

Policy Direction in Controlling Rice Field Conversion by Interpretive Structural Modeling (Ism) Approach in Bali Province of Indonesia

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ABSTRACT

Rice field conversion is one of the major constraints in implementing sustainable agriculture in the Province of Bali. This paper aims to formulate policy direction in controlling rice field conversion in the province. This aim is achieved by using Interpretive Structural Modeling (ISM) analysis method on 14 constraints of policy formulation. The ISM result suggests five main constraints that are prioritized to be solved immediately, namely (a) types and definition of incentives for farmers, (b) consistency in implementing Spatial and Regional Plan Regulation (RTRW), (c) productivity disparity, (d) population growth, and (e) water conflict between irrigation system (subak) and PDAM. Policy alternatives include ease in regulation for agricultural input procurement, agricultural output subsidy, price stability intervention, agricultural machinery and equipment assistance, favoring local products, development of agricultural technology, enforcement of Land for Sustainable Agriculture and Food (LP2B), RTRW, and water conflict laws and regulations. This study recommends several policy implications, namely, (1) involvement of subak and customary villages in formulating RTRW regulation; (2) revitalization of subak regulation; (3) development of incentive and disincentive mechanism; (4) management of existing rice fields; (5) implementation of LEISA concept; (6) assessment of interisland horticulture supply need; (7) formulation LP2B law at regency level; (8) formation of civil servant investigator institution at regional level to improve law enforcement for rice field conversion prevention.

Keyword: *Dynamic, land use change, policy, rice field*

INTRODUCTION

The Province of Bali is facing constraints toward realizing sustainable agriculture. Tourism infrastructure development and population growth have caused changes in rice field functions in the island. Agricultural land use change happened because of increases in housing and residential areas demand, tourism accommodation, infrastructure development, and so on.

In 15 year between 2002-2016, as many as 6,251 hectares of rice fields have been converted into non-rice field agricultural land or areas for non-agricultural purposes. It is recorded that lands for rice cultivations have shrunk about 496 hectares in 2015, 625 hectares in 2016, and 900 hectares in 2017 (Bali Post, 2018). The decrease of rice cultivation areas in Bali has caused a decline in rice production. BPS Bali (2020) suggests rice production (GKG) in the

province in 2019 was 579.321 tons. That number is 10,9% lower than rice production in 2018, which was 650.245 tons.

Land use change is a major constraint in realizing sustainable agriculture in Bali. Furthermore, land quality potentially deteriorates each year due to excessive usage of inorganic agricultural inputs. Water scarcity due to global warming and water demand from tourism and housing sectors add the constraints in implementing sustainable agriculture in Bali. All of that background information gives an overall illustration how the sustainability of agricultural land, especially lands for rice agriculture is difficult to maintain.

Sustainable agriculture development is part of sustainable development commitment that has been introduced in 1980 in World Conservation Strategy report by United Nations Environment Programme. There are three dimensions in sustainable agriculture concept. Economic dimension is related with efforts in maximizing economic need fulfillment for today's generation and future generation. Social dimension could be seen from the need of social life that is harmonious and could be assessed from poverty alleviation, income distribution, socio-political participation, and socio-cultural stability. Ecological dimension in sustainable agriculture could be viewed from the preservation of biodiversity and biological carrying capacity, land resources, water, and agroclimate, as well as environmental health and comfortability. All three dimensions must be considered in balance because they influence each other (Rivai dan Anugrah, 2011).

Wahyunto and Shofiyati (2008) specifically suggest, from ecological dimension, efforts toward sustainable agricultural condition in Indonesia could not be separated from land resources management, because land resources are factors that influence agricultural production. Conditions of agricultural land use change need to be understood before policies on agricultural land protection are formulated.

The central government has ratified several policies in realizing sustainable agricultural land, namely Law No. 41/2009 on Land for Sustainable Agriculture and Food, Government Regulation (PP) No. 1/2011 on Stipulation and Transfer of Sustainable Agricultural Land, Presidential Regulation No. 59/2019 concerning Control on Rice Fields Conversion, Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the Indonesian National Land Agency (Permen/Perkaban) No. 19/2016 on Stipulation of Sustainable Food and Agricultural Land in Areas without Regional Spatial Plan.

Bali Provincial Government has issued regulations on spatial plan with Regional Law 16/2009 on Bali Province Regional Spatial Plan 2009-2029. Regulations at regency level on protection of sustainable food and agricultural land is realized through a spatial plan in each regency. Regulations that particularly oversee protection of LP2B has not been passed in the form of specific regional laws in each regency in Bali, except in Jembrana Regency through Regional Law No.5/2015 on Protection of Sustainable Food and Agricultural Land.

Hardjowigeno *et al.* (2004) defines rice field as land that is allocated to plant rice continuously throughout the year or alternately with second crop. Between 2005 and 2016, 4.685 ha of rice fields have been converted with an average of 512,2 ha of rice fields were converted each year. The total area of rice fields in Bali in 2011 was 80.164 ha, in 2012 was 79.399 ha, in 2013 was 78.425 ha, in 2014 was 76.665 ha, in 2015 was 75.922 ha, and in 2016 was 79.526 ha (BPS Indonesia, 2018a).

BPS Bali (2016) suggests almost all regency/city experience decline in total area of rice field when the total rice field area in 2002 and 2016 are compared. Tabanan is the regency that experienced decline the most and followed by Jembrana, Gianyar, Buleleng, and Badung. The reduction of total rice area was about 496 ha in 2015, 625 ha in 2016, and 900 ha in 2017 (Bali Post, 2018). Those data suggest rice field conversion has become a major threat because almost 1000 ha of rice fields had been converted in a year.

Interpretive Structural Modeling (ISM) is a systematic application that can be utilized to explain conceptual relationships between elements. ISM can define problems and relationships, evaluate impacts, and identify relationships between policy sectors (Darmawan, 2017). Darmawan (2017) also suggests that analysts will be helped in developing the concept of strategic planning if they master the ISM method.

More studies on challenges in controlling rice field conversion, which focus on policy direction in controlling rice field conversion in Bali are needed.

RESEARCH METHODS

The purpose of this study is the formulation of policies to control the conversion of rice fields in Bali Province with constraints as the variables. The location selection was done purposively because Bali has experienced massive rice fields conversion of 2,218 ha between 2011-2016 (BPS Bali, 2017), and the area of rice fields in Bali has shown the tendency to continue to decline so that many doubt its sustainability. The duration of this research is six months, starting from January 2019 to June 2019.

Primary data includes the identification of needs and problems faced by stakeholders who aim to preserve the sustainability of rice fields in the Province of Bali. Secondary data is obtained from relevant agencies, including the Central Statistics Agency (BPS) of Indonesia and the Province of Bali, the Regional Revenue Agency (Bappeda), the Department of Tourism, the Department of Public Works for spatial planning and the irrigation department, the Office of Agriculture and Food Security of the Province of Bali, and other related agencies. Data collection techniques used in this study are interviews, documentation, and observation. The instruments in this study include questionnaires, cameras and laptop.

The variables of this study are (1) Types and definitions of incentives for farmers, (2) Consistency in implementing RTRW regulations, (3) Disparity in productivity, (4) Scarcity of water resources, (5) Availability of infrastructure for water supply, (6) Land ownership, (7) Population growth, (8) Conflicts of water interests between *subak* and PDAM, (9) Regional regulations on cropping patterns, (10) LP2B incentive funds, (11) High tax costs, (12) Lack of farmer-owned land, (13) Idealism and commitment of farmers, and (14) Government's subsidy budget.

ISM will be used as a method for policy direction that will be made. ISM analysis explains the conceptual relationship between elements. The steps in ISM modelling are: (1) Identifying the elements that are relevant to the problem; (2) Establishing contextual relationships between elements on element pairs that will be examined; (3) Developing Structural Self-Interaction Matrix (SSIM) of elements; (4) Developing the Reachability Matrix of SSIM; (5) Partitioning the Reachability Matrix Partition on different level; (6) Convert the Reachability Matrix into conical form; (7) Drawing digraph based on

relationships in the Reachability Matrix and removing transitive links; (8) Converting the resulting digraph into an ISM based model by replacing element nodes with statements; (9) Review the model to examine conceptual inconsistencies and make necessary modifications (Darmawan, 2017).

RESULT AND DISCUSSION

Result of Constraint System Structure Analysis

Constraints are factors or circumstances that limit, hinder, or prevent the achievement of goals, and therefore need to be identified in order to effectively achieve targets. Based on the results of the expert meeting (agricultural experts and practitioners) in discussing the control of rice fields conversion in the Province of Bali, 14 main constraints were identified.

The results of the Interpretative Structural Modeling analysis produce a classification and mechanism of relationships between factors (hierarchical) which can be seen in the system structure model Figure 1. The distribution of the overall ordination of the constraint factors is divided into independent, linkage and dependent quadrants based on the Power-Dependence Matrix Driver which is presented in Figure 1.

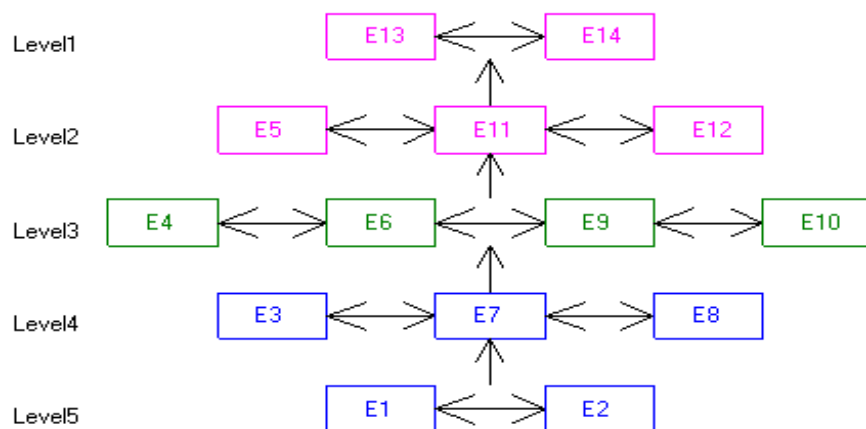


Fig 1. Diagram of the constraint system structure model for controlling rice field conversion in Bali Province

The results of the analysis of the system structure show that the type and definition of incentives for farmers factor (E1), the consistency of the implementation of the RTRW regulation factor (E2), the productivity disparity factor (E3), the population growth factor (E7), and the water conflicts between *subak* and PDAM factor (E8) are in an independent quadrant that are key element in controlling the conversion of rice fields in the Province of Bali. Furthermore, the scarcity of water resources factor (E4), land ownership (E6), regulations on cropping patterns (E9) and LP2B incentive funds (E10) are in the linkage sector (strong driver/strongly dependent variable). This factor is a supporter of land use change, therefore it must be carefully studied because the relationship between factors is unstable.

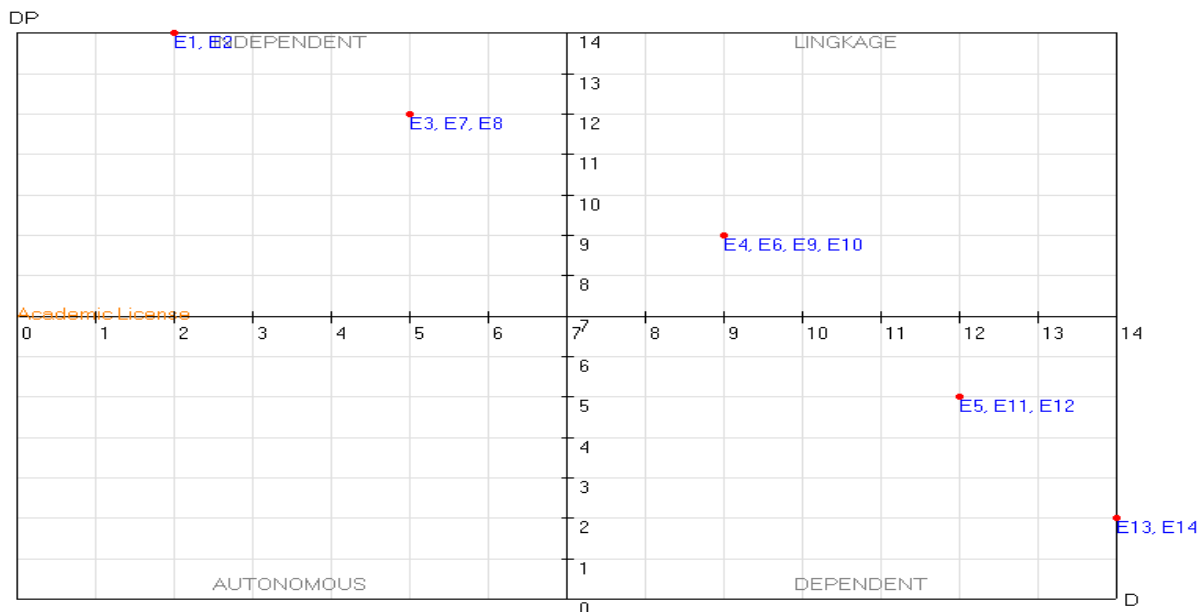


Fig 2. Matrix driver-power dependence of constraints in controlling rice fields conversion in Bali Province

Analysis of the system structure also shows that there are factors that fall into the dependent sector group, namely: the availability of infrastructure for water supply (E5), high tax costs (E11), lack of farmer-owned land (E12), idealism and commitment of farmers (E13), and government subsidy budget (E14). These factors are affected factors which in turn will also play a role in controlling land use change.

Discussion on Constraints System Structure Analysis

Law in development is one of the facilities that must be able to encourage the process of modernization (Kusumaatmadja, 2002). Development is essentially a process of humanizing humans, but in practice faces a number of challenges that are multidimensional and complex. For the Bali Province, with its geographical, resource potential, and cultural aspects, carrying out development while still preserving the Balinese culture has not been easy. With regard to this matter, several laws has been made and amended, such as Law Number 9/2015 on Second Amendment of Law Number 23/2014 concerning Regional Government. One of the objectives that is hoped to be achieved in the implementation of regional autonomy is to bring regional independence, therefore increasing Regional Original Revenue (PAD) has become one fiscal instrument that must be improved.

Based on the achievement of these objectives, the regional government through Law Number 28/2009 concerning Regional Taxes and Regional Levies is given authority to determine regional taxes and levies, the results of the management of separated regional assets, discretion to determine tariffs in accordance with their capabilities and other legitimate sources. Local governments must continue to pay attention to the principles of democracy, equity and justice, involving community participation and accountability by taking into account regional potentials. The source of PAD to improve the standard of living and quality of the community of Bali so far also comes from the tourism sector. The development of the tourism industry that was built by utilizing natural and cultural resources including utilizing

the nuances of agriculture in rural areas actually resulted in the conversion of rice fields (agriculture) to non-agricultural purposes.

Looking at these conditions, the role of law enforcement is very important. Regional Regulation Number 16/2009 on Bali Province Spatial Plan of 2009-2029 (Regional Regulation of Bali Province RTRW) already includes the amount of PAD on rice fields in the province's green belt. The law already stipulates calculations of the amount of PAD received from rice fields and attempts to increase PAD in other sectors, so that PAD outside the green belt tends to be higher and has a trend that is always increasing every year. The implementation of this stipulation needs to be monitored because if there are government officials who are too obsessed with increasing PAD, loopholes in legal instruments may be used to allow rice field conversion. The government could be said being ambivalent between increasing PAD and preserving rice fields. This condition is in accordance with the study conducted by Widhiantini (2016) which suggests that there are several causes that ease land conversion, namely contradictory policies between policies that seek to suppress land conversion with policies that encourage land conversion.

Although the protection of agricultural land has been regulated in Law Number 41/2009 concerning LP2B Protection and a number of derivative regulations, in its implementation it still faces obstacles. In substance, the legal juridical regulations at the regional level have not been formed in a positive regulation in the form of regional regulations regarding allocation policy LP2B, in this case the allocation of permanent rice fields. Likewise, in terms of legal structure or legal apparatus organs, there is no policy from the local government of Bali to be formed. The provisions of article 71 of the PLP2B Law provide a legal umbrella for the establishment of a legal organ of the Civil Servant Investigator (PPNS) within the scope of duties and responsibilities in the field of sustainable food and agricultural land protection, but to date the formation of PPNS at the regional level has not yet been established. Law Number 1/2009 concerning PLP2B that is complemented by local government regulations in implementation has not been effective as seen from the shifting of functions of agricultural land that continues to occur and is increasingly out of control. The economic incentives contained in the regulation are still at the normative level, making it relatively difficult to implement in the field.

The control of rice field conversion in the Province of Bali will be effective if the government protects rice fields through the adoption of a policy regulating the increase of permanent rice field allocation by 20% from Business as Usual (BAU) in a formal regulation at the level of regional regulation (Perda). Rice field protection can also maintain and increase agricultural production, support programs for food sufficiency, security and sovereignty, protect and empower farmers and communities around agricultural land and maintain ecosystems. This is in accordance with Law Number 41/2009.

According to Firmansyah (2016) the application of government LP2B based on farmer empowerment could optimally protect the existence of rice fields despite some obstacles. The constraints include land use for government interests, community needs in economic fulfillment, depreciation of ownership due to inheritance systems, agriculture may be less promising economically, government support in long-term orientation, lack of farmers' understanding of the LP2B area, and the lack of sense of rice field ownership among farmers.

One of the fundamental mandates of Law Number 41/2009 is that LP2B should be integrated in the Spatial and Regional Plan Regulation (RTRW) and/or Provincial and Regency/City Spatial Plan (RDTR) Plans. Dissemination of Law Number 41/2009 and its derivatives to relevant stakeholders at the Central and Regional levels, to all relevant agencies, including the Agricultural Scope Department, Spatial Planning Department, Regional Land Department and Land Department.

Discussion on Policy Implication

Previous sections explained that factors that are in the independent quadrant have a major influence on other factors, while factors that are in the dependent and linkage quadrants are strongly influenced by factors that are in the independent quadrant. Management of obstacles for effective control of rice field conversion can be made in stages. Main short-term management is prioritized on solving all independent factors.

Alternative policies that can be taken from this research are the protection and empowerment of farmers, namely; simplification of regulation of agricultural inputs procurement, subsidy of agricultural outputs, intervention for maintaining price stability, assistance for agricultural machinery and equipment, favoring local agricultural products, protection against the invasion of imported agricultural products, development of agricultural technology, enforcement of LP2B and RTRW regulations, as well as resolution of water conflict between irrigation and drinking water, improvement of rice production technology and development of other agricultural food commodities that have high economic value, and finally to continuation and implementation of family planning programs.

Farmer empowerment is directed at efforts to increase creativity and technological innovation, for example by implementing blue economy which is a development of green economy (Pauli 2010 in Firmansyah, 2016). Investment can also be a driver of GDP growth in the agricultural sector. Increased investment from the government and the private sector will create conditions that is conducive to the agricultural sector. *Subak* institutions also need to revitalize themselves to become institutions that also function as a business development entity that has legal entities and develop *subak* regulations related to rice fields conversion, and has a role in spatial planning and regional development. Based on the description, the efforts that can be formulated as a policy to overcome the constraints that exist in the key elements (quadrant independent) in controlling the agricultural land use change include:

- a. Type and definitions of incentives for farmers factor (E1): Farmers whose land is included in the LP2B protected area are given incentives by providing input assistance such as subsidized fertilizer and seeds, agricultural machinery, ease of financing for People's Business Credit (KUR) in the form of KUR interest subsidies, and exempting the cost of issuing land rights certificates on LP2B land.
- b. Consistency of RTRW regulation implementation factor (E2): Establishment of an investigative institution within the scope of civil servants at the regional level whose duties and responsibilities are in the field of LP2B protection in order to minimize the gap between implementation in the field (*das sein*) and the regulations that must be applied (*das sollen*).
- c. Productivity disparity factor (E3): The productivity gap between the agricultural and non-agricultural sectors needs to be addressed by optimizing the Seven Farming

Management program. It is necessary to expand new agricultural land in the LP2B area, such as clearing forests or shrubs or revitalizing non-productive paddy fields to become productive again. The next step is agricultural diversification.

- d. Population growth factor (E7): Controlling the migration rate needs to be considered by the local government through the efforts to establish and supervise regulations on population issues.
- e. Water conflict between *Subak* and PDAM factor (E8): Water conflicts between *subaks* and PDAMs are generally caused by a lack of attention from local or district governments in preserving catchment areas and fairness in natural resource management. This often happens between farmers and PDAMs and tourism accommodation investors. Effort that can be made to overcome the problem is to reinforce the implementation of existing legal regulations in all stages of preparation, implementation and supervision of water resources management patterns. For the community, internal cooperation of *subak* needs to be improved through the role of *Subak Agung pekaseh* that has a control function of monitoring irrigation and has the authority to regulate water distribution along watersheds (DAS).

Regional governments in overcoming problems of land use change are expected to issue regional regulations at the level of regents/mayors. Local governments must have the same commitment to maintain their rice fields. One good example is the Regional Government of Jembrana Regency which has issued Perda (Regional Regulation) No. 5 of 2015 concerning Protection of LP2B. The discussion and handling of agricultural land use change problems will only be effective if there is a legal umbrella that is legally strict and has the power to force implementation.

Soerjono Soekanto (2011) suggest 5 (five) factors of legal effectiveness, namely: 1) The legal factors themselves, 2) Law enforcement factors, 3) Factors of facilities and facilities that support law enforcement; 4) Community factors, 5) Cultural factors. Based on the description above, the component of the legal aspect also has a very important role, because the law regulates the synergy of economic, social and environmental aspects. Law enforcement related to the increase in the conversion of agricultural land is not only repressive, but also preventive. Preventive law enforcement against the utilization of the Bali Province RTRW can be done by preventing various policies that can be utilized to permit rice field conversion. Repressive law enforcement must be taken firmly to anyone who violates the LP2B Law and in using the RTRW of the Province of Bali.

Compliance with law in Indonesia depends on how much legal awareness the society have. One of many factors that affects law enforcement in the matter of land use change is related to legal structure. This happens because there is a lack of coordination and consolidation between related institutions/agencies in carrying out policies to control the conversion of agricultural land to non-agricultural land, so that institutions related to investigating violations of regulations need to be formed in each region. In addition, there is a lack of understanding among law enforcers in the agrarian sector regarding Article 33 paragraph 3 of the 1945 Constitution *Juncto* Article 2 of the Agrarian Main Laws, which emphasizes that all natural resources in Indonesia whether on land, water and space must be used as much as possible for the prosperity of the people. Lack of understanding of these rules causes the government or law enforcement officers in the field of agrarian easily give permission to

convert agricultural land under the pretext of increasing PAD for the interests of few people without considering the sustainability of agricultural land. This illustrates that the position of law enforcement is very vital in the implementation of rule of law.

CONCLUSION AND RECOMMENDATION

The policy to control rice field conversion includes the protection and empowerment of farmers, namely facilitating the regulation of procurement of agricultural inputs, continuing efforts to intervene price stability, provision of agricultural assistance, favoring local agricultural products, protecting against the invasion of imported agricultural products, protecting from price declines of agricultural products due to unfair trade (unfair market), development of agricultural product technology, enforcing laws on RTRW and LP2B, conflict resolution between irrigation and drinking water, improving rice production technology and facilitating the development of other agricultural food commodities that have high economic value, and continue implementing family planning programs.

Other policy suggestions and implications that must be implemented in an integrated manner include: (1) The formulation of regional regulations governing spatial planning and regional development should involve *subak* institutions and customary villages integrally; (2) The government needs to encourage revitalization of *subak* regulations related to the conversion and selling of rice fields that have received approval from the village's *Pekaseh* and *Bendesa* of customary villages; (3) Incentive mechanisms are given to *subak* and *pakraman* (customary) institutions and community-based tourism that maintain agricultural land. A disincentive mechanism is applied to tourism investments that are not supportive toward sustainable agricultural land; (4) The government needs to encourage a more intensive management of existing rice fields in an effort to maximize land utilization and increase farmers' income; (5) The government needs to encourage the integration of rice agriculture with livestock and fisheries in a sustainable manner with low external input (LEISA concept); (6) The Regency Government in the Province of Bali needs to form a Regional Regulation related to LP2B Protection as a preventive measure so that agricultural land conversion could be decreased, which in turn will secure national food supply; (7) As a repressive effort, Local Governments need to establish Civil Servant Investigators (PPNS) within government agencies which scope of duties and responsibilities are on LP2B Protection; (8) The government needs to identify horticultural commodity supply needs between islands because current horticultural commodity supplies imported from outside Bali is still high.

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Conflict of Interest Declaration

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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