



UiT The Arctic University of Norway

School of Business and Economics

What ticks the tickets?

Determining ticket sales for the Bukta Open Air Festival

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Preface

I would like to thank my supervisor Eirik Eriksen Heen for his help and devotion to my master thesis. His humour and positive attitude had brightened up my day and motivated me a lot. Thanks to Sverre Braathen Thyholdt for not leaving me alone with all the non-economists at the Bukta festival. I think we finally can make the Bukta festival profitable again.

Thanks to my family for the love and support for all these six years of my life. It has been a tough time for all of us after the passing away of my dear brother Rudi and my aunt Merete, but we have stuck together in times of need. Rudi was not just my brother, but also one of my closest friends and biggest supporters, and I could never have done this without him. I will love you always, and you will forever have a special place in my heart.

I would like to thank Marianne Saus who is the previous board leader, and current CEO of the Bukta festival for help and permission for collecting the data.

Thank you to Tone, Heidi and Maria in the School of Business and Economics administration for all the support and periods of procrastination. It has been a pleasure to get to know all of you.

To all my friends at my study: Thank you for an amazing time. I will get my revenge in table tennis. Just you wait..!

As I am a board member of the Bukta festival I was entrusted with the data for this master thesis. Some of the data is confidential, and I can therefore not share the datasets. Being a board member means I have more insight into the organisation, and some information I provide about the Bukta festival might be difficult to find references for, as it is not public knowledge. No confidential information has been mentioned in this thesis.

Abstract

Knowing how to sell the right product, to the right customer to the right price can be the difference between profit or loss for music festivals. Festivals main source of income comes from ticket sales and being able to efficiently conduct booking management is crucial to sustain a stable income throughout the financial year.

Little empirical research has been done on pricing strategies and demand determinants for the festival industry. I have collected data on performing bands and ticket sales for the Bukta festival for the period 2016-2019. The aim of this master thesis is to model an ordinary least square (OLS) regression to find the determinants for the demand of festival passes for the Bukta festival. With the use of research from similar industries, theory around revenue management, price discrimination and product differentiation I modelled a quasi-demand equation.

The finds estimate a price elasticity of -3,2% for festival passes to the Bukta festival, suggesting that a lower price can beneficially increase sales. Weeks containing paydays are estimated to increase the sales of festival passes by approximately 29%. By focusing marketing in weeks containing paydays, when the consumers' willingness to pay is the highest, the Bukta festival might see an increase in demand for festival passes I used bands monthly Spotify listeners to quantify a measure of popularity for bands. The model estimates northern Norwegian bands popularity to increase sales, while a more popular Nordic band decreases sales. By booking more Nordic bands, sales are estimated to increase by 22%. When viewed in context with the popularity measurement, this indicates that there could be something wrong with the data. 2016 was the year that performed the best in terms of ticket sales.

Key words: Revenue management, OLS, the Bukta festival, Price discrimination, festival economics

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1 Introduction

Festivals, hotels, airlines, and similar enterprises are dependent on ticket sales/booking to continue operations. To sustain customers patronage firms may conduct booking management. This being knowing when to ask for what price, how consumers will react to market changes and what willingness to pay exists for different market segments, can lead to a more efficient and profitable revenue management (Stuart-Hill, 2013).

With several music festivals in Norway going bankrupt the last few years, it is vital for them to carefully manage ticket sales, prices, and bands to stay afloat. Knowing what impacts demand, when to focus marketing, and when to adjust prices is crucial for festivals profitability. With mainly fixed costs and a limited capacity (Kleppe, 2021), festivals needs to know how to fill underutilized capacity. Knowing how to offer a lower price to consumers segments with a lower willingness to pay, while still asking for a higher price from consumer segments with a higher willingness to pay (Pepall et al., 2014) can make the difference between profit and loss.

Because there exists little empirical research for pricing strategies and demand determinants for the festival industry, I will look at how research has been done in similar industries. The aim is to model a regression for a quasi-demand equation for festival passes to the Bukta festival.

The demand for tickets to a festival can be impacted by multiple variables, such as the performing bands popularity, the ticket price, days to festival, and bands origins. To measure a bands popularity, I will be looking at band's monthly listeners on Spotify. It would be expected to find a positive relation between band's monthly Spotify listeners and tickets sold. I would expect the ticket sales to have a negative relation to the ticket price, as a higher price should reduce demand for a normal good.

2 Literature review

Leenders et al. (2005) does in their article “Success in the Dutch Music Festival Market: The Role of Format and Content” try to figure what determines a festivals success. They define a festivals success as the percentage growth in the number of visitors in the period 2002 to 2003, relative to the average number of visitors in the period 1999-2003. As festival sizes may differ and smaller festivals may experience higher growth rates, they also used the budget as a proxy for festival size. What Leenders et al. found was that budget, star line-up, ticket price, theme and location are insignificant predictors of success. The festivals with a higher budget had higher ticket prices and more popular performing artists. Relatively newer festivals can achieve growth in visitors, especially for smaller niche festivals. Niche festivals performed better for both smaller and larger festivals. They also found festivals capacity constraints to be beneficial to diversity, as more festivals can enter the market. Usually, newer festivals had a more niche approach, and by having a narrower scope on genre, festivals can get more market power. Interestingly they found that brand loyalty is relatively low in the festival industry, which can imply that festival visitors might cycle more between festivals, rather than staying loyal to the same festival.

Kelley, Harrolle and Casper (2014) investigates ticket sales, and consumer spending during NHL matches. They collected financial data from 123 regular season home games to find out how different weekdays, special promotions, month in season, and other variables affected the sales for a given NHL team. They used an ordinary least square analysis to measure the effects of the independent variables on revenue. The results for ticket sales revealed that weekend games, special promotions, division opponents, and night games had a significant impact on the total ticket sales. Games during weekends sold more tickets than games during weekdays, and night games (after 17:00 local time) sold more tickets than games earlier in the day. Special promotions also significantly increased ticket sales, while division opponents had a significant negative impact on ticket sales. They could not find any significance for the month in season, except for November, which had a negative impact on ticket sales. Kelley et al. conclude that the opportunity cost for consumers time is lower during weekends, and therefore the weekend games see higher ticket sales. Since weekend games already have a higher demand, special promotions can be used more for weekday games to increase demand.

Lorenzo Zirulia (2016) shows that the accuracy of weather forecasts impact the profit of a monopolistic tourist firm (hotel). Tourists can look at the weather forecast before deciding to

go on holiday or not. At this time hotels need to have posted their prices to have as supply for the tourists. Since the weather is one of the deciding factors for where to go on holiday for last minute tourists, the accuracy of the weather forecast will affect the hotels' prices, as well as demand and tourists' perception of their holiday. Zirulia found that the price chosen by the monopolist and the corresponding equilibrium decreases in relation to the accuracy of weather forecasts. A higher accuracy for weather forecasts increases the information for the consumers, which puts pressure on prices and therefore increases the consumer surplus. The negative effect of weather forecasts can be mitigated by firms and the local authorities by actively investing in improving the tourist experience irrespectively of weather. For instance, investing in cultural attractions can reduce the effects of pessimistic weather forecasts.

Timo Tohmo (2005) examined the economic impacts of the Finnish folk music festival Kaustinen. They found that the Kaustinen festival has a net positive output on tax revenues for the municipality, with subsidies from the municipality in mind. The Kaustinen festival also contributes positively to the local and regional economy by attracting tourists and Finnish residents from outside the region. There is also a positive effect, although relatively small, on employment. Tohmo mentions that volunteers working at the festival also have an impact, but it is not included in Tohmo's study. The positive effects of the Kaustinen folk music festival on the local economy means it is in the municipalities and local authorities' interest in a pure profit maximizing way to host such events.

2.1 Price discrimination and product differentiation

Price discrimination is a way to offer the same product at different prices to consumers with different willingness to pay (Pepall et al., 2014). Unlike uniform pricing where every consumer is offered the same product to the same price. Price discrimination is a pricing strategy where firms look at different aspects of the consumers to offer different prices to different market segments, with different willingness to pay. To be able to efficiently apply price discrimination, firms will need some market power. It is also essential for all three types of price discrimination that the lower paying consumers can't buy the product or service, and then sell it to the higher paying consumers for cheaper than the firm is selling the product. This is called arbitrage, and if there is an opportunity for arbitrage, it is not possible to have price discrimination in the market. The three types of price discrimination are::

1. First-degree price discrimination

First-degree price discrimination is often called perfect price discrimination, or personalized pricing (Pepall et al., 2014). The practise of first-degree price discrimination presupposes that the firm has perfect information about the consumers and their preferences. The aim is to sell the product to each consumers exact willingness to pay, leaving no consumer surplus.

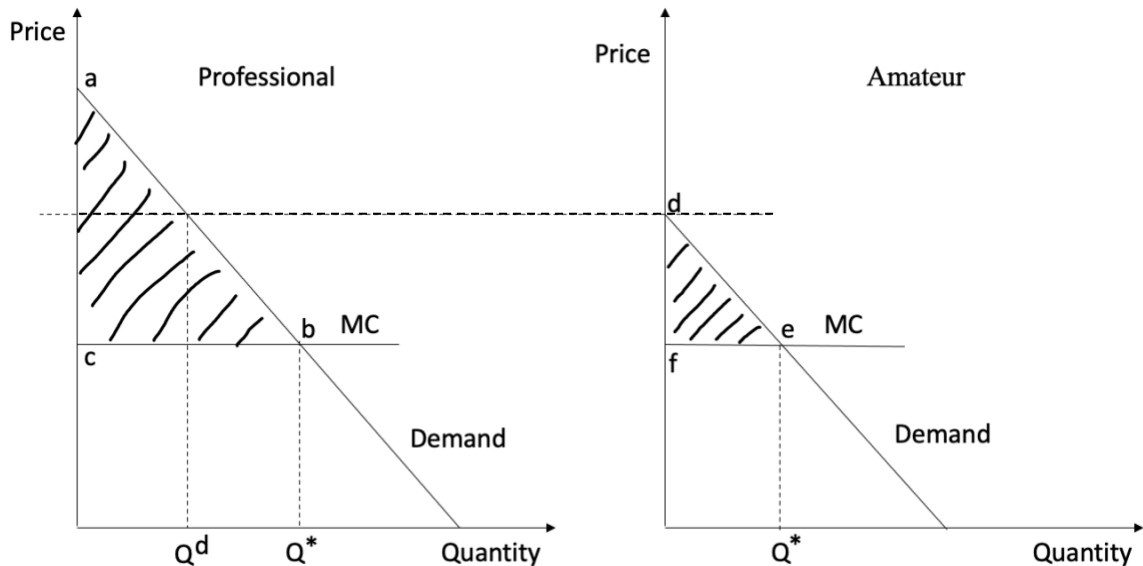


Figure 1: First-degree price discrimination (Pepall et al., 2014)

From figure 1, assume a monopolistic firm that sells cameras on Ebay, and incurs a marginal cost (MC) for each camera, and a fixed cost (F). There are two types of consumers on the market: professional and amateur photographers. The firm posts their camera with a starting price equal to the marginal costs (MC). Both the professional and amateur photographers start bidding on the camera and reveals whether they are a professional or amateur. The amateurs will be willing to pay up to the price in point “d” for the first camera, while the professionals will be willing to pay up to point “a” for the first camera. Only the professional photographers will buy cameras to decreasing prices, following the demand curve until the firms has sold Q^d number of cameras. At this point the amateurs will be able to afford cameras as well. The firm will keep selling cameras to both professional and amateur photographers until the last consumer buys a camera for a price equal to the marginal cost. At this point the firm has made a profit of $N_p * \frac{(a-c)^2}{2} + N_a * \frac{(d-f)^2}{2} - F$, completely capturing all the consumer surplus.

Where N_p is the number of professional photographers, and N_a is the number of amateur photographers.

2. Second-degree price discrimination

Second-degree price discrimination is when the firm observes the consumers preferences and their purchase patterns to offer different prices to lower- and higher demand customers (Pepall et al., 2014). By collecting data on the consumer, the firm can segment higher and lower paying consumers to encourage the consumers with a higher willingness to pay to purchase the product to a higher price. This can be achieved by for example giving a discount for large purchases.

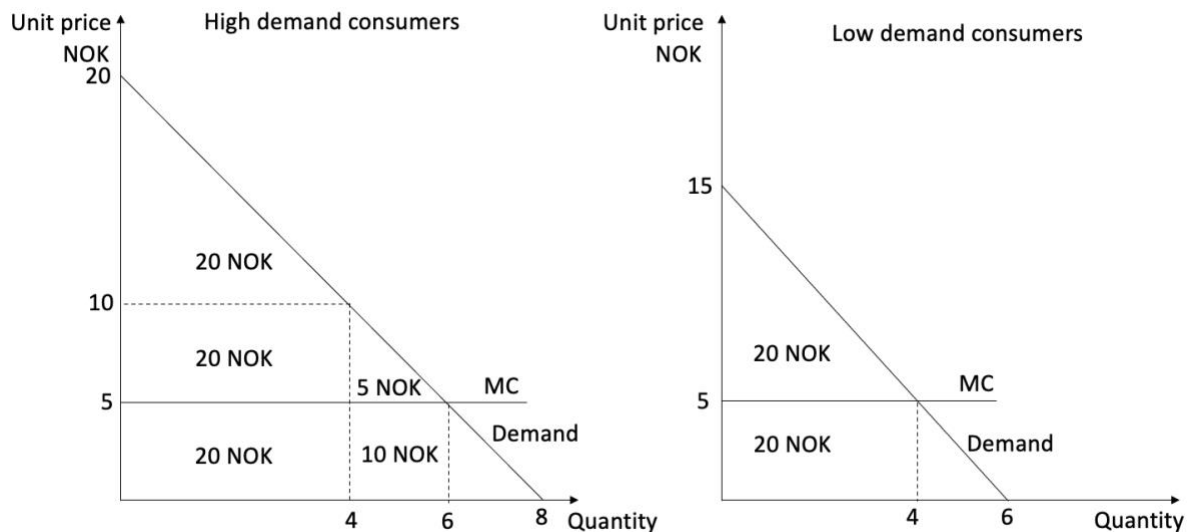


Figure 2: Second-degree price discrimination (Pepall et al., 2014)

From figure 2 assume a monopolistic water park with just one attraction: a waterslide. There are two types of consumers for the water park who are either high demand consumers or low demand consumers. The water park has a fixed cost for opening, and a marginal cost (MC) of 5 NOK per ride in the waterslide, and operates with a price for entry, and a price per ride in the waterslide. The low demand consumers are willing to pay 40 NOK for entry plus 4 rides in the water slide, while the high demand consumers are willing to pay 60 NOK for entry plus 4 rides in the waterslide. If the water park were to offer a package with entry plus 4 rides for 40 NOK, they would effectively extract the 20 NOK consumer surplus from the low demand consumers (compared to a market with perfect competition). High demand consumers would still have a consumer surplus of $60 \text{ NOK} - 40 \text{ NOK} = 20 \text{ NOK}$. The water park needs to offer a second package to the higher demand consumers to further increase revenue. The high demand consumers are willing to pay 75 NOK for entry plus 6 rides in the water slide, but they would rather have a 20 NOK surplus for the entry plus 4 rides package. This means that

the water park must make sure that the high demand consumers are offered 20 NOK consumer surplus to make the second package offer incentive compatible to the first package. The optimal strategy would be to offer entry plus 6 rides in the water slide for 55 NOK. This would give the high demand consumers the same surplus, whether they choose the first or second package, and at the same time generate some additional profits for the water park.

3. Third-degree price discrimination

Third degree price discrimination focuses on consumers demographics. Here the firm observes the consumers age, gender, nationality, and other demographic characteristics about the consumer. For example, can demand vary across national borders or between consumers in different life situations.

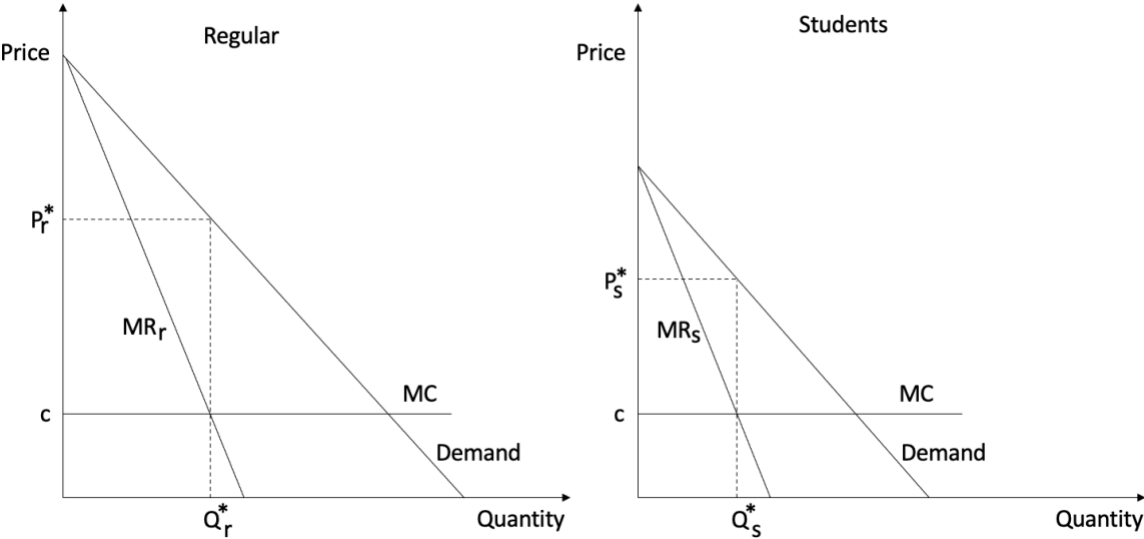


Figure 3: Third-degree price discrimination (Pepall et al., 2014)

Third-degree price discrimination is usually not graphed, but as an example assume a monopolistic night club that sells one type of beer and has customers that are either students, or regular customers. Let Figure 3 illustrate the demand from the regular consumers, and the student consumers respectively. The night club has a constant marginal cost (MC) equal to c . Under third-degree price discrimination, a monopolist maximizes their profit where marginal costs equals marginal revenue in each market. The optimal strategy for the night club would therefore be to set the output where the marginal revenue (MR) equals marginal costs (MC), and find the market clearing price for this quantity. This makes the output for regular

consumers Q_r^* and Q_s^* for the students. For this quantity the market clearing price for regular consumers are P_r^* , and P_s^* for the students. Note that $Q_r^* > Q_s^*$, $P_r^* > P_s^*$.

Product differentiation

Price discrimination is a brilliant way to sell the same product for different prices, but it is not the only way to possibly earn additional profits in a market. Another way to appeal to different market segments is to differentiate the products (Pepall et al., 2014). There are two main ways to differentiate a product called vertical and horizontal product differentiation. For horizontal product differentiation all consumers will not agree on which product is better. The aim is to alter the product to fit different consumers preferences. For example, in the mobile phone market some prefer IOS which is the operating system in iPhone, while others prefer Android, which is the operating system in Samsung phones. Horizontal product differentiation changes the product itself. For vertical product differentiation all consumers will agree which product is better and can arrange them in the same order. The aim is to make the product more appealing by increasing the quality of the product. This could be adding warranty, more storage, or stronger screens. Vertical product differentiation is a great way to increase profits by charging more for better quality, while horizontal product differentiation is great in a competitive market to differentiate the product from the competitors' products. While price discrimination is about altering the prices across market segments, product differentiation is about changing the product or service, and can therefore cause increased costs for the product or service.

2.2 Revenue management

Revenue management is taught to have started in the airline industry after the Airline Deregulation Act of 1978 (van Ryzin & Talluri, 2005). Before this the U.S. Civil Aviation Board controlled U.S. airline markets by (amongst other things) regulating the prices and routs. When the act was passed airlines stood free to choose their own prices, schedules, and service. This made airlines more profitable, and new low-cost airlines could now enter the market. This was due to the airlines themselves having more information about how to maximise their own profits and adapt to signals from the market.

The practise of Revenue management involves predicting consumers behaviour to predict the real-time customer demand at the micro market level (Cross, 2011). The goal of Revenue management is to sell the right product to the right customer to the right price. Revenue

management relies heavily on theory from price discrimination and product differentiation. If one were to split Revenue management in two, one half is trying to predict real-time demand by analysing historic data on consumer behaviour, and dividing consumers in as many segments as possible. The second half is where the firm uses this data to focus their products to the different consumer segments. This second part involves product differentiation and price discrimination to fit the right product to the right customer. Since most markets don't have a constant demand over time, aspects such as holiday seasons, payday, and weekends need to be included. This means that Revenue management is a dynamic model, which allows firms to offer the same product to different consumers to different prices, at the same time (Huefner, 2015).

Airlines are not the only industry that can have an advantage of revenue management. Hotels, cruises, car rentals and many other industries actively use revenue management. To be able to effectively use revenue management a firm has to meet four conditions (van Ryzin & Talluri, 2005):

A relatively fixed amount of inventory is available for sale at any given time.

The firm has a limited capacity, and can't change the capacity or its deployment in response to variations in demand (Stuart-Hill, 2013).

Inventory is perishable.

There is a limited time to sell the service or product. Unsold products cannot be sold at a later point in time, as the service no longer exists (Huefner, 2015).

Different consumer types are willing to pay different prices (demand is not constant).

Demand varies over time, and can be impacted by the time of day, for different seasons, or during holidays. With a constant demand, it is much easier to match demand by adjusting the capacity, while for a varying demand one will need some tools to predict future demand (Huefner, 2015).

There is some level of ability to forecast future demand.

To efficiently use Revenue management to bring additional consumers to underutilized service times, firms need the ability to forecast future demand, to predict times where excess

capacity is likely to exist. It is also important to know which consumers have what willingness to pay. A firm would not like to sell the lower priced service or product to consumers that are willing to pay for the more expensive service or product (Huefner, 2015).

It was previously taught that firms also needed to have a cost structure where fixed costs were the dominant costs for the firm. It was also taught that firms needed the ability to sell the product or service in advance. This is because Revenue management started in the airline industry, which has mainly fixed effects (Huefner, 2015).

2.3 Music festival economics

Music festivals are a collection of concerts put together to form a program of artists who performs to different schedules over the span of a couple of days. Festival's cost structure is about 42,5% booking costs, 43% operation costs, and 14,5% in staff costs (Kleppe, 2021). The income structure for festivals is on average 56% ticket sales, 20% added sales, and 24% backing from partners or sponsors (Kleppe, 2021). Added sales include food and beverages, and festival and band merchandise. Income from the sponsors and partners can be either in the form of payment in cash, increasing the income, or in the form of services, reducing the costs. These payments can be met with brand marketing, festival tickets, or other services from the festival. The income from ticket sales and backing from partners and sponsors can give a stable income throughout the financial year, while the income from added sales usually comes during the festival. As ticket sales is on average over half the income for festivals, one can understand why revenue management, with a clear strategy for booking management is crucial for festivals profitability.

During festivals the main workforce often consists of volunteers (Barron & Rihova, 2011). The volunteers can be private individuals, friend groups, or sport teams. Private individuals and friend groups can be compensated with a festival ticket and/or merchandise, while sport teams can be paid a fixed sum, based on how many volunteers they can offer. Volunteer work removes a lot of labour costs, and volunteers can also be a great way to market festivals, as they may speak to their friends about the festival.

In Norway weather can be harsh from late fall up until early autumn. Therefore, Norwegian outdoor festivals usually are in the period June-August (Kleppe, 2021). The weather can have an impact on the number of tickets sold, as well as impacting added sales during the festival (Zirulia, 2016). As the attendants at festivals know they will be staying outside for at least a

couple of hours, weather such as rain and wind can have a negative impact on sales, while sun and warmth may have a positive impact.

3 The Bukta festival

The Bukta Tromsø Open Air Festival was founded in 2004 by a group of friends that loves rock music. The festival has expanded exponentially since 2004, both in physical size, and financially (proff.no, 2022). There are five full-time employees, who works with year-round operations and side projects for the festival. The festival is arranged annually the second to last weekend of July and lasts from Thursday to Saturday. The festival is located at the southernmost point of the Tromsø island, called Telegrafbukta, and has become a part of the northern Norwegian culture.

3.1 The Bukta festival economics

The Bukta festival turnover about 11-14 million NOK a year (proff.no, 2022). The main sources of income for the Bukta festival comes from ticket sales, backing from partners, and added sales during the festival. Tickets consists of daily tickets, which can be bought for each separate day, and festival passes, which grants entry to all three days. The costs mainly consist of staff wages, production materials for the festival, and band fees. For the recent years, (excluded 2020, 2021 and 2022 because of the pandemic) Operation profits have been negative for the Bukta festival (proff.no, 2022).

During festivals, the Bukta festival hires local businesses to set up productions and for other services. The festival is an important source of income for many of these local businesses. There are annually about 500-600 volunteers working before, during and after the festival (Buktafestivalen, 2022c). It is important to the Bukta festival that the volunteers feel appreciated, and volunteers are therefore compensated with merchandise, a festival pass, volunteer parties and other events throughout the year.

The Bukta festival does also have some minor project throughout the financial year, such as Bukta battle and Bukta Arrangørskolen, which contributes to developing northern Norwegian rock bands and educates young event organizers. Bukta battle is a music competition, where the winners get to perform at the festival, as well as free productions of their first single, amongst other things (Buktafestivalen, 2022b). Arrangørskolen is an event

where young event organizer spouts get to plan and execute a mini version of the Bukta festival (Buktafestivalen, 2022a). Both events are a great way for the Bukta festival to let up and coming bands have an arena to perform at and recruit new volunteers that can take on more responsibility during the festival.

3.1.1 Who attends

In 2021 the Bukta festival sent out a survey to map the attendants of the festival. They were also interested in mapping the reasons from non-attendants, but I will be focusing on the attendants in this study. In total 969 people answered the survey, where 875 said they have previously attended the festival, while 94 said they have never attended the festival.

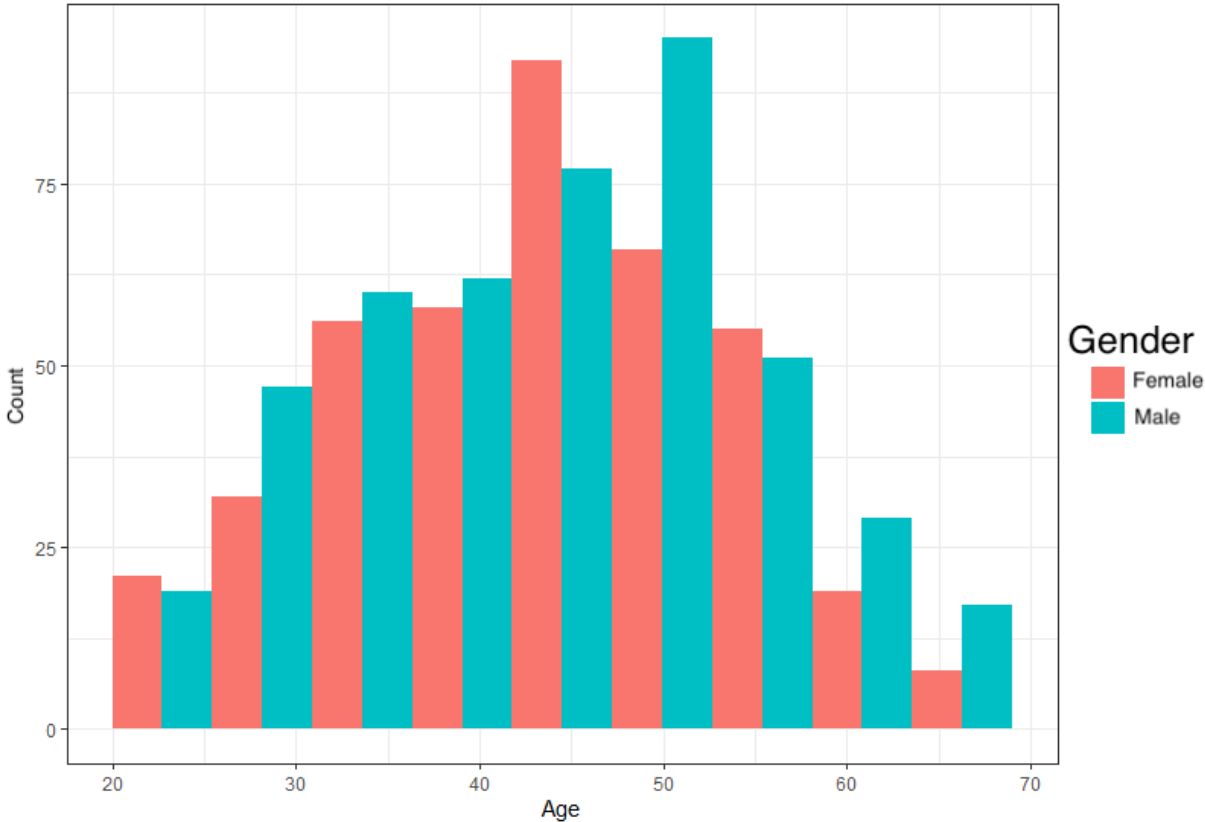


Figure 4: Age of attendants

Figure 4 illustrates the age span and gender of the responding attendants for the Bukta festival. Of the respondents there were 52% males, 47% females, and 1% of other genders. The average age was 44 years, with a median of 45 years. Opdahl et al. (2020) looked at attendants of different cultural events in Trøndelag county. They found that more females than males participated in the category concert, theatre, and cinema.

Attendants education level

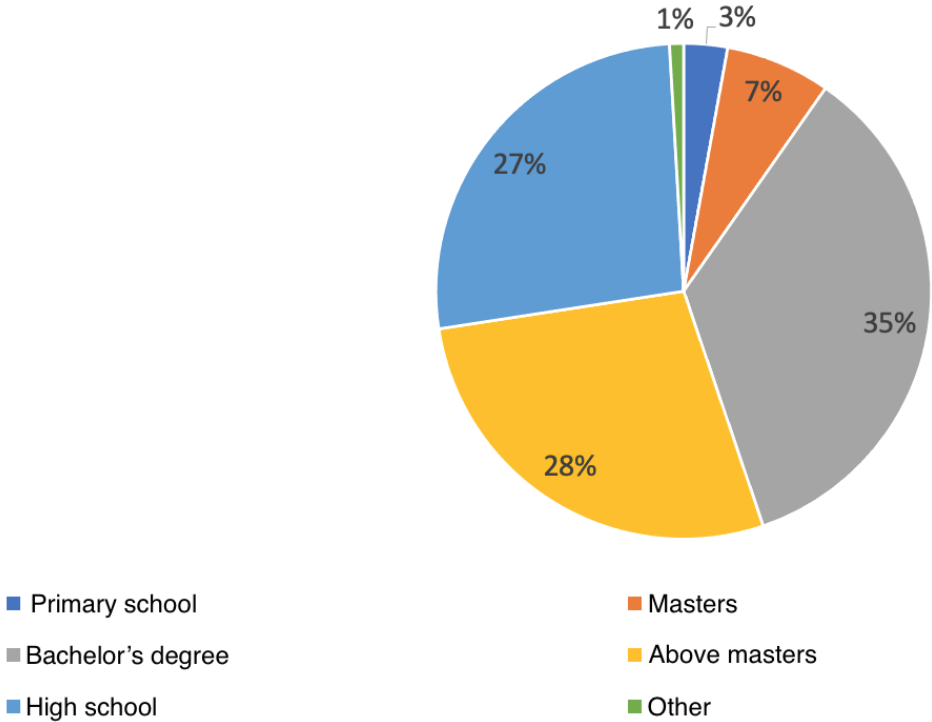


Figure 5: Attendants education level

Figure 5 show the education level of the responding attendants. The education level of the responding attendants is relatively high, with 70% of the attendants having a bachelor's degree or higher. This result can be expected as it is more common (at least in Norway) that there is a positive relation between level of education and participation in cultural activities (Opdahl et al., 2020). The education level can be an indication of the attendants purchasing power, as higher education jobs tend to pay more.

Work situation

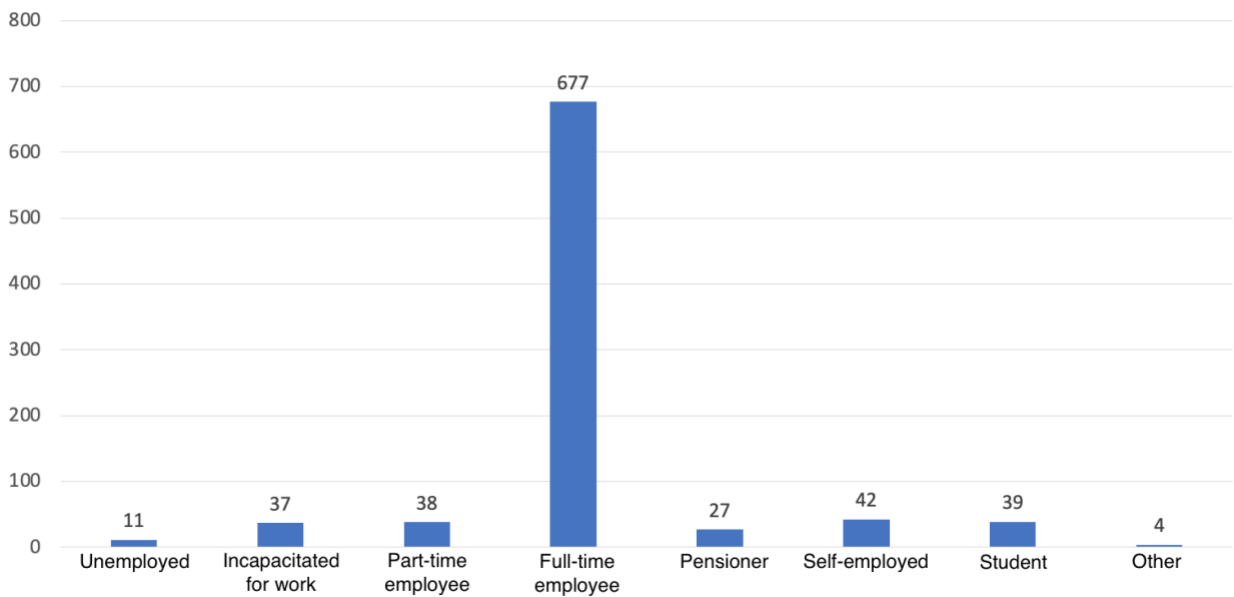


Figure 6: Attendants work situation

The responding attendants work situation is illustrated in figure 6. About 82% of Bukta attendants are full-time employees or self-employed, about 1% is unemployed, and just about 4% of attendants are students. This can be because the festival is during the summer holidays, and many students travels home to their parents, or travel abroad for holiday. Festival passes are relatively expensive, compared to other cultural events, such as theatres and cinemas. This could also be a reason for the high proportion of full-time employees, and the low proportion of students and unemployed. When viewed in context with the education level, it could imply that the Bukta attendants have a relatively high purchasing power.

3.2 Revenue management for the Bukta festival

As mentioned, to be able to efficiently apply Revenue management the Bukta festival will have to meet the four criteria's from Huefner (2015) and Stuart-Hill (2013):

A relatively fixed amount of inventory is available for sale at any given time.

The Bukta festival has a limited capacity at the festival area. The capacity cannot be increased, as it is physically limited by the area available in Telegrafbukta. Reducing capacity would also reduce the revenue from added sales as there would be less attendants, without necessarily beneficially reduce costs for production materials.

Inventory is perishable.

The festival is held annually the second to last weekend of July. After this weekend the product perishes, and the unused capacity cannot be inventoried for future sales.

Different consumer types are willing to pay different prices (demand is not constant).

The demand for each festival varies and is not constant. The bands are different for each festival year and day, which might attract different audiences. Some consumers are more sensitive to the weather, which makes them wait for longer to buy tickets. Others are more price sensitive, or risk-averse¹, and since the ticket prices increase with time, they might buy tickets early, even before the program is known. Consumers can buy either a ticket to a specific day, or a festival pass for all three days of the festival. The festival pass sales for next year's festival open as soon as this year's festival ends, while the one-day tickets are sold from May.

There is some level of ability to forecast future demand.

With the use of historical sales data, a measure of the popularity of performing bands, effects from marketing, and with a measure on how the market reacts to price changes, the Bukta festival can be able to forecast demand to some extent. By monitoring sales throughout the sales period, it becomes clear which festival days there exists excess capacity.

4 Data

The data was collected from the Bukta festival directly. As I am a board member, I was entrusted with the data of the previous ticket sales and band bookings.

The ticket sales data was downloaded from Ticketmaster. The data contains daily ticket sales observations from 2016-2019 for Thursday, Friday, Saturday, and festival passes. It is important to note that observations for festival passes does not include any combinations of

¹ Risk aversion is the tendency for agents to prefer certainty to uncertainty, this means that agents are willing to take a smaller safer payoff than a larger risky one. In this context the agents/festival participant wishes to buy the ticket early to avoid not getting a ticket Nicholson, W., & Snyder, C. (2018). *Microeconomic theory : basic principles and extensions* (Twelfth edition. Walter Nicholson, Christopher Snyder. ed.). Cengage Learning. .

daily tickets but is exclusively the sale of a three-day pass to the Bukta festival. The observations further contain the total sales value, reserved tickets, accumulated total sales, and accumulated sales value. A weakness with the data is that the ticket price is not given as its own value but must be found by taking the daily average of the total sales value. This is a problem because I know that the Bukta festival systematically increases the ticket price over time. Since both full-price tickets and discounted tickets are merged, the daily average does not represent the correct available price for regular consumers at the time for all observations.

The band data contains observations of the bands who have performed at the Bukta festival from 2016 to 2019. The data was collected directly from the Bukta festival, and includes the performance day, performance stage, and the booking fees. As the data contains the booking fees it is strictly confidential. The data does not include when the booked bands were released to the public.

As weather can have an impact on ticket sales, it would be interesting to have data on the long-term weather forecast. Unfortunately, the only weather data I could find was the actual observed data during the festival. It could be interesting for future research to observe the long-term weather forecast in the period before the festival to find whether there is an effect on the ticket sales.

4.1 Data adaptations

The tickets dataset from Ticketmaster had ticket types listed in bulks with the corresponding observations for each ticket type. I instead added the respective ticket types, and festival passes as dummy variables in columns. For each respective festival year, I added a column “Time_diff” that counts the days to the festival for every observation. To find the unit price I divided the total sales value by total sales for every observation and added the values in a column.

From the Bukta festivals home page (Buktafestivalen, 2022c) I gathered information about when each booked band got released to the public. I also found the bands’ monthly Spotify listeners (Spotify, 2022), and the bands’ origins. However, some bands are not listed on Spotify, and I could therefore not add observations on those bands’ monthly listeners. The Spotify listeners is gathered in 2022, which can be a problem, as bands popularity can have changed from then to now. I added the Spotify monthly listeners information to the observations for when the band got released (for the bands I could find). The bands’ origins I

listed as dummy variables in columns, and categorized as either international, Nordic, or northern Norwegian. Then I added the bands' dataset to the ticket's dataset as observation on when they got released, with the mentioned observations.

After combining the ticket and band datasets, I accumulated the data into weeks. Since the sales of festival passes contains more observations than the sales of daily tickets (as festival passes are sold throughout the whole year), I filtered away the daily tickets. I will therefore exclusively analyse the effects on the sales of festival passes. There were also some negative values which were observed after the festival. I had to remove these values, so the years don't start with negative sale values.

Further I normalized the weekly average of monthly Spotify listeners. As there might be a "band release threshold" I added a "cumulative releases" column, as well as cumulative releases for each band's origins. Finally, I added a dummy for weeks containing paydays.

4.2 Descriptive statistics

To illustrate some of the data I will present some descriptive statistics.

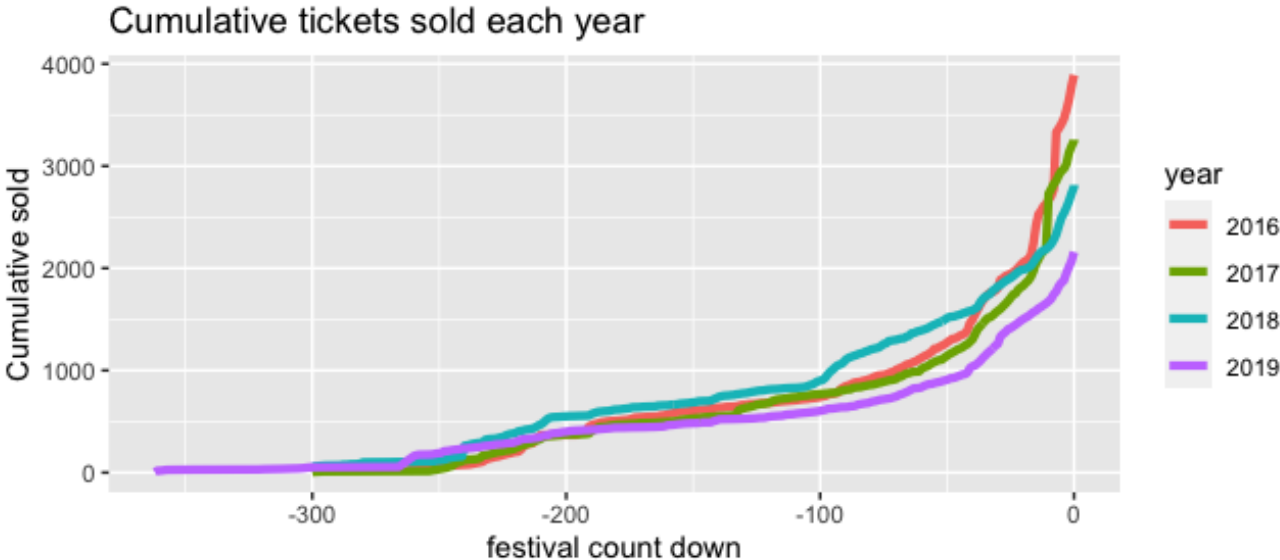


Figure 7: Cumulative sales of festival passes

Figure 7 illustrates the cumulative festival pass sale as time gets closer to the festival. One can see that the ticket sales increases as the time to the festival decreases. Most sales are within

the last 100 days before the festival. In 2019 ticket sales started earlier than for the other years, but the total ticket sales for 2019 were lower than for the other years.

Table 1: Descriptive statistics table for festival passes

year	Total_sold	Booking fees	Income	International	Nordic	Northern Norwegian	Average price	
2016	3891	0.7929894	5410880		5	6	2	1340.230
2017	3258	0.9037504	5283021		6	6	5	1513.515
2018	2815	0.9757822	4585732		6	9	7	1592.502
2019	2159	0.9625943	3659197		4	10	5	1646.460

From Table 1 one can see that 2016 generated the most income from ticket sales, even though the average price for festival passes were the lowest. The sale of festival passes has decreased each year since 2016. The booking fee column is calculated by dividing the band fee by the total booking budget for each respective year. Some booked artists were later cancelled for different reasons and are therefore not included in the dataset. Therefore, “booking fees” does not sum up to 1 for any of the years. 2019 sold the least festival passes and had the highest average prices.

5 Model/Method

In my thesis I wish to find out which variables that impact the demand for festival passes for the Bukta festival. To do so, I will be using an ordinary least square (OLS) regression (Hill et al., 2018). OLS will allow me to find how the dependent variables, such as time to festival, price, bands’ monthly Spotify listeners, and bands origins impact the dependent variable sales. To model a quasi-demand equation, I assume that the price for festival passes is exogenously given, because the Bukta festival sets the prices, it is not formed in the market. Therefore, I will be using OLS instead of a two-stage regression (2SLS), where the price can be endogenously given in the second stage regression. We know from figure 7 that the data is not linear, so I will be using a part log-lin, part log-log model, which should fit the data better than a linear model:

$$(1) \log(Sold) = \beta_1 + \beta_2 * Time + \beta_3 * \log(price) + \beta_4 * cum\ releases + \beta_5 * WASMI + \beta_6 * WASMN + \beta_7 * WASMNN + \beta_8 * band\ fees + \beta_9 * Telegrafbukta + \beta_{10} * factor(Year) + \beta_{11} * lag(payday) + \epsilon_1$$

From equation (1) the shorted variable names are the time to festival variable (Time), the cumulative bands releases (cum releases), and the weekly average of bands monthly Spotify listeners with respect to origin (WASMI, WASMN and WASMNN). If the Bukta festival releases a popular band, one could expect the sales to increase. Some consumers must however wait for the next payday to be able to afford a festival pass. Therefore, I have included an independent variable for paydays, which is lagged to pick up on the effects of the first days after paydays. The variables “band fees” and “WASMI, WASMN and WASMNN” might have multicollinearity as bands with more Spotify listeners tends to have higher band fees. Further there is a possibility that last week’s sales affect next week’s sales. To test for autocorrelation, I will be using the Durbin-Watson test (White, 1992):

Table 2: Durbin-Watson test equation (1)

```

Durbin-Watson test

data:  reg1
DW = 1.6406, p-value = 0.0002306
alternative hypothesis: true autocorrelation is greater than 0

```

From table 2 the Durbin-Watson test gives a value of approximately 1,6, which is between the range 1,5-2,5. However, when testing for autocorrelation, the alternative hypothesis for a Durbin-Watson test is that there exists autocorrelation. As the P value is significant, I cannot reject the hypothesis. By modifying the regression, I ended up with:

$$\begin{aligned}
 (2) \log(\text{Sold}) = & \beta_1 + \beta_2 * \text{lag}(\log(\text{sold})) + \beta_3 * \text{Time} + \beta_4 * \log(\text{price}) + \beta_5 * \\
 & \text{cum releases} + \beta_6 * \text{WASMN} + \beta_7 * \text{WASMI} + \beta_8 * \text{WASMNN} + \beta_9 * \\
 & \text{Cum.sum.I} + \beta_{10} * \text{Cum.sum.N} + \beta_{11} * \text{Cum.sum.NN} + \beta_{12} * \\
 & \text{Telegrafbukta} + \beta_{13} * \text{factor}(\text{year}) + \beta_{14} * \text{lag}(\text{payday}) + \epsilon_1
 \end{aligned}$$

Equation (2) is the new regression model after autocorrelation has been taken into account. The variable “lag(log(sold))” accounts for autocorrelation of sales between weeks. Consumers might not be interested in buying a festival pass just to consume a concert by a single band. Instead, it might be a threshold of released bands that creates enough value for the consumer to buy a festival pass. Therefore, the “Cum.sum” variables are the cumulative band releases over time, with respect to international (I), Nordic (N), and northern Norwegian (NN) bands. Band fees was removed as it basically explains the same thing as the monthly Spotify

listeners: Bands popularity. When testing equation (2) for autocorrelation using the Durbin-Watson test, I got:

Table 3: Durbin-Watson test equation (2)

```
Durbin-Watson test  
data: cum_sold_fest_week  
DW = 2.0239, p-value = 0.3148  
alternative hypothesis: true autocorrelation is greater than 0
```

From table 3 the Durbin-Watson test gave a value of approximately 2. The P value is not significant; therefore, I reject the alternative hypothesis that there exists autocorrelation. The model itself will not function as a demand model for the festival passes, but it can assist in pinpointing which variables the Bukta festival should have extra interest in, as they might impact sales.

6 Results

With the use of equation (2) I modelled a regression analysis in R. The estimated coefficients assume all other variables to be held constant.

Table 4: Regression of festival passes

Characteristic	Beta	95% CI ¹	p-value
Sale elasticity	0.11	-0.01, 0.22	0.067
Time to festival	-0.11	-0.15, -0.07	<0.001
Price elasticity	-3.2	-5.4, -1.0	0.004
Cumulative releases	-0.22	-0.30, -0.14	<0.001
Average Spotify Nordic	-0.13	-0.19, -0.07	<0.001
Average Spotify inter	0.03	-0.09, 0.14	0.7
Average Spotify N.N.	0.15	0.06, 0.24	0.002
Cumulative inter	0.06	-0.07, 0.19	0.4
Cumulative Nordic	0.22	0.11, 0.34	<0.001
Telegrafbukta stage	-0.53	-0.93, -0.14	0.009
factor(year)			
2016	—	—	
2017	0.95	0.30, 1.6	0.004
2018	0.46	-0.22, 1.1	0.2
2019	0.68	-0.04, 1.4	0.065
Cumulative N.N.	0.14	-0.06, 0.34	0.2
Payday	0.26	-0.03, 0.54	0.075

¹ CI = Confidence Interval

From table 4 one can see that there is a significant relation between the sale of festival passes and most independent variables, except for the weekly average of monthly Spotify listeners for international bands, cumulative released international and northern Norwegian bands, and

2018 (with 2016 as a benchmark). The multiple R-squared is approximately 0,52, with an adjusted R-squared of 0,49.

Sale elasticity

The lagged sales elasticity variable is included to remove autocorrelation, as ticket sales last week can impact ticket sales next week. The regression estimates that last week's sales of festival passes will increase next week's sales of festival passes by approximately 11%. The estimated coefficient is significant at a 95% level of significance.

Time to festival

The time to festival variable counts how many weeks there are remaining to the festival. The regression estimates that as time gets one week closer to the festival, the sale will increase by 11%. The estimated coefficient is negative because the "Time to festival" variable counts downwards, and it is therefore negatively related with the sales of festival passes. The estimated coefficient is statistically significant at a 99% level of significance.

Price elasticity

The regression estimates that a 1% increase in prices will decrease the sales of festival tickets by 3,2%. The estimated coefficient is significant at a 99% level of significance. As mentioned earlier, the price variable is the average of the total sales price, which could give inaccurate results, as it is not the actual price available for regular consumers.

Cumulative band releases

The cumulative band releases variable counts the total booked bands the Bukta festival releases throughout each respective year. It also captures marketing, as band releases are published through the Bukta festivals sosial platforms. The regression estimates that one more band release will decrease the sale of festival passes by approximately 22%, The estimated coefficient is significant at a 99% level of significance.

Weekly average of monthly Spotify listeners

The normalized weekly average of bands monthly Spotify listeners is calculated by the cumulative sum of the monthly Spotify listeners for released bands with respect to the band's origins and year, divided on the average of monthly listeners for that year. The regression

estimates a one-unit increase for Nordic bands to decrease the sales of festival passes by 13%. For the northern Norwegian bands, it is estimated that a one-unit increase will increase sales of festival passes by approximately 15%. Both estimated coefficients are significant at 99% level of significance. For international bands, the estimated coefficient is not statistically significant.

Cumulative origin releases

The “cumulative origin releases” cumulatively counts the number of bands published throughout each respective year, with respect to bands origins. The regression estimates that one more Nordic band release will increase the sales of festival passes by approximately 22%. The estimated coefficient is significant at a 99% level of significance. For northern Norwegian and international bands, the estimated coefficients are not significant.

Telegrafbukta

The “Telegrafbukta” variable is a dummy variable that observes if released bands are performing on the Telegrafbukta stage, which is the largest stage at the Bukta festival. The regression estimates released bands performing at the Telegrafbukta stage will decrease the sales of festival ticket by approximately 41%. The coefficient is significant at a 99% level of significance.

Years, with 2016 as benchmark

The factor(year) variable compares how each festival year performed, compared to 2016. 2017 performed 95% as good as 2016. The estimated coefficient is significant at a 99% level of significance. 2019 performed 68% as good as 2016 and is significant at a 95% level of significance. The estimated coefficient for 2018 is not significant.

Payday

To estimate the effects from paydays, the variable is included as a dummy for weeks that contains either the 12th or 15th each month. In the regression model the payday variable is lagged to find the effects from the period around paydays. The regression estimates that paydays increase sales by approximately 29%, with a 95% level of significance.

7 Discussion and conclusion

The practise of revenue management involves predicting consumer behaviour to predict the real-time customer demand at the micro market level (Cross, 2011). For the Bukta festival, the results from this analysis can give an indication to what aspects included in the model that affects the quasi-demand for festival passes.

The most impactful finds are the price elasticity and weeks' containing paydays. The price elasticity indicates that the price for festival passes can be decreased to increase sales, as the estimated price elasticity is -3,2%. The estimated price elasticity from this model can however give false results as it is not the actual price the consumers are offered. Since the price variable is merged with discounted prices, the coefficient is calculated by a lower price than the actual price for regular consumers. This means that the true price elasticity might be higher. Weeks' containing paydays is expected to increase sales by approximately 29%. It is fair to assume that the consumers' willingness to pay increases after paydays, and by focusing marketing such as band releases before paydays, the Bukta festival might increase sales. The Bukta festival's pricing strategy has been to increase prices at predetermined dates. By instead increasing prices after paydays, when the consumers' willingness to pay is higher, the revenue could increase.

Bands' monthly Spotify listeners can be thought of as a measure of bands' popularity. One would expect that a more popular band would increase the sales of festival passes, but the results for the normalized weekly average of monthly Spotify listeners for Nordic bands suggests a significant negative relation to sales. When viewed in context with the estimated coefficient for cumulative Nordic bands, which indicates that one more Nordic band will increase sales by 22%, it might indicate that something is wrong with the data. The estimated coefficient can give a false result, as the information about the monthly Spotify listeners was collected in 2022, while the sales data and band releases go from 2016-2019. Bands could have become less popular over time, or there could be some multicollinearity that was not picked up by the model. For northern Norwegian bands there seems to be a positive relation between Monthly Spotify listeners and sale.

As time gets closer to the festival, the sale of festival passes is expected to increase. From figure 7 one can see that the sale of festival passes starts relatively low and increases over time. Those who buy tickets early can be explained as either risk-averse, having a lower

willingness to pay, or as regulars. If the person buying a ticket is risk-averse, they would be afraid the festival could get sold out, and therefore buy tickets early. This could however make them take more risk, as all the band releases are not public until May, and they might not be fond of the released bands. Those with a lower willingness to pay would buy tickets early because the ticket price rises over time. The regulars are those that frequently participates at the festival. Some of the regulars are friend groups that have a tradition to meet up at the festival, or those interested in cultural events. I would expect the regulars to be the first ones to purchase a festival pass, as some in this segment might plan their holiday around the festival since they already have traditions to participate at the Bukta festival.

In their paper Leenders et al. (2005) found that star line-up and ticket price were not significant predictors for success in the festival industry. My results however, found that both the popularity of bands and price for festival passes are indeed significant predictors for the sales of festival passes for the Bukta festival. We have had different approaches to the problem, where Leenders et al. defines success as the festival's growth in visitors from the period 2002-2003, relative to the average number of visitors in the period 1999-2003.

The Bukta festival offers student a discounted festival pass, relative to the full price ticket other consumers must pay to enter the festival. By focusing more on price discrimination strategies, the Bukta festival can increase demand, as well as revenue. It is important that there is no arbitrage when price discriminating between market segments (Pepall et al., 2014). If students can buy discounted festival passes, and sell them onwards to other consumer segments, there will be a problem with arbitrage. The Bukta festival also offers festival passes to its partners, who get access to their own partner area at the festival. This is a type of product differentiation or second-degree price discrimination, as firms tends to buy a higher quanta of festival passes. By focusing on offering different packages to firms, the Bukta festival can increase sales.

As the Bukta festival is a season based outdoor festival, the weather forecasts might have an impact on the ticket sales. Lorenzo Zirulia (2016) found that by actively investing in improving the experience irrespectively to weather, it is possible to mitigate the negative effect of pessimistic weather forecasts. The Bukta festival can stand to benefit by friend groups that make traditions to meet up at the festival, or tourists that want to experience northern Norwegian culture, as the festival is uniquely placed at a beach by a Norwegian

fjord, with the view of mountains. By focusing more on this aspect when trying to sell tickets, the Bukta festival could mitigate negative effects of pessimistic weather forecasts.

7.1 Conclusion

The sales of festival passes to the Bukta festival increases as time gets closer to the festival. It is expected that the sales increase by approximately 11% for every week closer to the festival. The price elasticity is estimated to be -3,2%, which indicates that the Bukta festival beneficially could reduce the price for festival passes to increase sales. Weeks containing paydays are expected to increase the sales by 29%, and by focusing band releases and other marketing in the weeks containing paydays, the Bukta festival can increase the demand and sales for festival passes.

7.2 For future research

It would have been interesting to look at how long-term weather reports affect the sales of festival passes, to see if the same goes for the Bukta festival as Kelley et al. (2014) found for gameday tickets for the NHL team. The Bukta festival could in the future log the observed long-term weather forecasts to see if there is an effect.

By collecting data on variables that affect the price, the Bukta festival can in the future endogenize the price. This would be advantageous as this opens the possibility to model a two-stage least square regression (2SLS). This can hopefully give a more accurate analysis of the demand for tickets and festival passes to the Bukta festival.

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