Assessing the Effectiveness of Road Construction Project Delivery System in Indonesia

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Abstract: In today’s ever increasing demand for transportation services, the national road agencies are finding themselves in mounting pressure to provide reliable road transportation system. Despite efforts to improve the programming and implementation by the central and regional road agencies, the quality of national road system is constantly decreasing. For years the government of Indonesia has relied on traditional design-bid-build approach for delivery of road and highway construction and maintenance projects. This paper reports the result of study on alternative project delivery methods for road construction in Indonesia as way to improve the quality of national road system. The study is the first step toward identifying the potential application of alternative delivery method for the national road network system. The paper also summarizes the survey results from road agencies and contractor concerning the current road project delivery system as well as attempts to assess the viability of implementing design-build and performance-based contract approach.

Key Words: national road system, project delivery system, design-bid-build

1. INTRODUCTION

Road infrastructure plays vital role in land transportation system in Indonesia. It supports many aspects of the regional development as the essential foundation for the nation’s economic growth and social prosperity. The ever increasing demand for land transportation services has put pressure to the government to provide reliable road transportation system. In recent years, the national road system has became serious national concern, where the overall road condition has reached an alarming level and raises negative image to road construction in Indonesia. In 2009 alone, 11% of a total of 85.00 km of national road system was in bad condition and by the end of 2010 it is estimated that 30% of those roads will reach their end service lives.
The management of national road networks in Indonesia is centrally programmed and managed by the Directorate General Bina Marga (DGBM), under the Ministry of Public Works. Under this scheme, the national road and bridge system is planned, programmed and financed by the central government, whereas the implementation of construction and maintenance-rehabilitation of roads and bridges is delegated to the local road authorities. Under this scheme, program development and engineering for road and bridge system were prepared by the central road agency, whereas the bidding and construction process will be carried out by local authorities at the provincial and regional levels.

Under current government regulations, as in other public services in Indonesia, design-bid-build (DBB) is the only delivery system applied for road construction projects. Because of weak coordination between the central and provincial/regional agencies, coupled by bureaucratic involvement of other agencies, the road delivery process is often hindered by budget uncertainty and extensive delay in the project execution.

2. STUDY METHODOLOGY

The objective of the study is to identify issues and constraints concerning the role and function of road agency within the current road project delivery method, and to develop framework for employing alternative delivery method. This work was designed to capture the existing condition of road delivery project at both national and local level. Desk study consisting evaluation and analysis of both technical and legal documents relevant to the issue of road project delivery was carried out as initial step. A survey questionnaire was designed and distributed to obtain feedback from road managers at different level of road agencies as well as those who are actively involved road delivery practices. The questionnaire consists of inquiry about the mechanism and execution, as well as legal framework for road delivery at national and local road networks. The questionnaires were distributed to 20 targeted participants having experiences as road construction project managers in three major cities (Jakarta, Bandung, and Semarang) in Java Island and one city in Sumatera Island (Palembang), representing the variability in authority level as well as geographical dispersion. Two regional, two provincial and three county/city level road managers, all of them had the experience as road project managers, as well as two central government road managers representing central road agencies were actively engaged in the survey. Following up that survey, a series of one-to-one interview with the respondents and focused group discussion were held to further acquire a comprehensive view of the subject. In addition, this study also compiled responses to the questionnaire from thirteen contractors. Survey to the contractors was intended to determine their readiness in implementing non-traditional road construction project delivery system.

3. MANAGEMENT OF ROAD NETWORK IN INDONESIA

The management of Indonesian road networks at the national level is governed by the Directorate General of Bina Marga – Ministry of Public Works (DGBM-MPW), which is further divided into central and local levels. The Indonesian road networks consist of national road and local road. While the national road network is managed centrally by the DGBM-MPW, the responsibility of managing local road networks is shared by the local DGBM office and local government. The national road network planning, programming, and budgeting is carried out by the central authority, in this case by the Directorate of Program and Directorate
of Engineering, as well as other technical directorate under the coordination of the DGBM, which also involves the National Development Planning Board (NDPB), Ministry of Finance (MOF), and legislative body. All of these planning and budgeting processes are carried out at the central office in Jakarta, whereas the detailed engineering, procurement, and construction are executed at regional offices. At local level, DGBM-MPW has branches in 10 regions, covering 491 counties and cities in 33 provinces. Each regional office consists of three sections: planning and controlling section, implementation section, and testing section. In executing their duties, the planning and controlling section is responsible for procurement of independent consultant for design services, while the procurement of construction services becomes the responsibility of the DGBM regional office’s implementation section.

The delivery of local road projects, on the other hand, is mainly under the authority of local government, both at the provincial and regional or city levels. Under this scheme, local government’s road agencies, within the coordination of DGBM regional offices, are responsible for the planning, programming, budgeting, engineering and the construction or rehabilitation and maintenance of local roads. The funding for those activities came from both central government and local government budget.

4. ROAD PROJECT DELIVERY PROCESS IN INDONESIA

In this study, road delivery process is limited to the overall phases needed to deliver the functioning of a road infrastructure, which spans across the identification of the needs, planning, programming, budgeting, procurement of design consultant, up to the construction of new or rehabilitation of existing roads. As shown in figure 1, for works at national road networks, this lengthy multi-years process involves various agencies and units within DGBM, as well as other government authorities for planning and budgeting.

![Figure 1 Road delivery process at national level](image)

Technically the local road agencies are under coordination and supervision of the DGBM - Ministry of Public Works. However, within the context of governance those local agencies are subordinates of the local government (provincial, city and county). As shown in Figure 2,
such hierarchical structures often create conflicting situation when the needs of local government are not aligned with the national program set up by the central government. Further, due to the inadequate capacity and competence of their officials, provincial and/or city/county often find themselves having problems with planning, programming, and procurement of design and construction services. As the results unabsorbed budget and poor construction road works are common.

![Figure 2 Road delivery process at local level](image)

The method of project delivery being employed by DGBM is the traditional design-bid-build (DBB). Under this DBB scheme most of the procurement for design and construction works is executed at provincial and county/city level. Upon the budget approval by MOF and NDPB, DGBM then allows the DGBM’s regional office to execute detail design development and construction (figure 3). Often problems arise when the approved budget cannot accommodate the specific local characteristics of the area where the roads are to be built or rehabilitated. As the result, delays and poor road performance are common.

![Figure 3 Flow of process for road project delivery](image)
Related problems are faced by the provincial and regional/city governments. Although the planning and programming phases are relatively less complicated and lengthy than those of the national road networks, roads built under provincial and regional/city road networks using DBB project delivery method are often fall below expectation. It is believed that some of those drawbacks are caused by inefficiency of DBB and inability of the design to accurately accommodate the site specific condition. Because most of the road construction projects are minor rehabilitation, they do not require extensive planning and programming. Yet, the time it takes from budgeting to construction may span well over one year, during which time the site condition would have been changed quite significantly.

Several studies (Hale et al 2009; Gransberg et al 2006; Ibbs et al 2003) have shown that design-bid-build method performed inferior as compared to other alternatives of project delivery, which should also true for Indonesia. Yet, the traditional DBB is the only delivery project employed for road construction in Indonesia, and the selection DBB method is mainly for the reason for lowest cost, as well as transparency and accountability for public work project. Therefore, an effort to improve the delivery of road projects by introducing alternative delivery methods is to be examined.

5. PROBLEMS WITH THE CURRENT ROAD PROJECT DELIVERY METHOD

The cause of ineffectiveness of traditional DBB delivery method for road construction projects in Indonesia can be attributed to the following three aspects: the organizational structure, policy and capacity of the road management, the ramification of the current legal system, and the bureaucratic hierarchy of the government system (Soemardi, 2009). The first aspect concerns with the ability of the central and local organizations to prepare and execute the road construction project, whereas the second aspect is measured as the external constraints toward the delivery process.

Responds from the questionnaires reveal that both the central and local road authorities share the same problems. The existing bureaucratic structure of the road agency (DGBM) does not allow flexibility for the local government to execute the delivery of read project expeditiously. All participants in the survey agreed that programming and budgeting are the two most critical issues that need to be addressed in an integrative way. While issues of programming and budgeting process at central level may not be easily solved, it was acknowledged that at least at local level this issue can be better handled. This lengthy bureaucratic process between programming - budgeting and the procurement of third party design and construction services often causes poor schedule and cost performances.

In terms of construction schedule, delays in budget approval for national road construction program often leads to unsuitable timing of the construction execution. Upon budget approval road agency will then proceed with the procurement of design service, during which the process itself is often delayed for various reasons. Consequently, the construction phase which was originally scheduled during dry season was stretched out into the unfavorable rainy season; causing potential construction changes and unexpected cost growth. This schedule slippage attributed to the poor quality of work and construction cost ineffectiveness. Besides that problem, the survey also revealed another problem with the quality of engineering design. Due to limited time frame available between budget approval and the targeted construction schedule, as well as lack of sufficient budget the local road agency often
ended up with inadequate design for the construction of national road networks. The accumulation of such problems contributed to shorter life service of the roads.

Project delivery problems in local road networks are even worse. Not only they are under similar unfavorable circumstances, the delivery process for local road construction projects are also threaten by lack of support from competence officers at the local road agencies. Most officers at local road agencies are serving administrative works and do not posses adequate engineering expertise. Since they rely quite heavily on the engineering supports from the central, during the design development they cannot provide accurate guidance and specification for the engineering consultants. As a result many design produced by the consultant are late and/or in poor quality.

In addition to the above mentioned organizational constraints, the success of road delivery projects in Indonesia is also heavily influenced by the existing regulatory framework. In particular regulation concerning the procurement of design and construction frequently caused delays in procurement or even resulted in miss-procurement. The same as with other government-funded projects, road construction project must undergo a strict procurement process in accordance to guideline stated in Presidential Decree no 80 – 2003 (Indonesia, 2003) on Guideline for Government Procurement. In order to maintain the principles of transparency and accountability, strict procedure, requirements and schedule must be followed. Under this regulation a slight schedule change during the programming and budgeting process may result in significant delay in procurement process. Recently this decree has been replaced by Presidential Decree no 54 - 2010 (Indonesia, 2010) that allows more flexible and wider procurement options.

The implementation of Law no 18 – 1999 (Indonesia, 1999a) on Construction Service also contributes to the worsening of this condition. In particular, the requirement of certification for procurement of services has put pressure to the construction industry that may lead to improper application of certification process, where certification becomes a trade commodity (Soemardi and Wirahadikusumah, 2009). While this circumstance may not seem to be a great problem for engineering design and construction companies practicing in large road construction projects a completely different situation was found in small – medium construction companies working for local governments. Most of these engineering design and construction companies are not able to fulfill strict government requirements, which in turns adding problem to the already troubled road procurement process.

The third aspect under consideration concerns responsibility of managing road system between central government and its local counterparts. In principle all road network system in Indonesia is under coordination and management of the central government under the Ministry of Public Works. Meanwhile, the enactmet of Law no 22 – 1999 (Indonesia, 1999b) on Local Autonomy and Law no. 33 – 2004 on Financing Balance between Central and Local Governments (Indonesia, 2004) allow local governments to exercise their authority over infrastructure facilities within their judicial area. The problem arises when there is a conflicting interest between central and local government.

As shown in table 1, opinion gathered from survey to road agencies indicates that design and budgeting are considered as the two most critical aspects that contribute to the failure of DBB system. Incompatibility between design and field condition often causes technical problems and delays. On the other side, lengthy bureaucratic process was identified as the main cause of delay in budget approval and payment to the contractors. It can also be derived from table
that according to road agencies in addition to technical problems such as lack of quality data and technical competency of consultant, lengthy bureaucratic process and legislative intervention have great influence in the success implementation of DBB. It is quite often found that delay and redesign occur as the result of these ineffective circumstances.

<table>
<thead>
<tr>
<th>Points of Concern</th>
<th>Project Obstacle at various government administration level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central</td>
</tr>
<tr>
<td>Preparation and project proposal</td>
<td>Lack of data and preliminary design</td>
</tr>
<tr>
<td>Planning, programming and budgeting</td>
<td>Prioritization</td>
</tr>
<tr>
<td>Budget approval</td>
<td>Limited government budget</td>
</tr>
<tr>
<td></td>
<td>Intervention of legislative</td>
</tr>
<tr>
<td>Selection of engineering consultants</td>
<td>Consultants’ lack of understanding of TOR</td>
</tr>
<tr>
<td>Planning and design</td>
<td>Unclear initial data and engineering design</td>
</tr>
<tr>
<td>Bidding</td>
<td>Contactors’ bids are too low</td>
</tr>
<tr>
<td></td>
<td>Low contractor qualification</td>
</tr>
<tr>
<td>Construction</td>
<td>Changes in scope of works</td>
</tr>
<tr>
<td></td>
<td>Lack of coordination amongst agencies</td>
</tr>
<tr>
<td></td>
<td>Inaccurate and incomplete contractors’ project report</td>
</tr>
<tr>
<td>Payment</td>
<td>Lengthy process</td>
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</tbody>
</table>

Other financial constraint that was identified from the survey is that the approved budget for road projects is often inadequate. Therefore, it is not surprising that many roads in Indonesia cannot fully function up to their design service life. This condition subsequently leads to higher demand for road rehabilitation projects, especially for high priority roads at the
national level. Such high rate of road rehabilitation contributes to inability of the government to invest on new road networks.

From the results of this survey, it can be seen that the bureaucracy problem and funding issues are the most crucial issues in road management system in Indonesia, which makes the implementation of the road becomes less than the maximum and resulting in a lack of good quality result of road construction projects in Indonesia.

6. PREPARING FOR INTEGRATED ROAD PROJECT DELIVERY SYSTEM

In order to successfully implement an integrated delivery system on road project in Indonesia, it is important consider the fulfillment of the legal requirement. In addition, readiness of road agency managers and readiness of road service provider will also play important roles. To prepare the road agency, training and extensive dissemination of information are needed, especially for the agencies at provincial and county or city levels. Table 2 shows results from assessment of the readiness of road agencies in implementing the integrated road project delivery system.

In order to determine the readiness of road agencies and the contractors in applying non-traditional design-bid-build delivery method, a series of questionnaires survey were performed to get the opinion of the respondents. From the survey results, it is determined that there are still many agencies in the local area that do not know and understand about the integrated delivery system. In addition, they are still weak in technical capabilities. As for the readiness of service providers in Indonesia, the survey indicated that the contractor have already adequate understanding about the DB system, but not so with other issues such a performance-based contract. In this case, it is deemed necessary to provide a special training on integrated project delivery systems and training to improve planning capabilities for road agencies manager in local area. This initiative can be accommodated by the central agency. Training and dissemination of information on integrated delivery system that is focused on the design-build system and performance-based contract also needs to be done to service providers in Indonesia so the implementation of integrated delivery system can work well. With the training and dissemination of information to local agencies and service providers is expected to occur the same understanding about integrated delivery system.

<table>
<thead>
<tr>
<th>Issues to be reviewed</th>
<th>Central</th>
<th>Regional</th>
<th>Provinical</th>
<th>County/City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge &amp; understanding of integrated delivery system</td>
<td>Adequate.</td>
<td>Lower.</td>
<td>Lower</td>
<td>Lower.</td>
</tr>
<tr>
<td></td>
<td>Many agencies at the central level</td>
<td>Human resources in local area are less aware</td>
<td>Human resources in local area are less aware in</td>
<td>Human resources in local area are less aware</td>
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<td></td>
<td>have adequate knowledge and</td>
<td>in knowing and understanding the integrated</td>
<td>knowing and understanding the integrated</td>
<td>in knowing and understanding the integrated</td>
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<tr>
<td></td>
<td>understanding of the integrated</td>
<td>delivery system</td>
<td>delivery system</td>
<td>delivery system</td>
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<td></td>
<td>delivery system</td>
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<tr>
<td>Institutional readiness related to application of an</td>
<td>Institutional was considered to be</td>
<td>Institutional was considered to be well</td>
<td>Institutional was considered to be well</td>
<td>Institutional was considered to be well</td>
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<tr>
<td>integrated</td>
<td>well structured.</td>
<td>structured.</td>
<td>structured.</td>
<td>structured.</td>
</tr>
<tr>
<td></td>
<td>Fairly ready for</td>
<td>Fairly ready for</td>
<td>Fairly ready for</td>
<td>Fairly ready for</td>
</tr>
</tbody>
</table>

With the training and dissemination of information to local agencies and service providers is expected to occur the same understanding about integrated delivery system.
<table>
<thead>
<tr>
<th>delivery system</th>
<th>DB.</th>
<th>DB.</th>
<th>DB.</th>
<th>DB.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readiness of the Agency in terms of human resources in the development of delivery systems</td>
<td>Not ready. There are still lacks of sufficient capability from a technical and administration standpoint, and also human resources.</td>
<td>Not ready. There are still lacks of sufficient capability from a technical and administration standpoint, and also human resources.</td>
<td>Not ready. There are still lacks of sufficient capability from a technical and administration standpoint, and also human resources.</td>
<td>Not ready. There are still lacks of sufficient capability from a technical and administration standpoint, and also human resources.</td>
</tr>
<tr>
<td>Readiness of the regulatory and legal aspects in the development of delivery systems</td>
<td>Quite ready. Just waiting for the revision of legislation and the revision of Presidential Decree Public Procurement</td>
<td>Not ready. Regulatory and legal aspects are inadequate or not available.</td>
<td>Not ready. Regulatory and legal aspects are inadequate or not available.</td>
<td>Not ready. Regulatory and legal aspects are inadequate or not available.</td>
</tr>
<tr>
<td>Readiness of Contractor Service Providers as viewed by the manager</td>
<td>Contractor service providers were judged have not ready because most of them have the orientation on profits, not on the quality of work.</td>
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<td>Contractor service providers were judged have not ready because most of them have the orientation on profits, not on the quality of work.</td>
</tr>
<tr>
<td>Aspects considered as the most ready related to the implementation of integrated delivery system</td>
<td>Institutional Aspects and legal aspects.</td>
<td>Institutional Aspects.</td>
<td>Institutional Aspects.</td>
<td>Institutional Aspects.</td>
</tr>
<tr>
<td>Implementation availability of an integrated delivery system on road project in Indonesia.</td>
<td>Integrated delivery system can be applied because the base of regulations is in the process of making</td>
<td>Currently not ready, because the regulation is not yet complete.</td>
<td>Difficult. All parties do not have a uniform understanding of the integrated delivery system.</td>
<td>Currently not ready, because the regulation is not yet complete.</td>
</tr>
<tr>
<td>The form of cooperation between Contractor-Consultant which was considered as the most probable</td>
<td>The most possible form of cooperation in the implementation of an integrated delivery system is a joint-venture.</td>
<td>Joint-Venture is a form of cooperation between Contractor and Consultant are currently considered as the most feasible.</td>
<td>Joint-Venture is a form of cooperation between Contractor and Consultant are currently considered as the most feasible.</td>
<td>Joint-Venture is a form of cooperation between Contractor and Consultant are currently considered as the most feasible.</td>
</tr>
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</table>
From the survey results related to readiness in the use of integrated delivery systems, both local agencies and service providers, have not yet sufficient knowledge and understanding of integrated delivery system (design-build). It can be seen from the uniformity of understanding and dissemination of information that is still focused in the Central level. Due to these differences of opinion arise regarding the availability of integrated application delivery system on road project in Indonesia. Central agency considers that an integrated delivery system was quite ready and only waiting for the completeness of the rules, but local agencies have the contrary assessment that an integrated delivery system is not quite ready to be applied for at this time because of problems that have not been wide dissemination of information, understanding between central and local levels has not yet uniform, as well as regulatory issues are considered not exist. In this case, socialization is required from the central level to local level agencies to achieve uniformity in the understanding of the integrated delivery systems.

Table 3 Readiness of contractors to integrated road project delivery system

<table>
<thead>
<tr>
<th>Point of concerns</th>
<th>Contractors Readiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge &amp; understanding of the integrated delivery system</td>
<td>There are many respondents who with adequate understanding about DB, but not so with performance-based contract. (Strength)</td>
</tr>
<tr>
<td>Readiness in terms of human resources in the development of delivery systems</td>
<td>Quite ready, especially in large contractors who already have enough competent and experienced human resources in road projects.</td>
</tr>
<tr>
<td>Implementation availability of an integrated delivery system on road project in Indonesia.</td>
<td>Integrated delivery system can be applied, with a clear method of execution from the road agencies.</td>
</tr>
<tr>
<td>The form of cooperation between Contractor-Consultant which was considered as the most probable.</td>
<td>Integrated delivery system can be implemented with the best possible form of cooperation is a joint-venture. (Strength)</td>
</tr>
<tr>
<td>Obstacles in the implementation of an integrated delivery system</td>
<td>In planning, hat is related to the objectivity and appropriateness between planning and implementation.</td>
</tr>
</tbody>
</table>

Results of the survey found one thing that is considered unique, that is the road agencies assess that the contractor has not yet ready due to the orientation of his work that is not on the quality of work, but only focus for profit only. Related to this, after a further survey conducted to the contractor, can be seen that although there are still many contractors that have orientation more likely to seek profit, but there are also some large contractors who have concerned to the quality of work as asset to earn the trust of customers and as a step to compete with others contractors. The existence of the facts of this case makes the assessment that not all contractors have only the orientation of the profits, because there are some
contractors that have started to take into account the quality of works and can be considered that they are ready to execute the road by using an integrated method.

Concerning the use of an integrated delivery system in the future, both parties felt that this form of cooperation between contractor-consultant who assessed the most likely is a form of joint-venture. In this form of cooperation, the contractor may invite design consultant as a partner in implementing the plan to execute an integrated method. This form of cooperation is currently considered the simplest and most effective way as oppose to create a special design-builder company that has the capability of planning and implementation as well. Meanwhile, with regards to the obstacles in the use of an integrated delivery system, the two sides share the same views as a lack of planning that needs to be addressed in execution an integrated delivery system.

In integrated delivery systems, good planning skills are required by both the administrative and the executive units so that the road project can be held properly without the need to review the design and budget problems. If regulation and the completeness of document about design-build have already been available, as well as training for local agencies and service providers has been established, then the application of design-build delivery system on road projects in Indonesia is a matter of time. However, shifting form one delivery system to another requires careful consideration, and the government can learn from lesson taken from design-build application in other public construction projects. (Long, et al, 2007; Sharesth et al, 2007)

7. POTENTIAL APPLICATION OF ALTERNATIVE DELIVERY METHOD

Although arguments for having alternatives to traditional DBB delivery method for road construction projects have been discussed since mid 1990s, the needs for having an integrated delivery system have never been greater than in the last 5 years. While successful examples of alternative project delivery methods in many countries are widely available (Lahdenpera and Koppinen, 2009) caution should always be taken when the government is planning to implement such methods into Indonesian road construction projects. In particular, this study has shown that the both central and local road authorities will play important role in road project delivery. Legal framework provided by Law no 22 and 23 on autonomy and financing balance allows both the central and local government to exercise better balance authority in managing national road networks, including the implementation of non-traditional project delivery method, such as design build. Learning from the experience with traditional DBB, their roles should be strengthened and supported by adequate legal and organizational infrastructure before carrying on with other delivery methods.

Streamlining the delivery process for national road network must be prioritized. This can be achieved by providing more authority to the local agency in planning and budgeting. To avoid future problem in project execution, programming must be prepared in detail by the central agency, which should include both mid and long-term road construction program. The government should anticipate the legal ramification of implementing integrated project delivery method. The proposed streamlining and synchronizing the legal system should also be accompanied by effort to improve the capacity of local official, especially for those who will be responsible in executing integrated delivery method. Effort to build the capacity of local agencies can be started with the implementation of the design-build delivery for rehabilitation and preservation projects at local road networks. (Soemardi, and Pribadi, 2010).
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