas (2014), transportation modes that serve road passengers are 84%, train 7.3%, sea 1.8% and air 1.5% and rivers only 5.3%. For goods services, road serves 90.4%, the remaining is divided by sea and rail. The lack of synergy between the road network system and specifications for the provision of national, provincial, district/city road infrastructure in several corridors is due to the strict separation contained in Law No. 38/2004 concerning Roads. This must be in line because after all, transportation costs remain high if the road conditions are not adequate at the national, provincial, district/city levels. Unfortunately, the intermodal transportation system to support the national logistics system has not yet developed in Indonesia.

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Problems-5 Road Safety and Insufficient Environmental Insight

In Indonesia, there are various geographical conditions, such as the presence of hilly terrain that does not meet the geometric standards of the road which will lead to wasteful use of fuel and have an impact on increasing emissions resulting in construction failures and will have a negative impact on road safety.

Problems-6 Delays in Road Capacity Building

The existence of limited funding has several consequences, namely the failure to achieve the target in road administration, the disruption of accessibility, mobility and safety levels and support for road infrastructure such as intermodal transportation which has not been able to be developed in Indonesia.

Performance Based Maintenance Contract (PBMC)

PBMC Experience in Overseas

Reflecting on experience in the international world, the implementation of PBC in the field of maintenance (maintenance) or PBMC (Performance Based Maintenance Contract) has been carried out since several decades ago. In 1988, PBMC was implemented in British Columbia (Canada), then in Latin America in the 1990s, while in Australia and America began to be carried out in 1995 - 1996. Starting in the 2000s this concept was widely applied in many countries in this world. In Latin America, the first country to apply the PBMC concept was Uruguay. The first pilot project was carried out in 1996. The implementation of PBMC in Uruguay can be said to be quite successful, namely in 2001 around 46% of the national road network there had implemented and maintained the PBC/PBMC pattern.

In addition, the government imposes strict controls and imposes sanctions on the implementation of PBMCs that violate the contract. The implementation of PBMC in New Zealand started in 1998. Contract costs can be reduced by 15% lower than if carried out with traditional contracts. Performance standards are well established with a quality control system carried out by involving contractors (regarding quality manuals, quality plans and quality system procedures). In addition, asset management is applied and PBMC is applied for both routine maintenance and periodic maintenance, including bridge maintenance. This system also allows action in times of emergency and response to complaints from road users.

Based on several studies from many countries, the application of PBMC can result in a very effective and efficient road maintenance process, PBMC can reduce the life cycle cost of roads and ensure that the road network is in a condition that is expected to always be good.

Why PBMC

The definition of PBMC can be explained (Tamin, et.al., 2016) as follows: - the contractor's performance achievement is based only on the achievement of outputs that excludes inputs and processes; contractors freely determine what things will be done, with or without sub-contractors, - there are quite a lot of creative/innovative opportunities for contractors in terms of value added service life and improvement quality because there are no restrictions on inputs, work methods, and processes, - Determination of output and outcome performance indicators must be clear and precise, including monitoring plans and tolerances, giving rewards and punishments if they fail or exceed those previously determined where roads are the main infrastructure assets that designed and operated during the planning period. According to Liataud (2001), the main consideration in implementing PBMC is timely and continuous maintenance according to the life of the plan, so that it will reduce costs or provide savings in capital costs incurred by the government in the long term. With this system, it can indirectly transfer the risk of failure to the contractor. Besides that, it can reduce the administrative burden, claim and contract addendum,

Uses of PBMC

According to Tamin et.al., (2011) there are several benefits of implementing PBMC, namely:

1. Investment effectiveness will increase the amount of quality and value added for the implementation of national roads. Management costs will be more efficient due to reduced auction costs and time can be shortened.
2. The existence of predetermined performance indicators will provide guaranteed results so that risks can be transferred to contractors, including: planning that is not suitable for field conditions.
3. The budget that has been set is certain and will not be far off the mark and right on target.
4. There is job guarantee for contractors that will increase creativity and innovation so that work will be more productive and efficient
5. The supply chain with suppliers of heavy equipment and construction materials can be well developed.

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Implementation of PBMC in Indonesia.

PT. Jasa Marga for the first time in Indonesia implemented PBMC in 2000 on the toll road section between Cawang – Pluit (Hasanudin, 2008). At the time of implementation, maintenance problems were encountered, including limited human resources that should be allocated for the supervision process, maintenance of damage repairs before handing over the results and the absence of sanctions to contractors for damage that occurred during the maintenance period. PT. Jasa Marga has also made modifications (PBMC Modified) where the scope of work has been agreed. In addition, a trial was also carried out in 2002, namely layering the road section thinly with the type of pavement with a 2-year maintenance guarantee. The Research and Development Center of the Ministry of Public Works has also initiated PBMC in 2006 through the application of PBMC on Soft Soil. According to Tamin et. al. (2016), PBMC trial was conducted in 2011 for the national road maintenance process which was carried out in 4 years, namely 2 sections of the North Coast of Java with a length of 21.7 km and the Demak-Trengguli section of 12 km. The second trial was carried out on 3 sections of the Semarang-Bawean (22km) road, the Bojonegoro - Padangan section (11Km) and the Padangan-Ngawi section (10.7Km).

PBMC implementation problems in Indonesia

There are obstacles and problems faced in the implementation of PBMC in Indonesia, especially in the selection of sections to be carried out by the PBMC because most of the above roads are implemented by the PBMC system. As is known, the Pantura Jawa is the lifeblood of the economy that connects the island of Java with all its problems, especially the problem of overloading where the vehicle load is excessive, thus accelerating the reduction of road life. In addition, these sections are also characterized by the following characteristics of problems: very high traffic with side disturbances such as plot intersections and many spilled markets, poor subgrade conditions with high water levels, unavailable drainage due to inappropriate land use. well controlled, The condition of the structural pavement of the road is very varied. Even though the executor of the package mentioned above is a large BUMN contractor, knowledge and experience are still needed in carrying out the correct PBMC principles, it is proven that there are still implementing contractors who reconstruct the pavement structure. The Supreme Audit Agency of the Directorate General of Highways is preparing a third trial for a longer period of 10 years, but so far it has not been implemented, it is constrained in the pre-qualification/auction process and is not included in the policy on the strategic project priority scale that has been set. it is proven that there are still implementing contractors who are reconstructing the pavement structure. The Supreme Audit Agency of the Directorate General of Highways is preparing a third trial for a longer period of 10 years, but so far it has not been implemented, it is constrained in the pre-qualification/auction process and is not included in the policy on the strategic project priority scale that has been set. it is proven that there are still implementing contractors who are reconstructing the pavement structure. The Supreme Audit Agency of the Directorate General of Highways is preparing a third trial for a longer period of 10 years, but so far it has not been implemented, it is constrained in the pre-qualification/auction process and is not included in the policy on the strategic project priority scale that has been set.

PBMC Implementation Challenge

Challenges of PBMC Implementation in Developing Countries (Lesson Learned)

Tamin (2008) in his study related to the implementation of PBC, especially PBMC in several developing countries, found several main challenges that became obstacles in the introduction and implementation of PBMC in developing countries including: lack of support from the government, dependence on external funding, political influence and corruption, lack of experience in PBMC implementation, lack of proper planning, fear of losing the work that has been done so far, problems of losing competition, contractor performance and attitude as well as challenges in estimating the right PBMC costs.

Challenge-1 Lack of Support from the Government

Most developing countries have internal problems related to the development of sustainable infrastructure systems. It is clear that developing country governments always try to give priority to building new roads over maintaining existing ones. New road construction projects appear to be more attractive than maintenance of the existing road network, usually to attract the attention of the general public. The example of Bangladesh which is a developing country in South Asia can help to understand the problem. A study conducted by Tamin (2008) showed that bureaucracy among various ministries and the problem of lack of funds for road maintenance projects caused delays in the allocation of funds for road maintenance works in Bangladesh.

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However, the implementation of PBMC requires continued government support for this privatization approach due to the long term nature of PBMC. This cannot be done just for a moment in the short term. This study by Tamin (2008) found that governments in developing countries, which in general have faced funding difficulties in other development sectors, are generally hesitant to provide funding for long-term PBMCs especially in the early stages. In addition, governments usually only show interest in investing in a long-term PBMC approach only if the initial costs of implementing the PBMC are supported by an external funding authority (usually in the form of loans).

Challenge-2 Dependence on External Funding

The Government of Chad (in Africa) started the process of contracting roads to the private sector in 1994. This was done when the International Development Association provided funds as part of its efforts to support efficient and sustainable transport infrastructure, the Government of Chad began contracting road maintenance works. Using performance measures in 2001. The contractor managed to improve road conditions to the level of satisfaction expected by Queiroz (2005). The analysis of research by Tamin (2008) shows that support from external funding authorities can only be a temporary solution for developing countries because the provision of funds is very dependent on the willingness of donor funds to support PBMC activities in the country. If the donor is dissatisfied with the road authority or the government for any reason, they may postpone or cancel the loan. This study from (Tamin, 2008) shows that before introducing PBMC in developing countries, the authorities in the management and operation of roads must ensure an internal source of funding as early as possible that is sustainable in the long term.

Challenge-3 Political Influence and Corruption

Political influence and corruption crimes that often occur in developing countries are the most difficult obstacles to the application of the new concept in developing countries. For example, the selection of implementing contractors including PBMC contractors for road maintenance works in developing countries is sometimes influenced by political leaders. Local newspaper reports mention that the World Bank suspended a loan for the Padma Bridge Project in Bangladesh alleging the company's involvement in corruption to illegally win a bid to oversee the construction of a major bridge at a cost of around US$ 50 million9 (The Daily Star, 2011). The literature shows that building new roads is a means of becoming popular and gaining future voices among local elites and politicians in Bangladesh.

Asia Development Bank (ADB) helped introduce PBMC in Bangladesh. Routine and periodic road maintenance works for approximately 50 km of regional or district roads will be contracted out to domestic contractors based on a 3-year performance-based contract (Asian Development Bank, 2002). There is very little evidence that PBMCs can significantly reduce the likelihood of corruption. At PBMC, road authority officers will oversee the site to check contractor performance. If this official were to accept bribes during this examination, the situation would be even worse than before. This study from Tamin (2008) shows that contract documents need to be prepared and implemented strictly in PBMC. Otherwise, there is no guarantee that the PBMC will be free from political influence and corrupt practices in developing countries.

Challenge-4 Lack of Experience and Knowledge of the PBMC Concept

In Indonesia, when PBMC was first introduced, government agencies were considered capable of conducting road maintenance trials under the control of the PBMC. However, it is necessary to provide training to staff on the new approach so that they can adjust to their new roles and responsibilities (Opus International Consultants Ltd, 2006). The findings from the research of Sultana, et.al (2012) show that insufficient experience and knowledge regarding the implementation of performance-based contracts is a major challenge for developing countries. Experienced personnel are required to decide on appropriate maintenance projects, prepare all relevant contract documents, prepare appropriate performance standards for the country, train staff and contractors, and prepare guidelines for pilot PBMC projects. The study also shows that in the case of very poor road conditions, roads should be rehabilitated before starting PBMC. Experience is very important in determining all the factors discussed above. Road management authorities in developing countries, including their contractors, are very good at consulting with foreign contractors who are experienced in implementing PBMC, so that later it can be carried out properly.

Challenges-5 Weak Government Program Design Capability

Another challenge for developing countries in implementing PBMC is the lack of proper planning and managerial skills. Literature review of research (Tamin, 2008)) shows that lack of planning can lead to loss of quality in PBMC implementation. PBMC requires cultural and procedural changes in road authority. Road authorities should plan a systematic way to move from conventional contracts to PBMCs. They need good data retention on previous road maintenance projects, long term funding sources, good contract

documents, training and future planning for staff and determination of suitable projects for pilot PBMC implementation.

Challenge-6 Reducing the Number of Government Employment Contracts

Another advantage of the PBMC mentioned in the literature is reducing the number of staff in the road management authority. This survey of Tamin's (2008) research shows that sometimes fear of losing a job can make it difficult for government employees in developing countries to support PBMCs. The research also shows that government sector jobs are more secure than private sector jobs in some developing countries. Staff and unions may not cooperate in implementing PBMC for this reason. Road authorities should consider the consequences of staff reductions before implementing a PBMC. Government road authorities should have sufficient technological capability to improve the road infrastructure system with increasing population and future technology. The reduction in staff numbers should not be so extreme that road authorities in developing countries can remain dependent on the private sector for future development while carrying out a knowledge transfer process for road administration staff.

Challenge-7 Limited Number of Contractors and Low Competition

The implementation of PBMC will transfer the risk and responsibility of project design and management to the contractor. The contractor in this case should be big enough to take on such a responsibility. On the other hand, the preparation of tender documents involves a series of contract documents, compilation and verification of inventory data and typical asset conditions. It also requires program calculations and estimates to be used in tender evaluations (Department of Health and Human Services, 2002). Due to high bidding costs, the number of companies that were able to participate in tenders generated after the prequalification stage for performance-based contracts in Tasmania and Western Australia was only four (very few) in the early stages of PBMC introduction (Stakenvich, et., al, 2005). Very little due to the high costs of tendering and bidding. This can reduce competition among contractors and increase the fear of small contractors losing their jobs. However, the solution that can be done is the collaboration of small contractors with large contractors as a union to get jobs and a healthy business climate.

Challenge-8 Contractor Performance and Attitude

Since PBMCs depend on contractor performance, contractors must be capable enough to adapt this approach. The literature shows that poor contractor performance will lead to the failure of this PBMC. Road authorities should track the level of service provided by contractors at the PBMC. Contractors are also required to be motivated to enjoy the benefits of implementing the method.

Challenge-9 Cost

Literature review and research shows that the successful implementation of PBMC requires precise cost estimates. As for contract terms, documents and performance standards will vary in different countries. Since the PBMC is a long term contract, it is not possible to change anything after the contract starts. However, Tamin (2008) found that developing countries face difficulties in estimating costs in the early stages of implementing PBMC because this is a very new concept for them.

PBMC Development Challenges in Indonesia

As explained above, the challenges in implementing PBMC in Indonesia in the future can be explained by Tamin et. al. (2016) as follows:

a. Efficiently use other modes of transportation such as rail, sea and toll roads
b. Determining the segment segment that will be used as a PBMC is adequate with the same alignment and pavement so that investment programs and preservation programs are easily prepared.
c. Applying the concept of asset management in the implementation of national roads.
d. Improve the ability of contractors/sub-contractors, especially specialists in the maintenance process with the principle of PBMC

PBMC Handling Concept in the future

The quality of national road maintenance can be developed by implementing PBMC because this PBMC performs maintenance in a timely manner so that the quality and road plans can be guaranteed so as to minimize the costs used. Because the contractor is free to determine the type of work to be carried out, there are opportunities for creativity and innovation to get value added. However, based on lessons learned from various countries as well as based on the experience that has been carried out in Indonesia which has been conveyed previously, it can be seen that the implementation of PBMC needs to be designed in such a way by taking into account regional conditions, characteristics of implementation and financing and other things so that it can work well.

The most important thing is that PBMC requires strong support from key decision makers,

especially during the first year of implementation and what is clear is that PBMC is not the ultimate weapon that is sure to succeed, anticipation of supportive environmental conditions, regulations and law-enforcement and anticipation of classic problems that causes damage to roads that need to be carried out in a synergistic (from all relevant institutions) and comprehensive manner from the planning, development, operational stages to the maintenance and evaluation stages.

CONCLUSION

From the description above, it can be concluded that the implementation of PBMC is a new innovation that has been using conventional contracts. The Directorate General of Highways made a breakthrough to implement PBMC to replace the conventional method, but in its implementation there are still obstacles, including: determining the location of the PBMC trial in the Pantura of Java where the traffic is very heavy and overloading so that the life of the road plan is not reached, the laws and regulations that apply has not supported the implementation of PBMC, pre-qualification/auction documents that need improvement, building failures and road historical data that are not available have resulted in the PBMC concept not being fully implemented. The implementation of the PBMC modifications carried out, has not followed the actual PBMC concept, which is still carried out with high investment costs and a fairly long construction time, prioritizing improvement and reconstruction work instead of rehabilitation and preservation/maintenance. In this PBMC concept, service users still determine the activities to be carried out by the contractor based on volume based not based on road performance indicators. This is also seen in the concept of road handling using the long-segment method which is currently being promoted, the concept is based on road performance indicators but its implementation still refers to volume based. Some suggestions that can be given to address future challenges include: service users still determine the activities to be carried out by the contractor based on volume based not based on road performance indicators. This is also seen in the concept of road handling using the long-segment method which is currently being promoted, the concept is based on road performance indicators but its implementation still refers to volume based. Some suggestions that can be given to address future challenges include: service users still determine the activities to be carried out by the contractor based on volume based not based on road performance indicators. This can also be seen in the concept of road handling using the long-segment method which is currently being promoted, the concept is based on road performance indicators but its implementation still refers to volume based. Some suggestions that can be given to address future challenges include:

a. There must be a change from the conventional method to the PBMC method that allows it to be carried out effectively and efficiently so that it will increase the understanding and capacity of the organizers (Ditjen Bina Marga) and Contractor Competence
b. The key to the success of PBMC is a qualified contractor. Contractor performance will be assessed from the achievement of output. For this reason, massive but structured and systematic guidance is needed in increasing the experience and capabilities of contractors in the implementation of PBMC.
c. Clear rules are needed, adjustments to applicable laws and regulations, firm and detailed indicators regarding this PBMC system, so as not to cause confusion, especially in the financing audit process which will not cause problems in the future.
d. One of the considerations for implementing PBMC is the opening of opportunities for the workforce, businesses and new business actors. This is in accordance with the government's policy in increasing investment for the prosperity and welfare of the community.

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