

# A Systematic Literature Review of Dynamic Pricing Strategies

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## Abstract

Due to its success and acceptance in the airline and hospitality industry and the growing availability of behavioral, engagement, and attitudinal consumer data, dynamic pricing strategies are gaining popularity. The purpose of this systematic literature review is to answer the research question about how do dynamic pricing strategies affect customer perceptions and behaviors to avoid negative consumer reactions. The synthesis of over 50 articles revealed eight different research streams like for example the factors moderating the impact of dynamic pricing on customer behavior, strategic purchasing behavior in response to dynamic pricing, effect of dynamic pricing on customer perception of fairness, personalized dynamic pricing (PDP) and channel differentiated pricing. To advance future research, this systematic literature review identified the six propositions for further research like for example the assessment of the efficacy of different types of communication by firms seeking to mitigate the negative impacts of dynamic pricing and the assessment of the role and relevant importance of consumers' personal characteristics upon their perceptions of price changes. The findings of this study have a practical impact for managers and scholars. Scholars may use them to update their research agendas and managers to optimize their pricing strategies to increase revenues.

**Keywords:** channel differentiated pricing, consumer behavior, consumer perception, customer behavior, customer perception, data, dynamic pricing, dynamic pricing model, dynamic pricing strategy, fair, PDP, personalized dynamic pricing, price discrimination; pricing strategy

## 1. Introduction

The term “dynamic pricing” refers to a pricing model that entails altering the price of goods or services based on supply and demand or the characteristics of the customer (Wang, Tang, Zhang, Sun & Ziong, 2020). This model is growing in popularity within a wide variety of different industries due to its expected impact on revenues and corporate valuations (Brent & Gross, 2017; Chenavaz & Paraschiv, 2018; Cohen & Neubert, 2019; Drea & Narlik, 2016; Halkias, Neubert, Thurman, Adendorff & Abadir, 2020; Neubert, 2017; Wahyuda & Santosa, 2015; Xiong, Niyato, Wang, Han & Zhang, 2019). Throughout the course of the present paper, a systematic literature review relating to this form of pricing will be carried out.

Systematic literature reviews are an increasingly used review methodology for synthesizing the body of literature about a topic. Systematic literature reviews can also be considered as a qualitative research method (Halkias et al., 2022; Halkias & Neubert, 2020), because they differ from traditional literature reviews in that they center upon answering a specific research question (Neubert, 2022). Okoli and Schabram (2010) emphasize the notion that they contribute to a better understanding of a topic when answering the research question, going further than simply repeating facts. They categorize the review as a qualitative research approach in its own right (Okoli & Schabram, 2010). Using the systematic literature review methodology, the research question that this review will seek to answer is as follows:

“How do dynamic pricing strategies affect customer perceptions and behaviors?”

Neubert (2022) identifies five steps to conducting such a literature review: planning the review, the identification and evaluation of studies, data extraction, data synthesis and the dissemination of the review findings. Siddaway, Wood and Hedges (2019) have outlined a longer process consisting of 6 stages: identification of suitable literature; scoping, planning, identification (searching), screening, eligibility and evaluation/study-quality assessment. Okoli and Schabram (2010) detail a methodology with even more stages, following a total of 8 steps. However, while appearing lengthier than the system put forward by Siddaway et al. (2019), they dedicate a step to the writing of the final review, whereas Siddaway et al. (2019) include it in the same stage as the analysis and

synthesis (Okoli & Schabram, 2010). Petticrew and Roberts (2006) also provide details and the contents of a method for carrying out a systematic literature review that is broadly similar to that of Okoli and Schabram (2010).

Fink (2005) divides the process into a more stages, with seven steps advocated, noting that the exact methodology can vary depending on the topic and type of data that is needed to answer the research question. His methodology includes the different phases seen in Okoli and Schabram (2010), Siddaway et al. (2019), and Neubert (2022) systems. Although there is clearly no universally agreed upon model for the stages that are involved in a systematic literature review, but there is a general consensus on what should be incorporated into them.

There appear to be differing approaches, but an examination of the underlying procedures advocated indicates a high level of alignment, with some models merely dividing the actions up into a larger number of steps. For the purpose of the current paper, the methodology proposed by Neubert (2022) will be used, as it condenses the required activities into a small number of steps without losing any of the necessary detail, making it comprehensive yet relatively simple to implement (see table 1). However some elements from the other frameworks and the PRISMA 2020 model for new systematic reviews will be used in order to provide additional guidance where necessary. The review will commence with the planning of the review stage within the subsequent chapter.

Table 1. Systematic literature review process

Step	Activity
1	Planning the review
2	Identification and evaluation of studies
3	Data extraction
4	Synthesis

Source: Neubert (2022)

## 2. Planning the Review

The first stage of planning the review is to conduct a literature search to establish whether a systematic literature review of the chosen subject has already been conducted. This helps to ascertain whether a need actually exists for a systematic literature review about it (Neubert, 2022). An extensive review of empirical evidence revealed that no systematic literature review appears to have been carried out to date that examines the impact of dynamic pricing strategies upon customer perceptions and behaviors. There is therefore a clear need for the proposed research question to be addressed via this type of review.

Next it is necessary to create a review protocol. This defines the parameters of the data search. The protocol first defines how the research articles that are to be used in the study will be identified and assessed. It starts with the search method and then the determination of quality criteria for articles that are included in the review.

The search method begins with the determination of the search strategy. This includes consideration of the sources to be searched and the keywords that will be used. The search will focus on academic databases such as Web of Science, SpringerLink, Scopus, ScienceDirect, Mendeley, JSTOR, EBSCO and ProQuest databases will be used in the review, as Neubert (2022) states that they are widely used in such reviews. Therefore, this approach is adopted for the present review. Neubert (2022) advises that peer-reviewed journals are more rigorously checked, which means that peer review is often used as an inclusion criterion. Articles from Google Scholar can be useful for discovering grey literature and full academic texts (Neubert, 2022), but they have to be reviewed prior to be used as Neubert (2022) points out that this search engine lists a large number of non-academic sources.

The search process will include the use of relevant terms, in alignment with the requirement put forward by Neubert (2022) that the search terms or phrases are outlined in the review protocol. It was decided that combinations of the following keywords will be used: “dynamic pricing”, “dynamic pricing strategies”, “dynamic pricing model”, “dynamic pricing models”, “customer”, “consumer”, “purchaser”, “perception”, “belief”, “view”, “behavior” and “action”. Neubert (2022) advises that it is necessary to decide whether to search for these terms within the title of articles, in the title or abstract, or anywhere within the full text. In order to avoid missing out useful sources, a search will be carried out that looks for these terms anywhere within the full text. Siddaway et al. (2019) advocate for this broader approach as it facilitates the identification of more useful articles, with the later stages of review processes eliminating those that are not relevant, for example those from journals that are too off-topic for inclusion. This leads to the next state, where the suitable articles are identified and evaluated.

### 3. Identification and Evaluation of Studies

The assessment requires consideration of the content and the quality of the articles. Siddaway et al. (2019) argue that the protocol should include both inclusion and exclusion criteria, with specific requirements dependent upon the topic being reviewed. They advise that articles should directly address the issues and be of a suitable quality (Siddaway et al., 2019). A common approach is to restrict the review to empirical research in peer-reviewed journals, with a review of the research processes to ensure that they are sufficiently robust to generate reliable results (Siddaway et al., 2019). According to Neubert (2022), the review protocol can be used in conjunction with the three main journal-rating systems to identify studies to include and evaluate whether or not they are suitable. These ranking systems are JCR, ABS and VHB. Based on the consideration of these theorists and taking into account the nature of the research topic, the following inclusion and exclusion criteria will be used:

#### *Inclusion Criteria*

- Articles must include original research directly related to dynamic pricing that can be applied to the research question.
- Only articles that appear in peer-reviewed journals should be considered for inclusion.
- Only articles that appear in journals that are ranked Q2 or above in the JCR system, 1 or above in the ABS system or C and above in the VHB system will be included.

#### *Exclusion Criteria*

- Articles where the authors have a potential conflict of interests.
- Opinion pieces.
- Literature reviews.
- Withdrawn or corrected articles.

The relevant data that is required in order to address the research question will then be extracted from these articles in a systematic manner. The manner in which this will be done will be detailed throughout the subsequent chapter of this paper.

### 4. Data Extraction

The data extraction stage entails identifying relevant findings that are appropriate to include in the current study. Neubert (2022) and Siddaway et al. (2019) both advocate for the creation of a data extraction table that outlines every paper that will be reviewed and organizes it by concept. Neubert (2022) states that it also contain all of the necessary data from each paper. The full data extraction is presented in the appendices.

### 5. Synthesis

The synthesis is structured based on the following eight research streams (see table 2): factors moderating the impact of dynamic pricing on customer behavior, strategic purchasing behavior in response to dynamic pricing, effect of dynamic pricing on customer perception of fairness, personalized dynamic pricing (PDP) and channel differentiated pricing, dynamic pricing and reference prices, consumers benefiting from dynamic pricing, the impact of asymmetry of information and/or power within dynamic pricing, and consumer reactions to price increases.

Table 2. Eight research streams

Research streams
1. factors moderating the impact of dynamic pricing on customer behavior,
2. strategic purchasing behavior in response to dynamic pricing,
3. effect of dynamic pricing on customer perception of fairness,
4. personalized dynamic pricing (PDP) and channel differentiated pricing,
5. dynamic pricing and reference prices,
6. consumers benefiting from dynamic pricing,
7. the impact of asymmetry of information and/or power within dynamic pricing,
8. consumer reactions to price increases.

Source: author

The data extraction has indicated a high level of alignment, as of the over 50 papers, 41 explicitly noted that dynamic pricing, according to the definition of Wang et al. (2020), might have a negative impact on buyer perceptions, reduce intention to purchase and/or create impressions of unfairness, as seen with Abrate et al. (2012); van Boom, van der Rest, van den Bos and Dechesne, (2020); and Wang et al., 2016). However, the same papers almost unanimously agreed that the conditions under which the dynamic pricing occurred would have an

impact on those perceptions, although there were different influences identified that would mitigate or eliminate potential negative consumer reactions.

Nine of the papers noted that when consumers understood why the prices were changing, particularly if they were moving upwards, they would experience fewer negative feelings towards the firm, for example Abrate et al. (2012), Dasu and Tong (2010), Wang et al. (2016), and Shapiro, Draver and Dwyer (2016). The research appears to indicate that consumer actions and reactions to dynamic pricing are either exacerbated or moderated by their perceptions of whether the change in price is fair or unfair. Riquelme, Román, Cuestas and Iacobucci (2019) note that the usual reactions of consumers are to view price changes as unfair. This is particularly true of repeat customers who view themselves as loyal (Riquelme et al., 2019).

Riquelme et al. (2019)'s findings are by no means unique, with Haws and Bearden (2006) concurring with them and also noting that price changes over a short period of time are likely to enhance the consumers' perceptions of unfairness. Other sources of unfairness were identified by Lastner et al. (2019), Krämer, Friesen and Shelton (2018), David, Bearden and Haws (2017), Ettl et al. (2019) and Lou, Hou and Lou (2020), who all found that there was consumers' perceptions of unfairness were higher if they knew that they were paying a different price to others. Lastner et al. (2019) note that this is exacerbated if the consumers personally know people who have paid a lower price.

These findings have led to the determination that the strategy known as personalized dynamic pricing (PDP) is usually deemed to be unfair and stimulate a negative response. The systematic literature review identified five different articles that dealt directly with personalized dynamic pricing, a practice where the prices are determined as a result of specific situations, circumstances or personal characteristics that are associated with individual consumers.

The development of PDP is noted as occurring due to a range of influences, including the divergent costs incurred by retailers across different distribution channels as indicated in the research of Lou, Hou and Lou (2020) and the different amounts of overhead costs based on geographical location could also result in the interim in the use of PDP (Lastner et al., 2019). The differentiating factor within PDP that provides the greatest perception of unfairness is the presence of dynamic pricing based on the estimation of the retailer regarding the willingness of the consumer to pay a specific price (Yang, Zhang, & Zhang, 2017; Krämer, Friesen, & Shelton, 2018).

Krämer et al. (2018) argue that the practice had become easier to implement with the advent of advanced technology, as it provides a basis for the company to identify differences amongst consumers and determine a more personalized approach towards pricing. In the same paper, Krämer et al. (2018) also noted that the practice is deemed as particularly unfair when consumers are personally aware of other individuals who have been charged a lower price, but that the level of unfairness is perceived as less severe if the pricing is based upon broader demographic segments rather than highly personal information, a finding that was also arrived at by Van Boom et al. (2020). Krämer et al.'s (2018) study also suggests that while PDP is generally seen as unfair, not all forms of PDP are equally objectionable to all consumers. Krämer et al. (2018) and Ettl et al.'s (2019) studies also suggest that different consumers can react to it in divergent ways, a factor that is likely to result in a range of outcomes where the psychological reaction of the consumers impact upon their behavior. This behavior includes interactions with the company and that which is associated with purchase intent.

These studies on PDP, along with research in other areas, clearly demonstrate that in some circumstances dynamic pricing is not only accepted but actually expected (Bilotkach, Gaggero, & Piga, 2015; Ettl et al., 2019; Katz, Andersen, & Morthorst, 2016; Koenigsberg, Muller, & Vilcassim, 2004; Krämer et al., 2018; Saharan, Bawa, & Kumar, 2020; Wang, Fan, & Li, 2020; Yu, Liang, & Lin, 2019). For example, it was noted that customers were more receptive to price changes that occur in order to reduce demand when it exceeds supply in 16 papers, e.g. Viglia et al. (2016) and Katz et al. (2016).

Likewise, the utilization of dynamic pricing to reduce prices in order to stimulate demand was accepted as necessary by consumers when businesses would suffer as a result of lower numbers of purchases in slow seasons (Abrate et al., 2012, p. 160; Rahman, Endut, Faiso, & Paydar, 2014, p. 143). Conversely, the price increases during peak season were perceived as a justified based on the need to limit the number of consumers wishing to make a purchase when there were insufficient resources available to meet an unconstrained demand (Abrate et al., 2012, p. 160). However, it can be argued that the acceptability of dynamic pricing in relation to limited resources is more acceptable due to the longer term practices within the relevant industry; it has been an established practice within hospitality industry to adjust hotel prices based on seasonal demand (Rahman et al., 2014). It is noted that when prices are deemed to be fair, there is less likelihood of a negative reaction on the part

of the consumers, from which it can be extrapolated that there is less of a negative impact on the subsequent behavior of consumers towards the brand or their purchase intent. An excellent example of demand-based dynamic algorithmic pricing and the reaction of consumers is surge pricing as the example of Uber shows (Seele et al., 2021; Shapiro, 2020).

The studies regarding perceptions of fairness in the way in which dynamic pricing takes place also indicate that the framing of the price changes, information provided, and context of the changes can also impact upon perceptions of fairness and subsequent reactions. For example, dynamic pricing with the use of discounts is often used to stimulate demand in order to increase consumer commitment to make more sales during low demand periods, although several of the authors question the ability of sellers to identify the degree to which discounts need to be offered and optimal strategies need to be adopted to maximize the stimulation of demand (Chen, Zha, Alwan, & Zhang, 2020; Lobel, 2020). It is therefore recognized that consumer actions are impacted upon by dynamic pricing, while concurrently identifying the problems associated with retailers failing to understand the potential effect of price changes. Four of the articles, e.g., Gibbs et al. (2018) argued that suppliers frequently failed to adopt strategies that would help to maximize their revenues.

While the overall approach towards dynamic pricing is often perceived as negative, the adverse effects of the pricing, particularly when it incorporated an increase in the amount the consumer pays, could be mitigated via a number of different strategies. Hanna, Lemon and Smith (2019) note that when firms implement dynamic pricing, they are more likely to be viewed as fair by consumers if they are transparent about the reasons behind the changeable prices and the methods that were utilized in order to arrive at them. Van Boom et al. (2020) noted that even when the unfavorable practice of dynamic personalized pricing was taking place, if the policies of the firm implementing the practice were transparent there is a greater potential for consumers to accept the prices, as long as they understand the underlying motivations.

In total, 10 papers including those by Ghazvini et al. (2018) and Van Boom et al. (2020) found that increased transparency and clear declaration on the part of seller regarding their policies is beneficial and results in a greater number of positive consumer reactions. 3 papers note that dynamic pricing based on consumer groups and differentiation based on buyer characteristics are seen as fairer if they are based on broad categories rather than PDP as seen with David et al. (2017) and Krämer et al. (2018). However, four of the papers, including those by Riquelme et al. (2019), found that if customers believe they were charged more due to loyalty, they are more likely to feel aggrieved.

The moderating effect of expectations and transparency has clearly been depicted in the flight industry. For example, Koenigsberg et al. (2004) examined a firm in the low-cost carrier segment of the airline industry and noted that specific dynamic-pricing patterns were expected, with prices discounted when fares were first released with the aim of gaining early commitment from consumers in an industry that is reliant on volume sales to cover overheads. Möller and Watanabe (2010) argue that strategic use of dynamic pricing can combine the utilization of advance discounts to gain commitment with last-minute deals to stimulate demand to sell goods or services that have a limited availability. 8 other research articles, e.g. Kremer et al. (2017), agreed with Möller and Watanabe (2010) as they also noted the benefits of discounts to retailers.

These studies also show that dynamic pricing strategies have a clear impact upon the behavior and the actions of buyers as well as the psychological perceptions of the consumers, stimulating an intent and commitment to make a purchase. If there can be positive reactions to price decreases, price rises are likely to have the opposite effect, constraining the level of demand, particularly among those who are price sensitive, indicating its use as a strategic tool. However, while companies may seek to use dynamic pricing in a strategic manner, consumers can also have strategic responses to it.

Strategic responses were another common theme in the literature review, mentioned in 13 papers, e.g. Victor et al. (2012) and Dasu and Tong (2010). Strategic consumers are aware of prices and the use of dynamic pricing strategies and time their purchases to maximize their value or utility based on their own values and desires. Several researchers highlight the importance of referent prices including Chen et al. (2020) and Yang, Zhang and Zhang (2017).

Importantly, researchers note that the concept of a referent price is not based on the most recent price, although it may be influenced by it; it is based on a number of factors, which can include historical prices and aspects such as the prices of competitors and the pricing points that stimulated previous purchase intent. Referent prices can also be impacted upon by the product itself, including its expected lifespan, a factor particularly pertinent within grocery shopping, and the perceived quality of the product or service (Lou, Hou, & Lou, 2020; Wang et al., 2016). However, the reactions of the consumers is based not only on their assessment of the referent price

compared to the current price, but their desire to make an immediate purchase, the urgency of that purchase, and their potential patience (Lobel, 2020)

Lobel (2020) differentiates between patient customers and strategic consumers: the former are those who do not need to buy something strange away and will wait until the price reaches a point that they are happy to pay. This is also supported by Chen et al. (2020), Victor, Thoppan, Fekete-Farkas and Grabara (2019) and Dasu and Tong (2010). While many of the articles focus on positive behavior, where consumers make purchases based on price changes, there is a lower amount of research addressing negative reactions. However, while this is an area where research is lacking, it is not completely absent. There was agreement among five of the papers, e.g. that of Ajorlou et al. (2018), that if consumers feel unhappy and as if they have been treated unfairly, they may become proactive and adopt more aggressive negative strategies, leaving the firm bad reviews or undertaking actions to deter sales and harm the firm's reputation.

The research also indicates another area of consideration: the perception of dynamic pricing and its potential impact upon a consumer if there is a choice between a contract with a firm utilizing dynamic pricing and one offering static pricing. Papers by Schlereth et al. (2018) and Hanna et al. (2019) found that consumers do not always favor dynamic pricing in ongoing contracts. Indeed, both of these researchers found that the risks associated with dynamic pricing can lead to a consumer choosing a firm that offers a static price, even if it is higher than the total amount likely to be played by dynamic pricing (Hanna et al., 2019; Schlereth et al., 2018). This demonstrates that perceptions of risk and a desire for security impact upon consumers' reactions to dynamic pricing, with an absence of dynamic pricing potentially being seen as advantageous in reducing uncertainty in the amount that is paid. These studies are predominantly undertaken within the energy market, where there is a greater difficulty in predetermining the prices that will be paid before services are utilized (Katz et al., 2016).

Despite the broad agreement on multiple issues, as discussed above, there are still some gaps in the research. A synthesis of the over 50 articles indicates a number of gaps where future research may increase understanding. The main gaps relate to how and why dynamic pricing may be seen as unfair based on personal perceptions. Influences such as limited supply or availability have been explored, but personal factors such as individual, actual or perceived utility remain under explored. Likewise, it is noted that increased acceptance is seen on the part of consumers when there is transparency and an understanding of why prices change, but there is little research exploring acceptable reasons for price changes other than resource availability. An assessment of the most appropriate communication models for firms in order to minimize any negative effects is also required yet currently lacking.

## 6. Discussion

Dynamic pricing can be used by sellers to increase revenues and corporate valuations (Cohen & Neubert, 2019). It can be effective if undertaken in a manner in which consumers see the increases as fair and justified. This systematic literature review provides clear advice for sellers, giving indications of actions that will benefit them: they should develop consistent policies that are transparent, easy to understand and aligned with consumer expectations. This is demonstrated by observations of the airline and the hospitality industries, where dynamic pricing is seen as fair based on consumers' knowledge of shift in demand in situations in which there are limited resources (Mitra, 2020; Viglia et al., 2016; Kwok & Xie, 2019). The research above also leads to the assertion that this phenomenon has expanded into newer areas where consumers understand the presence of limited resources, such as the public transportation, parking, education, financial services, and energy sectors (Halkias et al., 2020; Subramanian & Das, 2019; Saharan et al., 2020; Katz et al., 2016; Hanna et al., 2019; Neubert, 2020). Other industries that seek to use dynamic pricing can optimize their sales if they are willing to openly declare how and why dynamic pricing is taking place, with increased understanding generated if the retailers are willing to disclose their policies and practices.

Interestingly, the more controversial strategy of PDP also shows that sellers can also differentiate prices based on consumer characteristics of grouping, for example based on geography. This strategy may not be as well-accepted, but is deemed more acceptable if based on broad rather than narrow differentiating factors. Price differences based on broad demographic differences of distribution channels were found to be more acceptable than price discrimination implemented at an individual level, with the research of van Boom et al. (2020) providing some unusual and interesting insights, indicating that increased transparency can make dynamic pricing based on personal characteristics more acceptable, as long as the retailers are open and honest about the practice.

However, it is notable that this study was unique in the systematic literature review and that no other items of research corroborate its findings, which may indicate that more research is required before this approach can be

comprehensively advocated. The implication from the systematic literature review is that dynamic pricing based on price discrimination is generally not liked, but that it is most resented when it is implemented at a personal level. This indicates that firms should consider this strategy very carefully and mitigate negative effects for example via transparency.

It was also clear from the research that firms in a number of different industries including transportation and energy are expected to change prices when there is varying demand if the price differential is not seen as too great (Katz et al., 2016; Hanna et al., 2019). The implication is that companies in industries where it is known that there will be limited resources and varying demand are more able to adopt dynamic pricing than firms in sectors in which there is no perception of varying demand and resources (Seele et al., 2021; Shapiro, 2020; Katz et al., 2016; Kessels et al., 2016). When the price change is greater than may be expected, or when is no apparent reason for a price increase, firms can support sales by explaining how or why the processes are changing and increase transparency (Hanna et al., 2019; Van Boom et al., 2020).

This finding leads to the recommendation that firms should provide their buyers with an explanation of why prices have changed. Not only will this help to support sales, but it may also aid in reducing aggressive negative reactions, such as the stimulation of bad reviews or other harmful behavior; which several papers noted can occur if firms are perceived as unfair. With the research demonstrating that technology can enable increased utilization of dynamic pricing, it is also notable that the same technology can also facilitate a more effective negative reaction by consumers, particularly with reference to negative reviews and disparagement of the brand. However, as noted in the synthesis, there are some gaps in the research, including an assessment of how to best communicate with consumers and the identification of personal factors that can mediate the negative reactions, with only an indication that aspects such as personal utility, need, and perceived reference prices may all play a role.

The research also demonstrates that reductions undertaken earlier may help to maximize sales revenues, with earlier discounts likely to stimulate demand and avoid the need for larger later discounts (Kremer et al., 2017). For example, seasonal products have only a limited period of demand, and discounts offered mid-season onwards, rather than right at the end of the season, may generate a greater aggregate level of demand and help to maximize revenues, as the discounts offered early in the season do not need to be as extreme as those offered at the end. This finding indicates that firms do not undertake sufficient analysis of buyer patterns and that increased knowledge on the part of the sellers would help them make better pricing decisions based on the timing and nature of the discounts offered.

## 7. Conclusion

The purpose of this systematic literature review was to answer the research question about how do dynamic pricing strategies affect customer perceptions and behaviors to avoid negative consumer reactions. Due to its success and acceptance in the airline, transportation, and hospitality industry and the growing availability of behavioral, engagement, and attitudinal consumer data, dynamic pricing strategies are gaining popularity to increase revenues especially in low demand seasons and based on the willingness to pay of each customer (e.g., Brent & Gross, 2017).

The synthesis of over 50 articles revealed eight different research streams (see table 2), which show that dynamic pricing strategies affect customer perceptions and behaviors in positive and negative ways (e.g., Abrate et al. (2012); van Boom, van der Rest, van den Bos and Dechesne, (2020); and Wang et al., (2016)). Consumers' view on dynamic pricing varies depending on the industry, resource availability (e.g., Kessels et al., 2016), their personal circumstances (e.g., Priester et al., 2020), as well as the degree to which they believe a supplier is acting in a fair manner (e.g., Lastner et al., 2019). Consumers accept dynamic pricing, if they understand the reasons for price differences (e.g. demand and supply). Apart from that, research confirms that some consumers prefer stable or static prices, even if they are higher like for example in the healthcare (Gousgounis & Neubert, 2020) or financial service industry (Neubert, 2020).

Based on the answer to the research question, the following six propositions for further research were identified:

- consumer acceptance of dynamic pricing strategies,
- assessment of the efficacy of different types of communication by firms seeking to mitigate the negative impacts of dynamic pricing,
- reasons for consumer perception about how and why dynamic pricing may be seen as unfair,
- assessment of the role and relevant importance of consumers' personal characteristics upon their perceptions of price changes,

- personalized dynamic pricing based on data to determine the consumer's willingness to pay,
- additional factors influencing dynamic prices.

This study has several limitations. First, it only focused on publications in highly rated, peer-reviewed journals since 2015. Second, the suggested findings such as the eight research streams and the six propositions for further research still need empirical validation. Despite of these limitation, the results have a practical impact for scholars and managers. Scholars may use them to update their research agendas and managers may optimize their pricing strategies to increase revenues.

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## Appendices

Table 1. Data Extraction Table

Concept	Article	Journal	JCR Ranking	ABS Ranking	VHB Ranking	Necessary Data
Factors moderating the impact of dynamic pricing on customer behavior	“Impact of Dynamic Pricing Strategies on Consumer Behavior”	<i>Journal of Management Research</i>	Q1 (SCImago, 2019a).	No ranking available.	No ranking available.	High-involvement customers are more responsive to dynamic pricing offers on hotel rooms than they are to rooms that are priced using traditional pricing model (Rohani & Nazari, 2012, pp. 143-149).
	“Consumers Beware: Online Personalized Pricing in Action! How the Framing of a Mandated Discriminatory Pricing Disclosure Influences Intention to Purchase”	<i>Social Justice Research</i>	Q1 (SCImago, 2019)	No ranking available.	No ranking available.	Consumers buying from firms using dynamic personalized pricing based on demographic characteristics were more likely to make a purchase when policies were transparent and they understood the processes (Van Boom, Van Der Rest, Van Den Bos & Dechesne, 2020).
	“Dynamic Pricing Strategies: Evidence from European hotels”	<i>International Journal of Hospitality Management</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	No ranking available	Perceptions of fairness moderate negative effects of dynamic prices if they are perceived as fair. Consumers believe capacity limitations justify varying prices (Abrate et al., 2012, pp. 160–168).
	“Price-setting strategies and practice for medical devices used by consumers”	<i>Journal of Revenue and Pricing Management</i>	Q3 (SJR, 2020)	1 (ABS, 2021)	C (VHB, n.d.).	Instead of dynamic pricing, managers prefer market-based price-setting strategies and competition-informed practices. (Gousgounis & Neubert, 2020, pp. 160–168).
Strategic purchasing behavior in response to dynamic pricing	“Pricing strategies in the era of digitalisation and the perceived shift in consumer behavior of youth in Poland”	<i>Journal of International Studies</i>	Q1 (SCImago, 2019c).	No ranking available.	No ranking available.	Dynamic pricing can result in strategic purchasing behavior, particularly in buyers who are more aware this pricing model is used by the seller (Victor, Thoppan, Fekete-Farkas & Grabara, 2019, pp. 74-83)
	“Dynamic Pricing with Heterogeneous Patience Levels”	<i>Operations Research</i>	Q1 (SJR, 2020).	2 (ABS, 2015).	A+ (VHB, n.d.).	Patient consumers’ exist who are willing to delay purchases until prices are reduced to a level at or below their personal valuation. These are different to strategic consumers, and sellers can reduce prices to a lesser extent if seeking to attract patient buyers (Lobel, 2020, pp. 965–1284).
	“Revenue Management without Commitment: Dynamic Pricing and Periodic Flash Sales”	<i>Review of Economic Studies</i>	Q1 (SJR, 2020).	4* (ABS, 2015).	No ranking available	Consumers who do not plan immediate purchases will watch prices. If they observe flash sales, they will delay purchases until another sale occurs (Dilmé & Li, 2019, pp. 1999–2034).
	“Will Dynamic Pricing Outperform? Theoretical Analysis and Empirical Evidence from O2O On-Demand Food Service market”	<i>International Journal of Production Research</i>	Q1 (SJR, 2020).	3 (ABS, 2015).	B (VHB, n.d.).	Food delivery firms can stimulate greater demand with dynamic opposed to static prices (Tong, Dai, Xiao, & Yan, 2020, pp. 375–385)
	“Are Consumers Strategic? Structural Estimation from the Air-Travel Industry”	<i>Management Science</i>	Q1 (SJR, 2020).	4* (ABS, 2015).	A+ (VHB, n.d.).	5.3% to 19.2% of consumers in the air travel market behave strategically (Li, Granados, & Netessine, 2014, pp. 2111–2380).
	“Dynamic Pricing when consumers are Strategic: Analysis of a Posted Pricing Scheme”	<i>European Journal of Operational Research</i>	Q1 (SJR, 2020).	4 (ABS, 2015).	A (VHB, n.d.).	Consumers are aware that the prices of perishable goods may change as the products age. Strategic consumers wait for price drops. Retailers can optimise sales by setting predetermined times for price changes (Dasu & Tong, 2010, pp. 662–671).
	“Optimal Markdown Policy of Perishable Food under the Consumer Price Fairness Perception.”	<i>International Journal of Production Research</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	B (VHB, n.d.)	Consumers can increase utility selecting products of lower quality or shorter life. Dynamic pricing based on temporal proximity to expiry dates is perceived as fair by consumers (Wang et al., 2016, pp. 5811–5828).
	“Dynamic Pricing in the Presence of Myopic and Strategic Consumers: Theory and Experiment”	<i>Production and Operations Management</i>	Q1 (SJR, 2020)	4 A(abs, 2015)	A (VHB, n.d.)	Strategic consumers can be motivated to buy seasonal goods by way of a late season discount even if they believe that a larger discount may manifest at the end of the season (Kremer et al., 2017, pp. 116–133)

Effect of dynamic pricing on customer perception of fairness	“Examining Consumer Perceptions of Demand-Based Ticket Pricing in Sport”	<i>Sport Marketing Quarterly</i>	Q2 (SCImago, 2019d)	No ranking available	No ranking available	Purchase intent decrease where dynamic pricing strategies are seen as unfair (Shapiro, Drayer & Dwyer, 2016, pp. 38-43)
	“A special price just for you: effects of personalized dynamic pricing on consumer fairness perceptions”	<i>Journal of Revenue and Pricing Management</i>	Q3 (SJR, 2020)	1 (ABS, 2021)	C (VHB, n.d.)	Dynamic prices based on consumer segment are seen as fairer and support higher purchase intent compared to prices which are based on individual characteristics (Priester, Robbert & Roth, 2020).
	“The Dark Side of Good Reputation and Loyalty in Online Retailing: When Trust Leads to Retaliation through Price Unfairness”	<i>Journal of Interactive Marketing</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	B (VHB, n.d.)	Consumers usually perceive price variations to be unfair. Customers who believe they have suffered higher prices due to their loyalty are likely to undertake online retaliations to damage the retailer’s reputation (Riquelme et al., 2019, pp. 35–52)
	“Dynamic Pricing and Consumer Fairness Perceptions”	<i>Journal of Consumer Research</i>	Q1 (SJR, 2020)	4* (ABS, 2015)	A+ (VHB, n.d.)	Variable pricing was seen as most fair at auctions and most unfair when retailers set different prices for different consumers. Price changes within short periods of time are more likely to be deemed unfair than longer time alterations (Haws & Bearden, 2006, pp. 304–311)
	“The impact of dynamic bundling on price fairness perceptions”	<i>Journal of Retailing and Consumer Services</i>	Q1 (SJR, 2020)	2 (ABS, 2015)	C (VHB, n.d)	Negative effects of dynamic pricing can be mitigated via bundling, which increases the perceived level of dissimilarity with competing products and past prices (Li, Hardesty, & Craig, 2018, pp. 204–212)
	“Dynamic Pricing for Demand Response Considering Market Price Uncertainty”	<i>Energies</i>	Q2 (SJR, 2020)	No ranking available	No ranking available	Dynamic pricing can be seen as fair when undertaken with predetermined, clearly-communicated tariffs. Concurrently, dynamic tariffs effectively manage demand (Ghazvini, Soares, Morais, Castro, & Vale, 2018, pp. 1245–1264)
	“I guess that is fair: How the efforts of other customers influence buyer price fairness perceptions”	<i>Psychology &amp; Marketing</i>	Q1 (SJR, 2020)	No ranking available	B (VHB, n.d.)	Consumers are likely to view prices as unfair if they pay a higher price than known others. However the perception of unfairness can be mediated by a referrer who seeks to explain potential reasons for price disparity (Lastner, Fennell, Folse, Rice, & Porter, 2019, pp. 700–719)
	“Dynamic pricing techniques for Intelligent Transportation System in smart cities: A systematic review”	<i>Computer Communications</i>	Q1 (SJR, 2020)	No ranking available	No ranking available	Consumers see the use of dynamic pricing tariffs as fair when it is applied to services with capacity constraints, such as public transportation systems, on the condition that there are not large differentials that are perceived price gouging (Saharan et al., 2020, pp. 603–625)
	“Airline pricing under different market conditions: Evidence from European Low-Cost Carriers”	<i>Tourism Management</i>	Q1 (SJR, 2020)	Q1 (SJR, 2020)	No ranking available	Low-cost carriers use low-price headline prices to stimulate demand. A price reduction of 1 standard deviation increases the load factor by 2.7% (Bilotkach et al., 2015, pp. 152–163).
	“Dynamic pricing with fairness concerns and a capacity constraint”	<i>Quantitative Marketing and Economics</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	B (VHB, n.d)	Firms refrain from using this dynamic pricing when they believe consumers will perceive it as unfair, most likely to occur when consumers are paying access costs (Selove, 2019, pp. 385–413).
	“Investigating the discriminatory pricing strategy of theme parks considering visitor’s perceptions”	<i>Asia Pacific Journal of Tourism Research</i>	Q1 (SJR, 2020)	1 (ABS, 2015)	No ranking available	Dynamic pricing for theme park tickets, including discretionary pricing, was not found to create a perception of unfairness unless the lower prices were accompanied by a lower quality of service (Wang et al., 2020).
	“Bifurcation analysis of dynamic pricing processes with nonlinear external reference effects”	<i>Communications in Nonlinear Science and Numerical Simulation</i>	Q1 (SJR, 2020)	No ranking available	No ranking available	Price rises under dynamic pricing are not always be seen as unfair when sellers demonstrate price changes are justifiable (Lu, Oberst, Zhang, & Luo, 2019, p. 104929)
“Exploring price fairness perceptions and their influence on consumer	<i>Journal of Business Research</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	B (VHB n.d.)	Consumer responses to dynamic pricing differ depending upon the intensity of the perceived unfairness. Negative reactions included a	

	behavior”					reduced intention to purchase, complaints, negative feedback, and other courses of action that could be harmful to the brand. Personal income/utility can moderate or exacerbate the intensity of consumer feelings (Malc, Mumel, & Pisman, 2016, pp. 3693–3697)
	“Mapping the Ethicality of Algorithmic Pricing: A Review of Dynamic and Personalized Pricing”	<i>Journal of Business Ethics</i>	Q1 (SJR, 2020)	3 (ABS, 2021)	No ranking available.	This study offers a literature review about the ethical challenges of algorithmic pricing to identify morally ambivalent topics, which need further research (Seele et al., 2021).
	“An analysis of asymmetry in dynamic pricing of hospitality industry”	<i>International Journal of Hospitality Management</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	No ranking available.	In some sectors there is an expectation of dynamic pricing, e.g. hospitality, where dynamic pricing does not lead to negative effects. Asymmetric information for suppliers and consumer is a significant influence (Mitra, 2020).
Personalized dynamic pricing (PDP) and channel differentiated pricing.	“Are airline passengers ready for personalized dynamic pricing? A study of German consumers”	<i>Journal of Revenue and Pricing Management</i>	Q3 (SJR, 2020)	1 (ABS, 2021)	C (VHB, n.d.)	PDP has been facilitated by advances in predictive technology and is reliant on a firm having sufficient information about consumers to assess their willingness to pay. It has the potential to undermine long-term loyalty. It is used in the airline industry (Krämer et al., 2018, pp. 115–120).
	“Priced just for me: The role of interpersonal attachment style on consumer responses to customized pricing”	<i>Journal of Consumer Behavior</i>	Q2 (SJR, 2020)	Ranking not available	C (VHB, n.d.)	Customised pricing strategies in the presence of an interpersonal attachment lead to consumers expecting a discount. Consumers will be unhappy if pay the shelf price. Therefore, attachment orientations impact upon consumer perceptions of PDP (David et al., 2017, pp. 26–37)
	“A Data-Driven Approach to Personalized Bundle Pricing and Recommendation”	<i>Manufacturing and Service Operations Management</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	Ranking not available	The use of PDP in conjunction with the creation of personalized bundles of goods/services suggested by automated algorithms may increase the consumers’ perceptions of value and lead to a growth in revenue, particularly with high end consumers where there is a low level of sensitivity to price. (Ettl, Harsha, Papush, & Perakis, 2019, pp. 429–643).
	“Optimal Dual-Channel Dynamic Pricing of Perishable Items under Different Attenuation Coefficients of Demands”	<i>Journal of Systems Science and Systems Engineering</i>	Q2 (SJR, 2020)	No ranking available.	No ranking available.	Perishable products with a limited shelf life CAN be set at different prices based on the channel of distribution, with each being put in place to optimise demand. However, not all products will support sufficient price differences to remain viable across different channels (Lou et al., 2020).
Dynamic pricing and reference prices	“The exploration of hotel reference prices under dynamic pricing scenarios and different forms of competition”	<i>International Journal of Hospitality Management</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	No ranking available	Reference prices for consumers will decrease as the suppliers reduce prices (Viglia et al., 2016, pp. 46–55).
	“Dynamic pricing in the presence of reference price effect and consumer strategic behavior”	<i>International Journal of Production Research</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	B (VHB, n.d.)	Retailers under a centralised system of price mark-ups/mark-downs found consumers were more likely to adopt strategic behavior as the mark-down strategies created a lower referent pricing point. The shift to a lower referent pricing point was absent on retailers without centralised pricing policies (Chen et al., 2020, pp. 546–561).
	“The effects of relative and referent thinking on tourism product design”	<i>Tourism Management</i>	Q1 (SJR, 2020)	4 (ABS, 2015)	No ranking available	Under normal conditions, when bidding on goods with prices below a reference point, consumers prioritise satisfying personal needs rather than achieving value. Reference prices increased when in the presence of nonmonetary sales promotions, higher initial prices, and terms indicating higher quality (Yu et al., 2019, pp. 157–171).

	“The influence of reference effect on pricing strategies in revenue management settings”	<i>International Transactions in Operational Research</i>	Q1 (SJR, 2020)	1 (ABS, 2015)	No ranking available	Dynamic pricing impacts upon the consumers’ perception of value based on their recall of past referent prices. However, the use of dynamic/variable pricing strategies impacts upon the referent pricing points and therefore impact upon later consumer sales (Yang et al., 2017, pp. 907–924).
	“Optimal dynamic pricing for deteriorating items with reference price effects when inventories stimulate demand”	<i>European Journal of Operational Research</i>	Q1 (SJR, 2020)	4 (ABS, 2015)	A (VHB, n.d.)	Reference prices are often set by the existing price when goods are sold using displayed stock. When the prices change, consumers can be classified as loss neutral, loss avert, or loss seeking, with decisions based on the recall of past prices (Hsieh & Dye, 2017, pp. 136–150).
	“Dynamic pricing decisions by potential tourists under uncertainty: The effects of tourism advertising”	<i>Tourism Economics</i>	Q1 (SJR, 2020)	2 (ABS, 2015)	No ranking available	Reference prices are influenced by consumer status as a risk taker or a risk avoider. The risk avoiders do not alter their reference price by the same amount as risk takers. Perceptions of risk may be influenced by marketing (Song & Jiang, 2018, pp. 213–234)
Consumers benefiting from dynamic pricing	“A simulation of the impacts of dynamic price management for perishable foods on retailer performance in the presence of need-driven purchasing consumers”	<i>Journal of the Operational Research Society</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	B (VHB, n.d.)	When consumers know retailers will reduce prices on perishable goods, those seeking lower prices will wait until the goods are within the known discount period. Retailers may increase revenues by adopting a more graduated discounts (Chung & Li, 2013, pp. 1177–1188).
	“Pricing strategies on Airbnb: Are multi-unit hosts revenue pros?”	<i>International Journal of Hospitality Management</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	No ranking available	Hotels/suppliers using dynamic pricing, with prices below the category average gained the greatest increase in sales and enhanced overall revenue generation while concurrently benefiting consumers (Kwok & Xie, 2019, pp. 252–259).
	“EasyJet pricing strategy: should low-fare airlines over last-minute deals?”	<i>Quantitative Marketing and Economics</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	B (VHB, n.d.)	Low-cost airlines benefit from offering lower prices when tickets initially go on sale. Consumers expect this pricing model and are more likely to buy tickets early when believing that no last-minute special offers will be available (Koenigsberg et al., 2004, pp. 279–297).
	“Dynamic Pricing in Social Networks: The Word-of-Mouth Effect”	<i>Management Science</i>	Q1 (SJR, 2020)	4* (ABS, 2015)	A+ (VHB, n.d.)	Sellers can use dynamic prices when establishing demand within the market. New app developers have given away their apps in order to establish a reputation and support word-of-mouth marketing with a view to increasing prices at a later date (Ajourlou, Jadbabaie, & Kakhbod, 2018, pp. 495–981)
	“Dynamic pricing of electronic products with consumer reviews”	<i>Omega</i>	Q1 (SJR, 2020)	No ranking available	No ranking available	Dynamic pricing on new products can benefit consumers who gain good quality products at below market priced as firms seek to increase their market penetration and overcome the ‘cold start’ problem while concurrently developing a reputation that will justify higher prices (He & Chen, 2018, pp. 123–134)
	“Price-setting models for the innovative business school”	<i>Routledge, Taylor &amp; Francis</i>	No ranking available	No ranking available	No ranking available	Personal dynamic pricing can significantly reduce the total tuition fees of students in higher education (Halkias, Neubert, Thurman, Adendorff, & Abadir, 2020, p. 24-34).
The impact of asymmetry of information and/or power within dynamic pricing	“Use of dynamic pricing strategies by Airbnb hosts”	<i>International Journal of Contemporary Hospitality Management</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	No ranking available	Hoteliers suffer a lack of knowledge regarding optimal uses of dynamic pricing to attract consumers and maximise revenues (Gibbs, Guttentag, Gretzel, Yao, & Morton, 2018, pp. 2–20).
	“Advance Purchase Discounts Versus Clearance Sales”	<i>Economic Journal</i>	Q1 (SJR, 2020)	4 (ABS, 2015)	No ranking available.	Monopolists working in an uncertain market is likely to maximise revenues if they use both advanced price discounting to attract early commitment and cut prices for late buyers (Mtler & Watanabe, 2010, pp. 1125–1148).
	“Dynamic exploits:	<i>New Technology,</i>	Q1 (SJR,	3 (ABS,	No	On-demand firms can use their advantage of



	calculative asymmetries in the on-demand economy”	<i>Work and Employment</i>	2020)	2015)	ranking available	increased knowledge to leverage dynamic pricing with the aim of increasing revenues, which includes the use of ‘surge pricing’ (Shapiro, 2020, pp. 162–177) .
	“Competition-Based Dynamic Pricing in Online Retailing: A Methodology Validated with Field Experiments”	<i>Management Science</i>	Q1 (SJR, 2020)	4* (ABS, 2015)	A+ (VHB, n.d.)	Retailers need to know how and when to they should change their prices and could help themselves and reduce asymmetry of information by consumer reaction during in sales patterns, including periods when competitors had run out of stock or alternate choices were not available in order to (Fisher, Gallino, & Li, 2018, pp. 2473–2972)
Consumer reactions to price increases	“Fostering Residential Demand Response through Dynamic Pricing Schemes: A Behavioral Review of Smart Grid Pilots in Europe”	<i>Sustainability</i>	Q2 (SJR, 2020)	No ranking available	C (VHB, n.d.)	Suppliers can use dynamic pricing to adjust consumer demand/ consumption. Increases in price because of limited resources will result in consumers being more responsive when there are clear and easy to understand tariffs (Kessels et al., 2016, p. 929)
	“Dynamic pricing in customer markets with switching costs”	<i>Review of Economic Dynamics</i>	Q1 (SJR, 2020)	3 (ABS, 2015)	No ranking available	Dynamic pricing is less likely to have an impact on demand or on consumer switching behavior when there are high switching costs, so consumers may not show immediate reactions. These market conditions are likely to attract new competitors (Cabral, 2016, pp. 43–62).
	“Load-shift incentives for household demand response: Evaluation of hourly dynamic pricing and rebate schemes in a wind-based electricity system”	<i>Energy</i>	Q1 (SJR, 2020)	No ranking available	No ranking available	Simple, easy-to-understand variable price tariffs that allow consumers to predict the prices they pay are more effective at shifting demand than alternate schemes such as the provision of rebates (Katz et al., 2016, pp. 1602–1616).
	“Why do consumers prefer static instead of dynamic pricing plans? An empirical study for a better understanding of the low preferences for time-variant pricing plans”	<i>European Journal of Operational Research</i>	Q1 (SJR, 2020)	4 (ABS, 2015)	A (VHB, n.d.)	Consumers do not like pricing uncertainty within ongoing contracts, often preferring stable, non-changing prices over dynamic prices even if the result is a higher level of expenditure. Perceptions and attitude to risk influence the consumers decision-making process, more than price alone (Schlereth et al., 2018, pp. 1165–1179)
	“Is transparency a good thing? How online price transparency and variability can benefit firms and influence consumer decision making”	<i>Business Horizons</i>	Q1 (SJR, 2020)	2 (ABS, 2020)	C (VHB, n.d.)	Firms that adopt a transparent approach towards dynamic pricing to reduce the asymmetry of information are more likely to be attractive than less transparent firms (Hanna et al., 2019, pp. 227–236)
	“A two-layer model for dynamic pricing of electricity and optimal charging of electric vehicles under price spikes”	<i>Energy</i>	Q1 (SJR, 2020)	No ranking available	No ranking available	Dynamic pricing for electrical vehicle parking is most effective at managing demand when lower base prices are charged and a premium is added during peak periods (Subramanian & Das, 2019, pp. 1266–1277).

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