

# Market Conditions And Price Wars: Empirical Research In The Indonesian Lighting Industry

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**Abstract:** The conditions of price wars have been previously indicated as the result of competitive reactions by firms. While its antecedents can be classified into several aspects, the uncontrollable nature of market conditions remains one of the most interesting causes of price wars. Using a sample of respondents in the Indonesian lighting industry, this research is aimed to generate an understanding of how practitioners view their market conditions in relation to competition and the steps to overcome price wars. Survey data were collected through quantitative methodology from various managers and decision-makers in the industry. Based on statistical result of Smart PLS, the study found that firms regard price wars as the result of the pursuit of profit through growth, within the context of competition.

**Index Terms:** External Market Conditions, Indonesian Lighting Industry, Price Wars, Smart PLS

## 1 INTRODUCTION

PRICE wars is often regarded as a common issue faced by various businesses [1]–[3] especially in terms of competitive activities. Using materials gathered from multiple disciplines, the phenomenon's antecedent has been summarized by Heil and Helsen [4] into two main groups: controllable and non-controllable conditions. While it was mentioned that price wars could be avoided by properly managing a firm's internal competitive aspects, the world of commercial activities remains dependent on external interactions between firms and their counterparts [3]. It is important therefore to understand while a firm's internal condition could ignite competitive reactions that lead to price wars, the reactions it brought into the market are the real problem firms need to manage and conquer [5]. Several aspects of market characteristics have been previously discussed in their relation to price wars [6]–[8]. In general, these researches were conducted to evaluate market attractiveness, where efforts of investment are estimated through the size of market share and its growth potential. Ramaswamy et al. [7] argued that in some cases, a decline in price was caused by defensive efforts of certain firms, made in order to protect their share. Heil and Helsen [4] strongly agree that at the presence of certain market conditions, price wars is more likely to occur and its intensity increases as that particular market develops. In reference to game theory, Eslaminosratabadi, Salimi, Ibragimov, and Amini [9] also argue that price becomes the preferred variable in a strategy, regardless of the condition in which it is used to deliver results. This paper answers to Heil and Helsen's suggestion for empirical research. As research in price wars' market condition tends to focus on large industries such as telecommunication [10] and aviation [11], [12], the phenomenon has been rarely mentioned in smaller industries, especially in this case, i.e., the Indonesian lighting industry. Although further clarification in regard to this scarcity of research is necessary, it can be argued that, in most economics, it is difficult for practitioners to gain entry into larger industries.

Adding to this argument, nowadays we can find that most commercial activities take place on a smaller scale across various markets and price competition regularly occurs even in the most common places. Based on this condition, therefore, the need to understand price wars from a marketing perspective becomes an important addition to the theory of competitive dynamics, strategic management, and general economics. The Indonesian lighting industry was chosen due to its unique characteristics. This industry is a sub-sector of the larger electrical apparatus trade market. In practice, the industry offers various application and utility differentiation that could be used by firms to generate specific specialty offerings to their customers. In a much general sense, it can also be regarded as one of the most important industries that helps to prolong the life of other industries: without light, there will be no life, and there will be no activities to conduct. Nevertheless, competitive interplay between industry practitioners has lately been chaotic. As the industry has matured for some time since the birth of Edison's incandescent bulb in the late 1800s, light itself has become the source of commercial profit where firms contest each other to gain a larger share of the market [13]. Using the framework of external conditions introduced by Heil and Helsen [4], four main variables were presented as the independent variables that affect price war. These variables were later further defined in smaller dimensions in order to ease measurements. Further explanation in regard to these dimensions is presented later in this paper, together with literature discussion and its connection to research results.

## 2 LITERATURE REVIEW

Referring to several sources and based on market conditions, price wars are the result of certain characteristics, where firms are competing to serve their customers on an accepted price level previously set by the market. Because firms in the basic sense are a collection of discrete but economically interrelated entities [14] it can be argued that market conditions are direct results of interrelated activities conducted by firms in a constant competitive state [15]. Price wars therefore, can be explained through several antecedents associated with efforts of profit building and survival.

### 2.1 Competitive Entry

This variable is described as a period where firms infiltrate a market [4]. As an antecedent of price wars, results of competitive entry are the direct representation of market power preservation. When new firms are competing to gain a customer base, incumbent firms will work harder to maintain

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their market power and market position [16]. Because the entrant might use below-average pricing strategies to attract customers [17], competition is likely to become severe over time, especially if the customer's switching costs are low [18], [19]. Griffith and Rust [20] recall this condition as the prime cause of over-competition, where price often falls below market equilibrium. Klemperer [18] argues that low prices are the result of entry in markets where customers of new entrants incur switching costs. In reaction, incumbent firms usually will try to match prices in order to deter customers from changing sides. However, Elzinga and Mills [19] remind us that switching costs occur not because firms possess different cost structures, but rather because customers and market as a collective do not possess identical set-up costs. These conditions increase the intensity of price wars, as customer investments are relationship-specific assets. It is important to also understand that the customer's ability to purchase a certain product is limited to his or her available resources and future purchase plans. In another setting, a firm's retaliatory actions towards competitive entry often occur because managers have a tendency to over-compete by comparing their own relative performance against those of their competitors [20]. Setting prices to maximize profits requires strong consideration toward a competitor's performance even to the point of accepting lower profits. However incumbent firms may want to develop a reputation by acting *tough* and be seen as *ready to fight* in order to deter potential entrants from seizing market share [21]. In a collective, pricing actions often turn into predation strategies and are used to drive competitors out of the market [22]. Based on empirical research conducted by Griffith and Rust [20], managers in incumbent firms tend to be competitive when entry occurs even to the point of irrationality, as confirmed by Arnett and Hunt [23]. In practice, predation remains to be viewed as a worthwhile investment to sustain or enhance their firms' reputation [21], despite the fact that profits are sacrificed in order to create competitive standing against other firms.

## 2.2 Excess Capacity

This variable is viewed as a condition where firms are forced to increase sales through price [4]. While it is important for firms to fully understand the size of their capacity, a clear estimate of market capacity is much more difficult to predict. Also, in addition to pressure from rivals, managers within firms may feel the need to keep above-average inventory in order to reduce missed opportunities of loss sales. In several occasions, firms may want to install excess capacity to ensure that a firm's marginal revenue is decreasing their rival's revenue [24]. However under certain conditions, firms that feel threatened by new entrants often install capacity that will certainly be left idle [25]. Investments in capacity are typically made in chunks and often are not reversible [4]. When this large part of investments is idle and produces no return, managers will be tempted to release a below average price in order to stimulate the market and yield short-term monetary return [26]. As signals of price cuts are captured by rival firms and competitors, reasons of excess capacity will exceed its actual condition and turn all actions of inventory reduction into an aggressive marketing move. Price wars in this sense become the reaction of those competing firms who, in their view, are threatened and forced to defend their competitive positioning through successive price cuts [27]. Capacity building under regular demand conditions nevertheless can

only be acquired slowly over time. This condition indicates that firms have differing abilities to build their capacity to the point where it can be considered as an excess to the market's real demand. The difference in a firm's capacity, therefore, dictates the industry evolutionary traits alongside other attributes that complements operational activities within it (i.e., product development and the introduction of new supporting technologies).

## 2.3 Market Growth and Decline

Growth in the market is usually fueled by efforts to build profits through sales [4]. As firms grow over time, their need for resources increases and therefore become pressured to fulfil those needs through expansion [28]. In terms of coverage, expansion does not lead to damaging competitive interplay as long as the market expands [16] and idle demands are not yet fulfilled by incumbent firms. However, when growth declines and markets begin to disappear, competition will turn into a zero-sum game as firms can only expand by luring customers away from rivals. Bhattacharya [29] has also shown that in a period where firms are faced with short-term constraints and forced to survive, price cuts become the only method to preserve growth. Scherer and Ross [26] argue that growth in the industry should lead to decreased reactions because our commercial market and firms within it are bounded by capacity constraints. In general, a growing market requires additional input in capacity and resources, where firms are required to consider the additional cost entangled to satisfy growing demands. In support of this argument, Robinson [16] has provided empirical evidence that reactions to entry within the first year tend to be irregular, as the market is yet to accept new products and technology brought by new entrants. However, reactions will become greater as incumbent firms implement changes and begin to familiarize themselves with rivals. This indicates that changes in market characteristics can be induced by new entries, which later create new demand for better products with technologies that exceed current ones [30]. Ramaswamy et al. [7] demonstrated that market growth increases a firm's tendency to conduct retaliatory price cuts, especially in mature segments where chances of growth are limited due to technological disadvantages and aging customers. This issue is not only critical where new entry changes the competitive dynamics in the market but also when firms compete against each other subsequent to that particular entry period. Market disruption created by entry usually accelerates customer sophistication through awareness, and competition typically begins when a shift in preference occurs following the availability of new information. As market attractiveness is determined by the industry's structural characteristics [30]–[33], its strategic evaluation is typically characterized by the growth rate of the market, which becomes an indicator of potential profits [34]. Consequently, retaliatory behaviors will likely occur in markets where firms have seen considerable growth within them. As incumbent firms react by increasing investment to defend their position from new entrants, profit expectations will be high especially if the market is considerably important to them. In return, competitive reactions might be just as aggressive if these expectations are not realized [35].

## 2.4 Distribution of Market Power

Power distribution in terms of competitive dynamics is described as the condition where market concentration is divided among firms within a certain industry and dispersed again externally to form that particular industry [4], [36]. In the field of political science, the *power preponderance* theory [37] argues that wars are less likely to occur when power is highly concentrated. As there is little interest in provoking others, states (in this case, firms) that hold most of the power will eventually deter smaller rivals to challenge them. Heil and Helsen [4] drew the parallel and concluded that relatively large firms with *deep pockets* are able to set a certain market standard and chances of price conflicts are low when profits are highly fragmented [38]. However, it remains difficult to predict the size of market concentration as the modern arrangement of commercial industries is built upon diverse layers of firms with various cost structures. The result of this condition makes it difficult to coordinate cooperative pricing policies among firms because, in various cases, smaller firms may prefer to deviate and challenge larger firms [2]. Levy [39] also argues that equality, in its relation with the balance of power, is destabilizing because it tempts aggression, while a high level of power concentration is also destabilizing because it generates fears of domination. Based on these understandings and despite earlier suggestions, a highly concentrated market power in a highly fragmented industry tends to increase the likelihood of price wars. While in the intermediate levels of power distribution, the chances of a war occurring are unlikely [37], however, firms may face different outcomes in the later stages of power distribution, especially when the market begins to develop varied requirements. As concentration increases, reactions are expected to increase [30] because the incumbent will likely suffer significant loss of market share if it chooses not to react to the competition. Part of this argument has been raised by Ramaswamy et al. [7] where market concentration was argued as the leading factor of firms' retaliatory behavior.

## 3 MATERIALS AND METHOD

This study was conducted using primary data gathered from individuals who work in the Indonesian lighting industry and at least hold a managerial position in their respective companies. Although not all respondents are involved directly in sales activities on a day-to-day basis, their job responsibilities indirectly support policies that will be adopted by the market. Respondent positions include sales and marketing managers, channel directors, financial controllers, chief financial officers, supply chain managers, customer relationship managers, product managers, quality managers, and project champions. The breadth of positions was considered in order to find one common view in regard to market conditions and price wars, as the phenomenon could be seen as the result of various aspects implemented by numerous decision-makers. Referring to the suggestion made by Baruch and Holtom [40], an electronic method was selected in order to reduce the time for response collection. A set of questionnaires with 28 questions was prepared, uploaded digitally using Google Forms, and later sent through e-mails and the WhatsApp mobile application. The effort yielded an 82% response rate in which, from 63 questionnaires sent, 51 were returned with complete answers within seven working days. Measurement items were gathered from related literature and used as a reference of the questionnaire's design. Competitive entry was defined by

arguments of switching costs [18], [19] and performance comparison [20], [21], while idle capacity [24]–[26] was used to gain an understanding of the market's excess capacity. In terms of market growth, measurement items were designed in the context of profit building and market maturity [7], [16], while distribution of market power is measured in the context of clusters [36] and concentration [7], [26]. All questionnaires were evaluated using a five-point Likert scale, where higher scores represent *agreement*, while lower scores represent *disagreement*. The respondent's demographics were analyzed separately from the primary model and only used as means of a confirmatory phase of the study. Prior to the actual survey, a preliminary questionnaire pre-test was conducted on five individuals, and from the results of their face validity, several items were altered further in order to capture a more precise response.

## 4 RESULTS AND DISCUSSION

Following the first modification, all returned questionnaires were analyzed using SmartPLS 3.0 software. The results of reliability and validity tests indicate several items with loading factors lower than 0.6 were removed, and the analysis was performed once again. The second analysis results revealed that the remaining item's outer loadings exceed 0.7, except for one item under "Price Wars", which only yields results above 0.6. As seen in Table 1, results of the Cronbach's  $\alpha$  are also lower than expected: 0.756 for competitive entry, 0.616 for excess capacity, 0.570 for market growth, 0.755 for power distribution, and 0.572 for price war, respectively. Nevertheless, according to Hair, Hult, Ringle and Sarstedt [41], PLS-SEM prioritizes the indicators according to their individual reliability, and Cronbach's  $\alpha$  assumes that all indicators are equally reliable. Also because some variables have more indicators than others, Cronbach's  $\alpha$  sensitivity to item number in the scale is prone to internal consistency reliability underestimation [41]. Based on previous literature, a more appropriate measure of internal consistency reliability using composite reliability was used, where the different outer loadings of the indicator variables are taken into account [41], [42]. The calculation yields better results: 0.887 for competitive entry; 0.838 for excess capacity; 0.823 for market growth; 0.857 for power distribution; and 0.776 for price war, respectively. Hair et al. [41] acknowledged that values of 0.60 to 0.70 are acceptable for exploratory research, while Nunnally and Bernstein [43] suggested values 0.70 and 0.90 should be desirable in advance stages of research. Shown from the average variance extracted (AVE), results of convergent validity for each latent variable are also greater than the acceptable threshold of 0.5 [42]. As parameters, this indicates that the degree to which measures of constructs that theoretically should be related are in fact related. On the other hand, results of discriminant validity in Table 2 have produced values greater than other correlation values among the latent variables. The evaluation shows that all indicators which are designed to measure theoretically different concepts are not correlated with one another. Based on the results of the reliability test, 16 indicators in the questionnaire were removed from the original 28. The remaining 12 indicators are used to determine the effects of market characteristics in regard to price war intensity. From 51 respondents, 29 (56.9%) primarily work in the traditional (business to consumer) trade segment while the remaining 22 (43.1%) spend most of their professional careers in the professional (business to business)

trade segment. The difference between segments was intended in order to generate a common understanding of price wars. Although firms in the two segments may not experience the same level of competitive intensity, the analysis

result has managed to establish paths and a valid relationship model to show that a common view in regard to price wars is shared among them.

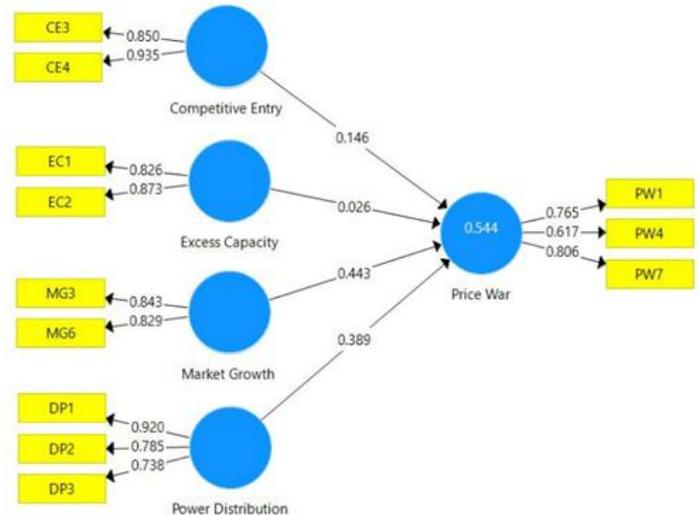
**Table 1. Results Summary for Reflective Outer Models**

Latent Variable	Indicators	Items	Outer Loadings	Reliability (Loadings <sup>2</sup> )	Composite Reliability	AVE
Competitive Entry	CE3	New entry will cause decline in sales	0.850	0.7225	0.887	0.798
	CE4	Decline in sales are caused by rivalry	0.935	0.8742		
Excess Capacity	EC1	Inventory level should represent average sales level	0.826	0.6823	0.838	0.722
	EC2	Excess inventory liquidation is a must	0.873	0.7621		
Market Growth	MG3	Growth in sales require additional support for discounts & promotion	0.843	0.7106	0.823	0.699
	MG6	More products can be sold if customers are familiar with its features	0.829	0.6872		
Power Distribution	DP1	Standard in market price are set by the largest seller	0.920	0.8464	0.857	0.669
	DP2	Smaller sellers adjust their price based on the largest seller's price	0.785	0.6162		
	DP3	Market with absence of large sellers do not have pricing standards	0.738	0.5446		
Price Wars	PW1	Discounts are essential to win customers	0.765	0.5852	0.776	0.539
	PW4	Competition leads to price war	0.617	0.3807		
	PW7	Best-selling products have to remain profitable	0.806	0.6496		

**Table 2. Criterion Analysis for Discriminant Validity**

	Competitive Entry	Excess Capacity	Market Growth	Power Distribution	Price War
Competitive Entry	<b>0.893</b>				
Excess Capacity	0.269	<b>0.850</b>			
Market Growth	0.179	0.394	<b>0.836</b>		
Power Distribution	0.184	0.217	0.334	<b>0.818</b>	
Price War	0.304	0.324	0.609	0.570	<b>0.734</b>

Looking at Figure 1, the coefficient of determination ( $R^2$ ) for price war as the endogenous latent variable is 0.544. This explains that the four latent variables (i.e., competitive entry, excess capacity, market growth, and power distribution) moderately explain 54.4% of the variance in price wars. Meanwhile, the inner model suggests that market growth (0.443) has the strongest effect on price wars, followed by power distribution (0.389) and competitive entry (0.146). The result of the standardized path coefficient of excess capacity on the other hand, yields lower than 0.1 (0.026) and indicates that the hypothesized path relationship between this variable and price war is not statistically significant.



**Figure 1 - Research model: External market conditions and their effect on price wars' intensity**

In comparison with previous research conducted by Elzinga and Mills [19] where competitive entry has been shown to significantly influence price cuts and intensify competitive interactions, it is surprising to see that the respondents did not regard a competitive entry as the leading causes of price wars. Although its indicator loadings show highly significant results (0.850 for new entry and 0.935 for rivalry), the connection

between competitive entry and price wars are weaker compared with market growth and power distribution. These results nevertheless, provide evidence that most respondents are confident with their brand's market positioning in relation to the competition, and indicates that, in its true form, competitive interaction should improve firm performance. Based on these results, we can conclude that market growth and power distribution are both strong predictors of price wars while competitive entry moderately affects its intensity. Nevertheless, although excess capacity was not considered to be the main causes of price wars, the outer loading results for its indicators remain high (0.873 for excess inventory liquidation; 0.826 for average inventory level). This suggests that firms should consider maintaining their inventory levels to represent appropriate demand prediction in order to avoid unnecessary loss in capacity investments. As an extension of the original model proposed by Heil and Helsen [4], results have shown that each variable has the potential to induce and increase the intensity of price wars. While it has been acknowledged that price wars are a common occurrence in business activities, most respondents respond positively to external indicators that involve competitive relations with rivals. The high outer loading results indicate that firms regard competitive consequences to be driven by rivalry interactions that sometimes lead to the outbreak of price wars. This condition explains the relationship between several variables and further confirms previously proposed ideas that cause price wars to erupt. As we look beyond statistical results, opportunities remain available nevertheless to firms that are able to conduct transactional activities within the supposedly *uncontrollable* nature of external market condition. The results show that market growth encourages competitive entry, especially when the dispersion of market power is not yet distributed evenly into smaller segments. An insight into power preponderance theory [37] should enable practitioners in the lighting industry to measure their performance standards against firms that operate with larger economic scale and possibly perform as the industry's incumbent. Once a standard in price has been acknowledged, growth potential can be measured in terms of future innovation possibilities in new product introduction and new segment creation. A Price war would still erupt when a shift in customer preference occur and firms in parallel also respond to development in other supporting industries. In retrospect, the early introduction of Edison's electric light technology also caused price wars to break out in the gas industry, as companies within it battled a *supposedly new threat* from a newly formed lighting industry that would bring their market into extinction [44]. Although to a certain extent the real effects of price war remain difficult to predict, early stories of the modern lightbulb we know today emerge as a result of victory in the battle of customer preference and market acceptance.

## 5 CONCLUSIONS

Results of the study indicate that external market conditions are actually influenced by collective internal conditions of firms in the industry. While it is difficult to predict the exact moment price wars in the Indonesian lighting industry previously erupts, the pursuit of profit has been shown to be one of the strongest motives behind pricing decisions made by firms. This result is consistent with the theory that growth rate becomes an attractive indicator of potential profit, especially when the role of market leader in the Indonesian lighting industry is

performed only by a few brands. The purpose of this research nevertheless is to understand how external market conditions could affect the intensity of competition in price. Based on the statistical results, firms can improve their competitive positioning and ease friction caused by price wars by understanding the relationships among competitive entry, excess capacity, market growth, power distribution, and price wars. Through a survey of key personnel in the lighting industry and the subsequent structural equation modelling in SmartPLS, important external factors that lead to price wars are identified. The results strongly suggest that firms in the industry should focus on the effects of their pricing policies based on efforts to maximize profit through growth and not on capacity building. While results of this empirical study have clarified certain aspects of price wars seen from the perspective of the external market condition, this research remained bounded in various limitations. It is important to understand that price wars as a phenomenon, is the consequence of extreme interaction among firms, and the measurement of its intensity may rely on indicators beyond those mentioned here. Further clarification and detailed classification remain open to be explored, as the ones presented here can be considered only as initial measures. Future studies in regard to other antecedents of price wars have to be analyzed further in order to obtain complete understanding of the phenomenon. Especially for the Indonesian lighting industry, this research could be used by industry practitioners as tools to analyze the effects of pricing policies they introduce to the market. Although several indicators are clearly beyond the scope of internal firm control, managers must understand that retaliatory actions in price remain to be accessible to them. Decisions to practice it however, undoubtedly rest within their own judgment and depends on how prepared these firms are to face future competitive consequences.

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