

## RESEARCH ARTICLE



# Stakeholders Mapping Based on Risk of Public Private Partnership (PPP) Non-Regional Water Supply Provision in Indonesia

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## ABSTRACT



Clean water is a necessity for human life that is obligated to be fulfilled. Quantity and the quality of groundwater are decreasing; thus, water provision through pipelines using the PPP scheme became a flagship option to provide water services, especially in Municipalities. PPP became an option to accelerate clean water provision for non-regional water supply. Water as a necessity has very detailed regulations and complex risks and involves many stakeholders. PPP, risk management, and stakeholders have tight linkages conceptually and through framework. This research aims to map the necessary stakeholders involved in non-regional water supply provision with a risk-based approach to mitigate the risks arising from them. The methodology used in this research is a mixed method using risk identification analysis and stakeholder mapping and identification. The result shows that there are 10 stakeholders in the non-regional PPP water projects, which are split into 3 categories those are key stakeholders, supporting stakeholders, and participating stakeholders. Each stakeholder has the potential to trigger risk in a non-regional PPP water project that sums up to 10 risks. Through this authoritative approach and the relevant support, stakeholders can mitigate the risks that exist in non-regional PPP water projects.

## Introduction

One of the vital needs for humans is clean water, and without it, we would not live. Humans need water for metabolism, whereas plants need water for photosynthesis to produce oxygen and absorb carbon dioxide. The necessity of water underlines Clause 33, Article 3 of the Indonesian Constitution Year 1945 [1]. Clean water in Indonesia is exclusively categorized as a basic requirement; therefore, it is tightly regulated. The strategy to provide sustainable basic needs is included in the priority Sustainable Development Goals (SDGs), which is already a global commitment to providing clean water access that is not just qualitatively good but also quantitatively available [2].

According to SNI 6728.1:2015, water for household needs is around 0.06 m<sup>3</sup>/day/person to around 0.150 m<sup>3</sup>/day/person. The clean water production in Indonesia in 2021 is 5.25 billion m<sup>3</sup>/year. In addition, the Indonesian population in 2021 is 273 million people [3]. Using population data from 2021 and the clean water needs per person, it is estimated that there is a volume of water that needs approximately 5.971 billion m<sup>3</sup>/year, and up to 14.929 billion m<sup>3</sup>/year. Therefore, current clean water needs have not reached the entire Indonesian population. Furthermore, looking at the projection it is estimated that Indonesian population will reach up to 342 million people during a century of Indonesian independence in the year 2045, therefore the needs for clean water access could reach around 7.09 billion m<sup>3</sup>/year up to 17.739 billion m<sup>3</sup>/year.

Currently, it is increasingly difficult to use groundwater as a source of clean water; thus, drinking water supply system usage provided by the Municipal Water Company (MWC), which we call *BUMD (Badan Usaha Milik Daerah) Air Minum*, is experiencing a rapid increase [4]. Pipe water in Indonesia is known as the *Sistem Penyediaan Air Minum (SPAM)* or Drinking Water Supply System (DWSS) because the quality it produces

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becomes drinking water standard water supply provision requires a massive budget. According to the Ministry of Public Works, there is a requirement of funding IDR 128 trillion to accelerate the drinking water scope in the year 2020–2024 and IDR 170 trillion in the year 2025–2030 [5]. The fulfillment of these funds is not only through the state budget but also through innovative financing that involves investors, such as PPP, performance-based partnership (PBP), and many other schemes.

The development of the water sector requires huge investment, with a huge initial investment and high inefficiency then PPP become one of the solutions to provide better value for money and services to the population [6]. The involvement of the private sector in PPP is not only to provide funding but also to prompt better standards of living and increase quality of life [7]. PPP is one option for the government to provide public infrastructure and its services without having to provide it alone with its budgetary constraints [8]. PPP can be implemented to provide hospitals, schools, water supplies, and waste treatment [9]. PPP can be chosen by developing countries to minimize inequality in the water sector [10]. Countries that have implemented PPP in the water sector are South Korea and Singapore, where fiscal pressure, political incentives, and socioeconomic pressure become the catalysts for its implementation [11].

One of the catalysts for PPP implementation is the private sector; therefore, the public sector or the government can be efficient in infrastructure provision [12]. Based on experience in several countries, PPP is the development and maintenance of service-based infrastructure that uses innovation and the ability of the private sector to provide private funding [13]. Until 2023, there were five water supply projects in Indonesia that have implemented PPP: Umbulan Regional Water Supply, Jatiluhur Regional Water Supply 1, Bandar Lampung Water Supply, West Semarang Water Supply, and Pekanbaru Water Supply [14].

PPP is a partnership between the Government and the Project Company for infrastructure provision that refers to the specification set by the Government Contracting Agency (GCA) which partly or wholly uses private sector resources with an emphasis on risk sharing between all parties involved [15]. Other researchers have defined PPP as: (1) public service activities that are funded and operated by the private sector with the public represented by the government based on the PPP agreement [16]; and (2) partnerships of bureaus and organizations between government and project companies that strive to provide social infrastructure [17].

The success of PPP projects depends on the role of the stakeholders [18]. This also needs to be enhanced with the benefit acceptance of the project by its stakeholders [19]. PPP also involves many stakeholders compared to conventional procurement, and its success depends on the role and decision made by the stakeholders as well as the relevant parties [20]. In the Water sector PPP, stakeholders are plural and can affect social risk stability [21]. The stakeholders in PPP must be managed well to achieve infrastructure provision targets, minimize risk, and accommodate the interests of stakeholders [22]. Referring to several of these definitions, PPP can be interpreted as the cooperation between government and private entities to provide infrastructure based on appropriate risk allocation.

Since 1990, the water sector PPP has started to develop worldwide [23]. Indonesia implemented a PPP scheme for the water sector for its regional and non-regional projects in 2016. There are three PPP principles: (1) the government can provide public infrastructure, (2) the private sector can receive sizable revenue, and (3) people can obtain a good service infrastructure [24]. The five determinant factors for PPP success in the water sector are strong commitment from stakeholders (GCA, including the central government and municipalities), experienced partners, long-term investment, political support, and the establishment of joint PPP offices [25]. According to Amelia [26], the four critical factors that affect PPP water sectors are: (1) Central government, municipalities, and project company commitment; (2) fair risk allocation between the public and private sectors; (3) professional coordination; and (4) an efficient legal framework. The Build-Operate-Transfer (BOT) model in the water sector PPP is the best scheme to ensure the use of private capital and establish government control [27].

Risk is one of the main areas of attention for the private sector in a long-term PPP contract. Effective risk management could determine PPP implementation, especially in the water sector, which involves many stakeholders. One of the most important risk-mitigation strategies is the right choice of mitigation plan according to the project objectives [28]. Good water management requires strategy-level policy [29]. PPP has a complex relationship between actors and groups because it requires a cross-institutional and jurisdictional relationship [30]. Complex contractual PPP involving many stakeholders has the potential for great uncertainty [31]. The water sector in Indonesia is complex and involves many stakeholders, including commitments to the project, communication, and objectives [32].

Stakeholders are individuals or groups who interact with managers and make the project operational [33]. PPP stakeholders are individuals or organizations affected by each stage and outcome of the PPP project [31]. Stakeholders in PPP play a role in risk mitigation and sustainability [34]. In PPP, relationships depend on the type of infrastructure being developed [35]. Therefore, the relationship pattern and stakeholder mapping for non-regional water projects will be different from other infrastructure. PPP, risk management, and stakeholders are strong conceptually and through the framework. In the Water sector, PPP, including non-regional water projects, has its own challenge to elaborate on these three approaches; thus, it needs risk-based stakeholder identification of the PPP water sector in Indonesia. The objective of this research is to provide risk-based stakeholders mapping with the intention of risk mitigation.

## Materials and Methods

The research method used was a combination of qualitative and quantitative methods. The mixed method has advantages in quantitative and qualitative approaches to obtaining phenomena at the research depth [36]. The mixed method is based on the quantitative analysis used in this research as well as classification stakeholder mapping using a Likert Scale that is descriptive and thorough regarding its involvement in the PPP water sector, risks arising from each stakeholder, and its effect in the PPP water sector. The data used are secondary data related to the water supply system in Indonesia, which includes (a) project structure data from all non-regional water supply system provisions in Indonesia, which will be used to analyse the project structure in the non-regional water supply PPP Project, (b) risk data in the PPP Project specifically for the water supply system for identifying existing risks of non-regional water supply PPP projects, and (c) regulations related to water supply systems to identify the role and influence of each stakeholder. The research population is a non-regional water project, which means that it is only an encompassing project conducted by one municipality. According to Bappenas [14], there are three non-regional water projects in the Indonesian PPP Book: Bandar Lampung Water Supply, West Semarang Water Supply, and Pekanbaru Water Supply. Structurally and through government support, these three projects have similarities based on census data. The stages of this research are as follows:

1. Stakeholders' identification, including its authority and the support given based on the non-regional water sector PPP, support whether it is fiscal or non-fiscal.
2. Stakeholder risk identification.
3. Analysis of stakeholders using four quadrants. According to Reed et al. [37], stakeholder analysis can be seen through two approaches: importance and influence. There are four stakeholder quadrants: (a) stakeholders, that is, stakeholders with high importance and low capabilities or low influence; (b) key stakeholders, that is, stakeholders with strong importance and influence; (c) supporting stakeholders, low importance but high influence; and (d) Crowd Stakeholders, stakeholders with low importance but with high influence. These criteria are based on the variable of interest, which refers to the number of risks that could potentially arise from these stakeholders. This was done using a Likert scale, divided into two scales: low and high. Low scale if the potential risk is below 50% of the total population of potential risk. While high scale if the potential risk is above 50% from the population. The criteria used in the variable of interest are based on authority and given support with the same scales of low and high, as shown in Figure 1. Low scale if the stakeholders only have authority or support, while high scale if the stakeholders possess authority and support.

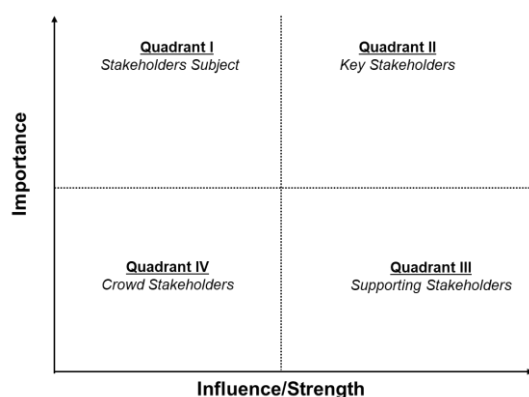


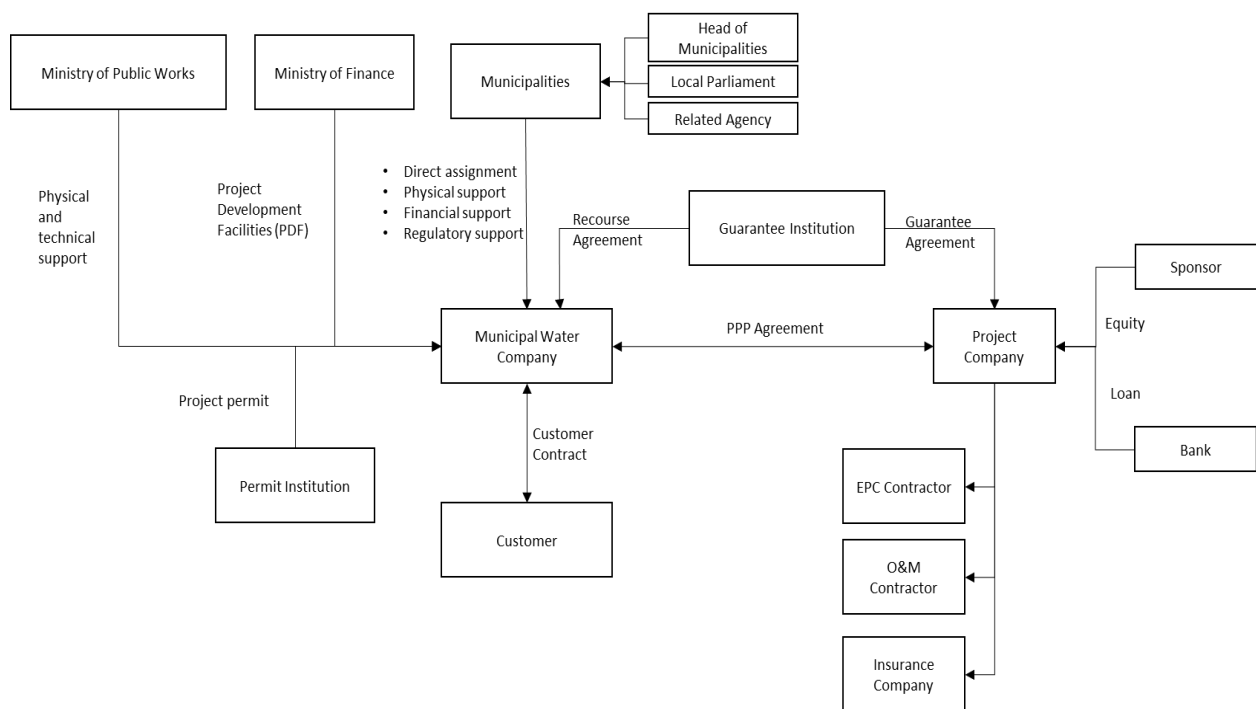
Figure 1. Risk profile matrix based on influence/strength [37].

## Results and Discussion

PPP can overcome several problems such as funding, technological, and effective management of public infrastructure using government and private sector capabilities; thus, it links with risk allocation, benefits, and project capital structure [38]. Capital structure is the key for PPP implementation, as it can complete all project cycles and achieve the project objectives [39]. The PPP project structure depends on the level of capital required for the PPP water sector. The consequence of the enforcement of water as a basic need requires the support of many parties to buy clean water.

### Identification of Stakeholders Based on Non-Regional PPP Water Sector

Support from various parties for non-regional water sector PPP projects could potentially cause interface risk; thus, risk-based stakeholder management according to the project becomes important. The analytical results of the three non-regional PPP water project plans for 2023 have similarities and structures, as shown in Figure 2.



**Figure 2.** Structure of the non-regional PPP water supply project based on the analysis of the three projects.

Based on the structural analysis of the project, it can now provide the results of stakeholder identification, including its authorities.

1. Ministry of Public Works. Have two authorities and support the projects, as follows:
  - a. Authorities: Formulation of water sector policy, issue of the necessary government support (physical and technical), recommendation regarding water usage permits (*IPSDA/Izin Pengusahaan Sumberdaya Air*), publishing of the license, extension of the permit, and support in the form of water sector development through technical recommendations regarding the use and administration of national roads.
  - b. The support of non-regional water projects: Publishing *IPSDA*, physical support for water systems and distribution systems, and technical support for municipal water companies.
2. Ministry of Finance. The authorities and support for non-regional water projects are as follows.
  - a. Authority: Issuance of Viability Gap Fund (VGF) and Project Development Facilities (PDF), as well as formulation of policies regarding loans, grants, obligations, and financial risks.
  - b. Support for non-regional PPP Water Project: VGF and PDF.
3. Municipalities consist of the heads of municipalities, local parliaments, and municipal agencies that have authority and support as follows.

a. Authorities.

Head of Municipalities:

- (1) Assign the Director of Municipal owner company to act as a GCA.
- (2) Support for Municipalities as taskmaster for MWC.
- (3) Act as a representation of the government as the capital owner of MWC with task and authorities to give instruction and policy that could be referred for MWC management.
- (4) Publish of permit that is under the municipality's authorities, and
- (5) Establishing a municipality's strategic plan.

Local Parliament:

- (1) Regulatory approval of project.
- (2) Approval related to the support of the municipal budget.

Related Municipal Agencies:

- (1) Issuing technical recommendations and permits for road usage.
- (2) Issuance of permission from municipal authorities.

b. Support for PPP Non-regional Water Projects.

Head of Municipality:

- (1) Related Municipal regulations of the project.
- (2) Municipal resolution related to the assignment of head of MWC as GCA.
- (3) Technical and physical support for MWC.
- (4) Related regulations of municipal authorities.
- (5) Municipal strategic plan regarding water sector.

4. The Guarantee Agency (*BUPI/Badan Usaha Penjaminan Infrastruktur*), which is aligned with government guarantee regulations, is funded by the Indonesian Infrastructure Guarantee Fund (IIGF). The authority of a non-regional water project is to provide government guarantees.
5. MWC/BUMD, has the authorities of the project as follows.
  - a. The head of MWC acts as the project GCA.
  - b. Establish and inspect and provide strategic business plans and project budgeting for the MWC on a yearly basis.
  - c. Implementation planning and project transactions refer to Presidential Regulation No. 38/2015 [15] and other related regulations.
6. The project company has the scope of financing, planning, development, operating, and maintenance of the infrastructure from water extraction up to its distribution by GCA.
7. Banks have the authority to issue funding for projects.
8. Customers have the right to buy clean water according to the set standards.

#### **Risk Identification Arise from Stakeholders**

The objective of risk identification arising from stakeholders is to identify risks related to stakeholders, and these risks are divided into four quadrants. According to *PT Penjaminan Infrastruktur Indonesia* [40], those risks are as follows: (1) Location risk is an event where the land intended for the project facility is not available or cannot be used thus affecting the plan and budget of the responsibility of one party; (2) Design risk, construction and operational testing is the event arise from design, construction and commissioning; (3) Sponsor Risk is an event where project company cannot fulfill its obligation stipulated on the PPP agreement due to act of sponsor, failure to secure loan or the failure of financial institution to provide loan; (4) Financial risk is an event that affect or related to financial feasibility; (5) Operational risk is an event related to the disruption experienced by the project company to provide services; (6) Revenue risk is an event where project revenue cannot be fulfilled according to the financial projection; (7) Connectivity risk is an event related to availability payment and financial feasibility in refer to the condition of connectivity system; (8) Interface risk is an event related to the project implementation from many parties that disrupt the project and

infrastructure service done by public sector or vice versa; (9) Political risk is an event caused by government action or inaction that causes material loss and affects equity and loan payment; (10) Force majeure is an event caused by the prolonged force majeure outside of all parties control.

In principle, in PPP, the risk allocated to GCA is representative of the public sector, whereas the private sector is represented by the project company. Therefore, the source of risk arises from parties outside the GCA and project company. The sources of risk for non-regional water-supply PPP projects arising from each stakeholder are listed in Table 1.

**Table 1.** Risks associated with stakeholders.

Stakeholders	Potential Risks associated with stakeholders									
	A	B	C	D	E	F	G	H	I	J
Ministry of Public Works		√		√			√	√		
Ministry of Finance				√						
Municipalities	√			√	√	√	√	√	√	
Local Parliaments				√		√			√	
Related Agencies	√	√		√	√		√	√		
MWC	√	√			√	√	√	√	√	
Guarantee Institution				√	√	√				
Project Company		√	√	√		√	√	√		
Banks				√	√					
Customers							√			

Explanation: A: Location Risk, B: Construction design risk and operational test, C: Sponsor Risk, D: Financial Risk, E: Operational Risk, F: Revenue Risk, G: Connectivity Risk, H: Interface Risk, I: Political Risk, J: Force Majeure.

According to the potential risks related to stakeholders, most are associated with financial risk. Financial feasibility is key to optimal services. The stakeholders that could potentially cause feasibility risks are as follows:

1. The Ministry of Finance (MOF) provides feasibility support in the form of a VGF. The lack of VGF provided for the project could potentially affect its feasibility. However, based on the three non-regional PPP water supply projects, the project company bids with a VGF lower than the financial risk set by the MOF. Thus, the financial risk associated with the MOF has a very low chance of occurrence.
2. The Head of Municipality has the authority to increase or not increase its water tariffs. In the availability payment scheme and project operation, considering the customer's availability to pay, the tariff set can be staged from one or every two years. A delay in tariff staging can decrease the feasibility of the project.
3. The Local Parliament, as part of the municipality, could give insight into whether to increase or not increase the tariff.
4. Related agencies in the municipality. In all three non-regional PPP water projects, there was physical support from the municipalities carried out by the related agencies. The latency of physical support could shift the project timeline or interface risk, which could affect the project feasibility.
5. Guarantee institutions with a mandate for government guarantees on the PPP Scheme could increase bankability and ensure the sustainability of the project during breach of contract. Therefore, if there is no government guarantee, this can influence the financial aspect. In three of the non-regional water supply projects, the guarantee works well; thus, it can acquire bank loans with low risk associated with guaranteed institution/BUPI.
6. Project companies play vital roles as operators and investors. Operational failures, such as ineffective operations, can affect financial feasibility.
7. Banks play a vital role in funding issuance. In all three non-regional water projects, the loan portion encompasses 70–80% of the initial investment. Failure to acquire a loan or to gain interest could potentially cause financial risk.

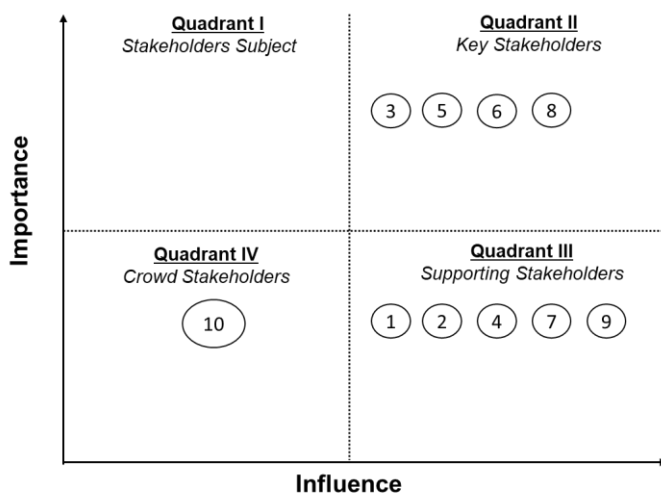
Moreover, for stakeholders that could trigger the most risk associated are municipalities with seven risks, MWC with seven risks, and project companies with six risks. These three stakeholders play a vital role in ensuring project sustainability.

### Risk Based Stakeholders Analysis

The stakeholder’s analysis is based on its authorities, support and the risks associated with the stakeholders that are then divided into four categories, those are: subject stakeholders, key stakeholders, supporting stakeholders, crowd stakeholders. The stakeholder analysis results are shown in Table 2 and Figure 3.

**Table 2.** Risk based stakeholder analysis.

No	Stakeholders	Importance (risk associated with stakeholders)	Influence (have authorities and support)			Stakeholder’s category
			Authorities	Support	Influence	
1	Ministry of Public Works	Low	Yes	Yes	High	Supporting stakeholders
2	Ministry of Finance	Low	Yes	Yes	High	Supporting stakeholders
3	Municipalities	High	Yes	Yes	High	Key stakeholders
4	Local Parliament	Low	Yes	Yes	High	Supporting stakeholders
5	Related Agencies	High	Yes	Yes	High	Key Stakeholders
6	MWC	High	Yes	Yes	High	Key Stakeholders
7	BUPI/Guarantee Institution	Low	Yes	Yes	High	Supporting stakeholders
8	Project Company	High	Yes	Yes	High	Key Stakeholders
9	Banks	Low	Yes	No	Medium	Supporting stakeholders
10	Customers	Low	No	No	Low	Crowd stakeholders



**Figure 3.** Stakeholders mapping of non-regional water supply project.

According to the mapping results, there are four key stakeholders for project sustainability: The Head of Municipalities, related agencies, municipal water companies, and project companies. The late decision making or action of the four stakeholders has the potential to disrupt sustainability and project operations. The four stakeholders are municipalities, related agencies, MWC, and project companies that need to collaborate to mitigate all potential risks associated with non-regional water supply projects. Other key stakeholders with vital roles include the Ministry of Public Works, Ministry of Finance, Local Parliament, and the Guarantee Institution. Water provision is a basic need and has limitations related to customer availability. Thus, physical support from related ministries was implemented in three operational projects. Fiscal support from the Ministry of Finance and Guarantee Institution can bring significant benefits in terms of feasibility and investor appeal.

## Conclusions

In relation to stakeholders related to the risk management of non-regional water supply projects, commitment is required for each stakeholder. With the relevant commitment, all risks can be mitigated, and four key stakeholders and five supporting stakeholders play an important role in the management of non-regional water supply projects. Risk mitigation for risks originating from each stakeholder must be carried out at each PPP stage, such as the planning, preparation, construction, and operation stages. There needs to be a risk-monitoring forum that involves all stakeholders involved so that an early warning system for risks can be identified. Thus, it is hoped that access to drinking water will increase.

## Author Contributions

Yuki M.A Wardhana as author is fully handling the whole article.

## Conflicts of Interest

I declare no conflict of interest in my research.

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