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Cost Observation in Natural Monopoly Settings: The Relevance of Jean-Jacques Laffont and Jean Tirole's Thoughts in The Regulation of Natural Monopoly Companies

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Abstract:

Government intervention is necessary to protect consumer interests and prevent companies in monopoly markets from exploiting consumers by setting high prices. Regulations such as business competition laws and price regulations can be implemented to prevent monopoly markets from exploiting consumers. However, implementing price regulation in natural monopolies is challenging due to challenges such as determining accurate marginal costs, monitoring and enforcing regulations, and ensuring compliance by monopolists. Thus, effective regulation must be holistic, covering aspects of price, service quality, and innovation incentives, and supported by strong transparency and accountability mechanisms to ensure compliance and protect overall consumer interests. The study concludes that there is a need for regulation in monopoly markets, particularly in sectors like water utilities, electricity, and rail transportation where high fixed costs and large economies of scale make one firm more efficient than several competing firms. The government plays a crucial role in implementing regulations to protect consumers and ensure market efficiency. Further research is needed to test the effectiveness of incentive and fine mechanisms in other sectors, develop econometric models to measure monopoly efficiency and conduct international policy evaluations. By combining theoretical and empirical approaches, the proposed policies can improve efficiency, consumer welfare, fiscal sustainability, and better management of public resources.

Keywords: *Cost Observation, Natural Monopoly, Government Regulations.*

1. Introduction

Under ideal conditions, in a market there will be more than one company in the market. If there is more than one company, there will be tight competition in the market, considering that each company wants to maximize its profits so that each company competes with each other to win profits in the market. As a result, every company will try to provide products with the best quality and lowest prices for consumers, because only these companies can obtain maximum profits in the market. This kind of market is in line with consumers' interests, considering that in this market consumers can obtain products with the best quality and lowest prices (The Royal Swedish Academy of Sciences, 2014). However, in reality, in a market there may only be one company in that market. This condition is known as a monopoly market. A

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monopoly market is not seen as an ideal condition, because this market is not by consumer interests. This is because in a monopoly market companies can set high prices to consumers, considering that there is no competition in the market so companies are not encouraged to lower their prices. Consumers cannot switch to using another company's products, so consumers must follow the prices set by that company (Mankiw, 2011). As a result, monopoly markets only benefit the interests of companies, but harm the interests of consumers. One of the causes of monopoly markets is that in certain markets, one company can provide a product to consumers at a lower cost than if two or more companies were providing the product. This is because in this market, as the number of companies increases, each company will produce less and less at higher costs. Therefore, it is actually more efficient if there is only one company serving the market. This condition is known as a natural monopoly (Mankiw, 2011). Examples of natural monopoly markets are the tap water, railway, and electricity network markets (The Royal Swedish Academy of Sciences, 2014).

2. Theoretical Background

Natural Monopoly

An industry is considered a natural monopoly when a solitary company can provide an item or service to an entire market at a more economical price than the combined costs of several enterprises. A natural monopoly occurs when there are cost advantages due to economies of scale within the applicable range of production. In this scenario, a solitary company can manufacture any quantity of goods or services at the lowest possible expense. In other words, when there are more businesses producing a certain quantity of output, each individual firm produces less production and incurs greater average total cost. A prime illustration of a natural monopoly is the dispensation of water. To supply water to the inhabitants of a municipality, a company is required to construct an extensive system of pipelines that spans the whole town. If many businesses were to engage in competition to provide this service, each firm would be required to bear the fixed cost associated with constructing a network. Therefore, the lowest average total cost of water may be achieved when a single corporation monopolizes the whole market. Additional instances of natural monopolies were seen during our examination of public goods and common resources. An example is a bridge that is used so rarely that it never experiences congestion. The bridge is considered excludable due to the ability of a toll collector to restrict access to it. The bridge does not have rivalrous consumption as the utilization of the bridge by one individual does not reduce the capacity for others to use it. Due to the presence of a constant cost for constructing the bridge and a minimal increase in cost for each new user, the average total cost of a journey across the bridge (calculated by dividing the total cost by the number of trips) decreases as the number of trips increases. Therefore, the bridge is inherently a monopoly. When a company operates as a natural monopoly, it is less worried about new competitors diminishing its monopolistic control. Typically, a company faces difficulties in sustaining a monopoly without possessing a crucial resource or receiving government protection. The monopolist's profitability entices more participants to enter the market, hence increasing competition in the market. In contrast, it is unappealing to enter a market where

another company has a natural monopoly. Prospective participants are aware that they are unable to attain the same level of cost efficiency as the monopolist, as each new business would have a reduced market share upon arrival. The size of the market can be a determining factor in identifying whether a sector qualifies as a natural monopoly in certain instances. Once again, let's contemplate a bridge over a river. If the population is limited in size, the bridge might potentially function as a natural monopoly. One bridge can meet the total demand for crossing the river at the lowest possible cost. However, when the population increases and the bridge gets overcrowded, meeting the whole demand may necessitate the construction of two or more bridges over the same river. Therefore, when a market grows, a natural monopoly has the potential to transform into a more competitive market (Mankiw, 2011).

3. Methodology

This study employs a qualitative descriptive research methodology. The objective of this study is to provide a descriptive account of phenomena without relying on theories. The objective of this research is to provide a detailed account of the natural monopoly and regulation of natural monopoly companies. The descriptive approach allows for a detailed description and a more thorough examination of phenomena that cannot be adequately stated using quantitative methods. This research use case studies as it presents empirical concerns pertaining to a specific situation. The primary objective of this is to provide a more concentrated analysis of the subject matter and effectively elucidate the many entities associated with the research. This study utilized secondary data in the form of literature related to the natural monopoly. The data obtained from literature studies were examined using qualitative methodologies. In this instance, the data acquired from the study's findings are organized and chosen, and subsequently linked to the topic under investigation, in order to address the problem's formulation. The data was gathered through meticulous observation, which involved analyzing various papers and records. This qualitative study employs an inductive approach, specifically utilizing a mindset and methodology that begins with individual symptoms and facts and gradually draws conclusions based on them. These conclusions may then be generalized into broader provisions (Sekaran & Bougie, 2016; Yin, 2016).

4. Empirical Findings/Result and Discussion

General Views On Natural Monopoly

Under ideal conditions, in a market, there will be more than one company in the market. If there is more than one company, there will be tight competition in the market, considering that each company wants to maximize its profits so that each company competes with each other to win profits in the market. As a result, every company will try to provide products with the best quality and lowest prices for consumers, because only these companies can obtain maximum profits in the market. This kind of market is in line with consumers' interests, considering that in this market consumers can obtain products with the best quality and lowest prices (The Royal Swedish Academy of Sciences, 2014). However, in reality, in a market there may only

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Natural Monopoly Analysis

Natural monopolies arise because of large economies of scale, where one company can provide goods or services at lower costs than if there were many competing companies. This condition occurs because high fixed costs, such as infrastructure or initial investment, can be spread among more units of output, reducing the average cost per unit. In sectors such as piped water, railways, and electricity networks, these fixed costs are so large that competition will lead to expensive and inefficient duplication of infrastructure. Thus, natural monopolies are not only inevitable but can also be desirable from a cost-efficiency perspective (Stiglitz & Rosengard, 2015). However, although natural monopolies can be more cost-efficient, they still present problems in terms of price and service quality. Without competition, a monopolist has no incentive to lower prices or improve service quality. This could lead to higher prices and inadequate service for consumers. Therefore, regulation is important to ensure that natural monopolies do not abuse their dominant position (Shapiro, 1989).

Government Intervention in Natural Monopolies

Considering that monopoly markets are not by consumer interests, government intervention through regulations is needed to protect consumer interests and prevent companies in monopoly markets from exploiting consumers by setting prices as high as possible. Several regulations that can be implemented include business competition law (antitrust law) and price regulations (Mankiw, 2011). In business competition law, the formation of monopoly markets is attempted to be prevented by preventing a company's efforts to dominate the market and become a monopolist. Business competition law must ensure that there is no dominant company in a market. If there is a dominant company, the company must be split into smaller companies. Companies also may not increase their dominance in the market by carrying out acquisitions or mergers with their competitors. As a result, with the existence of business competition law, there will be no one company that is very dominant in the market, thus the formation of a monopoly market can be prevented (Olsen, 2017). In the case of natural monopoly, considering that monopoly cannot be prevented, the government still allows monopoly in the market. However, the government prevents

monopoly companies from setting prices as high as possible through price regulations. In price regulation, the price of a monopoly company's product is not determined by the company but is determined by the government. This aims to prevent monopoly companies from setting prices as high as possible to the detriment of consumers. Ideally, the government determines the price of a monopoly company's product based on its marginal cost, where the product price is the same as the monopoly company's marginal cost. By determining prices using this method, consumer surplus will be protected and monopoly markets will become efficient (Mankiw, 2011).

Implementation and Regulatory Challenges

Implementing price regulation in natural monopolies is not without challenges. One of the main challenges is determining accurate marginal costs, because monopolists may have incentives to hide information or change their cost reports to gain higher profits. In addition, monitoring and enforcing regulations requires significant government resources, which are often limited. Therefore, price regulation must be accompanied by strong transparency and accountability mechanisms to ensure compliance by monopolists (Baumol & Blinder, 2011). Additionally, in some cases, price regulation may not be sufficient to prevent abuse of monopoly power. For example, monopolists may reduce service quality or delay innovation as a way to reduce costs and increase their profit margins. Therefore, price regulation must be complemented by service quality regulation and incentives for innovation, ensuring that monopolists continue to provide the best value for consumers (Carlton & Perloff, 1999). Thus, although natural monopolies can provide cost-efficiency benefits, government intervention is still necessary to protect consumer interests and prevent abuse of monopoly power. Effective regulation must be holistic, covering aspects of price, service quality, and innovation incentives, and supported by strong transparency and accountability mechanisms to ensure compliance and protect overall consumer interests.

Use Of Cost Observation In Natural Monopoly Company Settings

Determining the price of a monopolist's product based on the monopolist's marginal cost raises several problems, namely:

1. Decreased Average Total Cost: The average total cost of a monopoly company generally tends to decrease, so that the marginal cost of a monopoly company will be smaller than its average total cost. As a result, if the price of a monopolist's product is determined based on marginal cost, then the monopolist will lose money because the product price will not cover the average total costs borne by the monopolist. Therefore, in order not to suffer losses, the government must provide subsidies to the monopoly company, where the difference between average total cost and marginal cost is covered through subsidies (this scheme is also known as cost reimbursement) (Mankiw, 2011; The Royal Swedish Academy of Sciences, 2014). This scheme increases the government's fiscal burden and ultimately harms the public as taxpayers. In addition, this scheme creates long-term fiscal sustainability problems due to the ever-increasing subsidy burden.

2. Wrong Incentives for Efficiency: In a cost reimbursement scheme, monopolistic companies tend not to increase their efficiency and reduce their production costs. This is because if a monopoly company increases its efficiency and reduces production costs, then marginal costs will decrease and the price of the monopoly company's products will also decrease. As a result, increasing efficiency and reducing production costs will reduce the monopoly company's income, so that the monopoly company has no incentive to produce more efficiently (Mankiw, 2011). Apart from that, the use of a cost reimbursement scheme for monopoly companies also makes monopoly companies reluctant to produce more efficiently, because even though monopoly companies are not efficient in producing, their losses will still be covered by subsidies from the government. As a result, subsidies for monopoly companies often swell due to increasing losses experienced by monopoly companies, which ultimately increases the fiscal burden for the government and harms the public as taxpayers. This also results in a distortion of resource allocation, where funds that could have been allocated to other, more productive sectors are instead used to cover the inefficiencies of monopoly companies.

3. Government's Inability to Measure Efficiency: Although a monopolist can increase its efficiency, the government cannot force a monopolist to increase its efficiency. This is because the government can only know the output and costs of a monopoly company, but the government cannot know the monopoly company's ability to achieve efficiency and to what extent the monopoly company can achieve this efficiency (Laffont & Tirole, 1986). As a result, the government cannot encourage monopoly companies to increase their efficiency, because the government does not know whether monopoly companies can actually increase their efficiency or not. This inability is caused by asymmetric information, where the monopoly company has more complete information about production costs and potential efficiency than the government. Two French economists, namely Jean-Jacques Laffont and Jean Tirole (winner of the Nobel Prize in economics in 2014), realized that there were several problems caused by determining the price of a monopoly company's product based on its marginal cost. Therefore, in 1986 these two economists wrote an article entitled "Using Cost Observation to Regulate Firms", and thanks to this article (along with several other articles regarding market regulation), Jean Tirole won the Nobel Prize in economics in 2014. The contributions to the article "Using Cost Observation to Regulate Firms" on solving price regulation problems for natural monopoly companies are:

1. Incentives for Efficiency through Cost Monitoring: The problem of the government's inability to know the monopoly company's ability to carry out efficiency and the extent to which the monopoly company can achieve this efficiency can be overcome by the government asking the monopoly company to disclose the amount of its output and its efficiency characteristics. Then the government promises to provide incentives to monopoly companies with the following formula:

$t(\beta, C) = s^*(\beta) + K^*(\beta)[C^*(\beta) - C]$,

Where:

t = the amount of incentives given to the monopolist

β = the amount of efficiency achieved by the monopoly company

C = production costs of the monopoly company

Through the mechanism above, the monopoly company will be encouraged to be efficient, remembering that the more efficient the monopoly company, the greater the incentives the monopoly company will receive. The government can also punish monopoly companies that are inefficient and experience cost overruns by imposing fines on monopoly companies that experience cost overruns. As a result, monopolistic companies will definitely be efficient because apart from being motivated to obtain incentives, monopolistic companies also want to avoid fines from the government (Laffont & Tirole, 1986). Providing subsidies to monopolistic companies can also be reduced so that the government and society as taxpayers benefit. This approach creates an environment where efficiency is rewarded and inefficiency is punished, thereby encouraging companies to operate more optimally and reducing the government's fiscal burden.

2. Overcoming Information Asymmetry and Moral Hazard: The mechanism of providing incentives to increase the efficiency of a monopoly company can cause other problems if the government has information asymmetry regarding the output, production costs, or product quality of the monopoly company. This is because in these conditions a moral hazard arises for monopolistic companies. If there is information asymmetry regarding output or production costs, a monopolist can reduce the amount of production so that efficiency increases even though this is detrimental to consumers. Meanwhile, in conditions where there is information asymmetry regarding quality, a monopoly company can reduce the quality of its product to increase its efficiency. In conditions like this, apart from encouraging monopoly companies to be efficient, the government also needs to bear a certain portion of the monopoly company's production costs. With this mechanism, monopoly companies are less focused on reducing production costs, but more focused on increasing output or product quality. Therefore, in this mechanism, apart from the government providing cost reimbursement, from the start the government has to bear a certain portion of the monopoly company's production costs (Laffont & Tirole, 1986). This mechanism aims to ensure that efficiency is not achieved at the expense of product or service quality, as well as maintaining a balance between cost savings and consumer satisfaction.

Implementation and Empirical Research

The mechanism proposed by Jean-Jacques Laffont and Jean Tirole in the article "Using Cost Observation to Regulate Firms" has been applied in several studies regarding cost reimbursement mechanisms in natural monopoly companies. One of them is research by Wenqian Zou and Shoshi Mizokami, outlined in the article "Incentive Subsidy Scheme Design With Elastic Transport Demand". In this research, Wenqian Zou and Shoshi Mizokami propose a cost reimbursement mechanism for city bus transportation companies in Arao City, Kumamoto Prefecture, Japan following the mechanism proposed by Jean-Jacques Laffont and Jean Tirole. This is because providing subsidies to city bus transportation companies is one of the causes of the budget deficit experienced by the Arao City Government. To reduce this deficit, it is necessary to reduce subsidies for bus transportation companies which can be

achieved by providing incentives and fines for bus transportation companies as proposed by Jean-Jacques Laffont and Jean Tirole (Zou & Mizokami, 2014). This research shows that companies can be encouraged to improve their operational efficiency by providing the right incentives and implementing fines for inefficiencies. The results of this research indicate that incentive mechanisms can significantly reduce production costs and improve service quality, which ultimately reduces the government's fiscal burden and improves consumer welfare. Thus, the concept proposed by Laffont and Tirole can be applied in various contexts and other sectors that experience natural monopoly problems. This study shows that the right incentives can change corporate behavior in desired ways without the need for extensive direct government intervention. This approach also provides empirical evidence that incentive-based regulation can be effective in overcoming efficiency problems in natural monopolies.

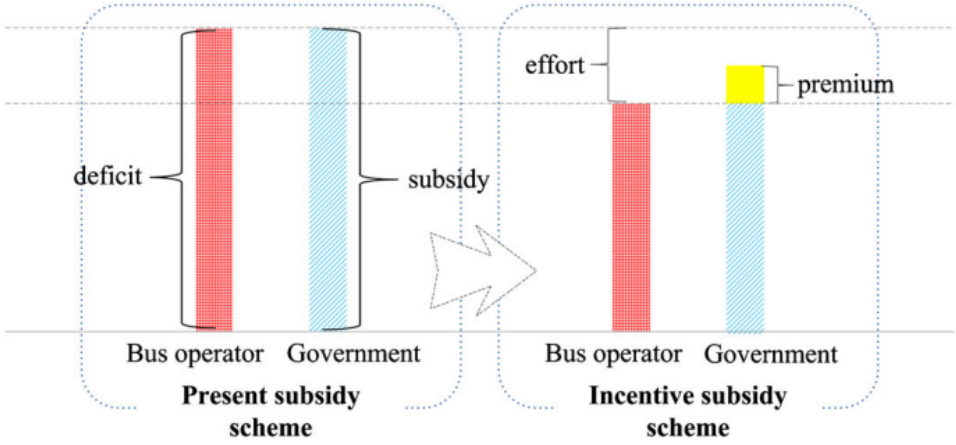

Figure 1. Incentive Mechanism for Bus Transportation Companies.
Source: Zou & Mizokami, 2014.

5. Conclusion

The analysis concludes that regulation is necessary in monopoly markets, particularly natural monopolies like utilities and transportation, to protect consumers and ensure market efficiency. Governments should implement regulations, including pricing controls and business competition laws, to manage monopolies. Pricing based on marginal costs presents challenges, including the need for subsidies and the risk of inefficiency due to information asymmetry. Jean-Jacques Laffont and Jean Tirole suggest incentivizing efficiency and imposing fines to mitigate these issues. Policy implications include adopting incentive-based regulations, managing subsidies to maintain fiscal health, and using technology to address information asymmetry. Further research should empirically test these mechanisms in various sectors, develop advanced econometric models, and conduct international policy evaluations to inform more effective regulatory practices.

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