

P1 – reeksamen**Indhold**

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Indledning

I projektet om Manufacturing system for assembly of sandwiches begyndte gruppearbejdet med intensiv læsning af projektoplægget der blev præsenteret tidligere for os. Efter alle i gruppen blev enige om, hvad oplægget handlede om, valgte vi at lave et mindmap over hvilke virksomheder, vi som gruppe kunne tænke os at arbejde videre med. Efter en hurtig brainstorm, skrev alle i gruppen deres ønsket virksomhed op. Derefter gik vi igennem hvert forslag for at identificere, om virksomheden var realistisk at benytte som vores case gennem projektperioden.

Gruppekонтраkt og tidsplan

Det næste vi skulle have styr på, var en gruppekонтраkt, samt en tidsplan. Disse to elementer er essentielle for at et gruppearbejde kan fungere på længere sigt. I gruppekонтракten skulle indgå tilgangen til eventuelle sygemeldinger eller forsinkelser der måtte forekomme. Vi fandt meget hurtigt frem til en rimelig gruppekонтраkt, som alle i gruppen var tilfredse med. Dernæst planlagde vi et møde med vores vejleder. Under mødet, informerer vi vores vejleder om hovedfokus med selve projektet, og hvad vi fandt interessant at arbejde videre med. Dernæst, blev en skitse af en tidsplan lavet over de delmål, og selve afleveringsdatoen, så vi bedre kunne visualisere hvornår de enkelte dele skulle laves færdig. Efter mødet og skitsering af tidsplanen, kunne vi distribuere opgaver ud til det enkelte gruppemedlem.

Beskrivelse af gruppearbejdet

Da vi først begyndte med at få P1 projekt oplæg, havde vi gennemgået gruppedannelsen. Gruppen bestod af tre forskellige grupper, der blev dannet under P0 projektet. Da kun nogle medlemmer havde været i gruppen sammen, blev der lavet en kort introduktion til hinanden for at få en ide om, hvem ens gruppemedlemmer var. Efter den korte introduktion, blev projektoplægget nøje gennemgået så alle gruppemedlemmer var inde forstået med, hvad opgaveforventningerne var og for at sikre os at alle var enige om hvad der skulle laves.

Gruppekontrakt

Efter at have lavet gruppekontrakten, varede det ikke længe før vi begyndte med at spore væk fra gruppekontrakten. Dette medførte at vi ikke længere arbejdede som en gruppe, men som forskellige enheder som var sat sammen og blev kaldt en "gruppe". Grunden til dette var, at gruppekontrakten ikke blev taget seriøst og at den hurtigt blev sammenfattet fra en tidligere gruppes gruppekontrakt, som vi formodede var nok til at komme i gang med selve projektet. Da vi allerede havde brugt nogle uger på at lave meget lidt, kom vi meget bagud. Derfor er en gruppekontrakt et essentielt element til succes inden for projektarbejde, da det binder det enkelte gruppemedlem til både at lave det der bliver uddelegeret til dem, men også for at få rutine samt disciplin til at møde op til tiden. Vi blev alle enige om at der skulle tages fat på gruppekontrakten endnu en gang, for at lave en ny kontrakt og dermed nogle nye regler. Det første var en ny mødetid. Den hed fra klokken 08:00 til klokken 16:00 hver dag, undtagen lørdag og søndag. Udover dette blev der bestemt at der skulle holdes en pause fra klokken 11:00 til 11:30, så vi alle kunne blive friske til endnu et par arbejdstimer. Derudover, blev vi også enige om at al projektarbejde nu foregik i grupperummet, da det var der vi fik mest arbejde lavet.

Efter indførelsen af den nye gruppekontrakt, kom der ny motivation til at begynde med at lave projektet igen. Den nye mødetid samt gruppekontrakten, havde meget stor indflydelse på hvordan arbejdsdynamikken var i grupperummet. Der blev delt tanker og spurgt interessante spørgsmål. Derfor kan det anbefales at lave en effektiv gruppekontrakt fra projektstart, så alle gruppemedlemmer får lavet det de skal lave til tiden. Derudover blev mødepligten afholdt af alle gruppens medlemmer. Det anbefales at sætte delmål for gruppe, så det enkelte medlem ved hvilken del der skal laves til den pågældende dato. Dette benyttede vi, og alle i gruppen fik noget deres delmål.

Facebook chat

En essentiel del af et godt gruppearbejde er kommunikationen mellem medlemmerne af gruppen. Derfor er det en væsentlig god ide at benytte et program hvorved der nemt og hurtigt kunne kommes med input til gruppemedlemmernes arbejde, men også kunne meldes hvis man er syg eller andet. Derfor valgte vi at anvende Facebook chat. Dette gav os mulighed for at både sende besked med det samme, men også overfører vigtige dokumenter til hinanden.

Den negative del ved Facebook chat

Denne måde at benytte Facebook chat rum til hurtigt at skrive en besked til gruppens medlemmer, var meget velfungerende. Den negative side af denne kommunikationsform er dog at det gav os mulighed for at have selve Facebook åben, og dermed kunne vi sidde og læse opslag på Facebook, og ikke arbejde koncentreret med projektet. Derfor kunne det tænkes at benytte et andet chatrum i senere projekter, såsom Skype eller Discord. Hovedsageligt ville det foregå det samme måde på begge platforme, uden direkte mulighed for at afvige væk fra selve projektet og gå ud på en tangent i flere timer, uden at de andre gruppemedlemmer opdager det.

Rettelse af gruppemedlemmers arbejde

Ved at udnytte funktionen til at sende dokumenter med det samme gennem Facebook chat, blev rettelser af opgaver meget lettere. Vi benyttede to simple farver til at markere i dokumenterne. Havde teksten en gul farve, gav den markerede sætningen ikke mening, derimod, var den rød, var grammatikken ikke korrekt. Efter at have lavet rettelserne, kunne dokumentet hurtigt blive sendt tilbage til det gruppemedlem der havde lavet opgaven, så de kunne rette den og dermed få den ind i rapporten. Dette gav os mulighed for ikke kun at rette opgaver, men også for at holde en rød tråd gennem hele opgaven.

Måden vi rettede gruppens individuelle opgaver, med de farvekodede farver, fungerede meget godt til knivskarpt at kunne fortælle det gruppemedlem der havde lavet opgaven, hvad der var galt med de enkelte dele de havde skrevet. Farverne gav lejlighed til at kunne rette opgave meget hurtigt og effektivt, så vi ikke behøvede at komme med individuelle kommentarer til hver sætning der blev skrevet.

Negative side af rettelse af gruppemedlemmers arbejde

Dog skal der siges at der var en meget stor ulempe med teknikken som kunne ses tydeligt, da der skulle rettes. Nogle gange ville gruppen gentage den samme grammatiske fejl om og om igen, eller skrive noget som ikke gav nogen mening. Derfor kunne det tænkes at den der markerer med farver, også var den som rettede fejlene til sidst. Da vi som mennesker ikke altid kan se de fejl vi laver, havde vi andre medlemmer til at rette dem efter at have skrevet opgaven.

Samarbejde med vejleder

Gennem projektperioden har hver gruppe fået tildelt en vejleder. Vi fik tildelt Kim Nørgaard Jensen som vejleder. Formålet med at have en vejleder til rådighed, er at vejlederen kan styre gruppen i en konkret retning hvis gruppen bliver i tvivl om hvad de skulle lave. Der er forskellige måder hvorpå vi kunne kontakte vores vejleder på, både på aau e-mail, men også via Skype. Fra dag til dag foregik det på e-mails, hvor et enkelt medlem af gruppen fik besked på at skabe kontakt til vores vejleder, hvor vi andre medlemmer havde gjort os tanker om hvad vi gerne ville snakke med vejlederen om. Dog havde vi et par enkelte gange brug for et fysisk møde med vejlederen, da vi bedre kunne forklare vejlederen om hvilke udfordringer vi havde. Derfor var det meget vigtigt at planlægge møder i god tid, da vi ikke altid var sikre på at vejlederen kunne komme over i vores grupperum og vejlede os. Var der ikke tid til et fysisk møde, kunne alternativet være et Skype møde, der enten foregik på en computer eller en telefon. Derudover kom alle gruppemedlemmer ind på banen hvis de var nysgerrige om noget, eller hvis de havde nogle spørgsmål til vores vejleder. Dette gav mulighed for at formulere sig bedre efter vejlederen havde svaret på spørgsmålet. Alle de forskellige spørgsmål der blev svaret på, blev skrevet ned til senere brug i rapporten.

Negative side af samarbejde med vejleder

Vi havde ikke nogen problemer med måden hvorpå kommunikationen mellem vejleder og gruppe foregik. Det største problem der var, var måden e-mail systemet var bygget op på, så vi ikke alle fik den besked eller response fra vejlederen som et andet gruppemedlem fik. Dette fik vi opklaret hurtigt med et enkelt møde med kontoret. Den tilgangsmåde vi som gruppe benyttede til at kontakte vores vejleder, fungerede udmærket, så det opfordres at benytte den samme teknik til næste projekt. Under møderne med vores vejleder om fremgang i rapportskrivning, kunne vi anvende vejlederens tanker og refleksioner i vores rapport. Det der kom som et chok til vores gruppe var, at vi halvvejs i vores projekt var nødt til at ændre vores vinkel vi taklede opgaven på, da vi til et statusseminar fik feedback på vores case af anden vejleder som mente at vi ikke kunne nå langt med den case vi havde valgt. Dette bevirkede at vi ren tidsmæssigt ikke kunne få det endelige vejledermøde, da vi skulle planlægge alt fra bunden igen, hvor vi eventuelt kunne få vejledning om den måde vi benyttede til at skrive rapporten på, var den mest optimale for vores gruppe. Dog skal der siges at vores vejleder har virket som en der har guidet os til det endelige

mål, og opførte sig ikke helt som en vejleder. Dette havde drastisk ændret hvordan vores endelige rapport havde set ud, idet vi ikke fik konkret feedback på hvad vi skrev.

Introduction

The manufacturing system for assembly of pizza starts all the way back when the dough is being kneaded and all the different ingredients are being stocked up. In this project we will be discussing the Manufacturing process of a pizza and the theorem of how the lead time can be reduced by 30-40% by only kneading the dough and applying a layer of tomato sauce and cheese.

It can be an advantage for the pizzerias to knead the dough into its specific shape the day before. By doing this, we can shave off approximately 30-40% of the lead time. This is done by having shaped the dough and applied both a layer of cheese and a layer of tomato. All the pizzas produced can be kept in a freezer for over a month when wrapped, so the durability of the pizzas is not an issue.

Problem delimitation

I have decided to limit this assignment to only the production of pizza inside one pizzeria. I won't be going over the purchasing of stock, reorder-point and such nor the steps necessary for producing a pizza dough. Furthermore, I won't be going over the costs of the individual items as I will be trying to improve the overall system of the production of pizzas.

Initiating problem

In current pizza manufacturing systems, it is tradition for having the pizza stored as small balls of dough. When an order comes through, an employee takes their time and effort into kneading the pizza, which in turn is also the longest of the processes, taking up more than half of the production time, then applying the right ingredients and the right amount before baking it for a couple of minutes¹. The kneading of the dough not only takes time and effort, it also requires the employee to have trained for multiple weeks on end to master the kneading technique to perfection.

¹ UKEssays. November 2018. Manufacturing process of pizza. [online]. Available from:

<https://www.ukessays.com/essays/management/manufacturing-process-of-pizza.php>

Therefore, I want to focus on why modern-day pizzerias haven't evolved the production of their pizzas to be as efficient as possible? And by using the method described earlier, how much time can be saved per pizza? What are the results of said time shavings?

Problem analysis

In this assignment I'll be focusing on this following problem, "*Why haven't modern pizzerias evolved the production of their pizzas to be as efficient as possible?*". It is known that every pizzeria is using the same technique and has been using it for decades. It is therefore an interesting topic to touch on when it comes to pizzerias. The capability of being able to produce a high number of pizzas can give a pizzeria an edge against its competition. Therefore, it can be interesting to delve into the problem mentioned earlier. By improving the rates of how many pizzas can be produced on an hourly scale, the pizzeria owners can do drastic changes to their business and get ahead of the other companies.

Problem definition

How can pizzerias tweak their production of pizzas to allow them a higher output of pizzas an hour?

Analysis

I have chosen to work with the optimization of pizzerias manufacturing process. In order to optimize it, we first need to understand what goes on in a modern-day pizzeria in Denmark. To understand what goes on we can either research the necessary steps in the production of a pizza, or by contacting a pizzeria to better get an accurate representation of the process. I will try to implement a change that can alter the very way pizzerias function. This can be achieved by industrializing the process of how a pizza is produced, and this could potentially lead to many different changes in the foundation of pizza production such as, but not limited to, having to reorganize your workshop and time management.

The production of a pizza

The production of a pizza starts by a customer ordering a specific pizza. This information is then sent off to another employee which then navigates themselves over to the pizza dough storage system, which usually is some sort of freezer to keep the pizzas nice and chilled. The pizzas are

stored on racks that can be moved by an employee to the desired destination. Next, the employee takes the required amount of pizza doughs out of the freezer and lays them on the kneading counter. The next step is to knead the dough into its correct shape and thinness so that the pizza can become crispy in the oven. After kneading, the employee applies a layer of tomato sauce followed by a layer of meat, vegetables and/or sauce completed by a layer of cheese. After this, the pizza is either baked in the oven for 8 minutes or if the customer has ordered a special pizza, the next step would be to apply the correct amount of toppings and only then bake it in the oven. This process can take anywhere from 10-15 minutes depending on the type of pizza that needs to be produced. There can fit 6 pizzas in a stone oven and every pizza takes approximately 8 minutes to bake². The amount of pizzas that can be made in an entire work day, given that the employees work as optimally and efficiently as possible, with enough pizzas stored, is around 216 pizzas. This number is unrealistic given the amount of pizzas capable of being stored at one time³.

Solution

My proposed solution for optimizing the production of pizzas is as followed. An employee that has prior training with kneading the dough and forming it, they can prepare the dough, the cheese and the tomato layer. Optimizing the manufacturing of pizzas can lead to varying positive outcomes such as but not limited to: the amount of pizzas being made per hour, the amount of employees needed to operate a single pizzeria can be decreased from four to three seeing as it doesn't take two employees to knead the pizza dough. Other benefits from the proposed solution may be that you can save money on employees seeing as a pizzeria owner does not have to employ well-trained employees, which take an hourly rating of around 200 DKK, to knead the dough to perfection, but can make do with students that can be paid around 120 DKK an hour to do the work that is required. That means we can cut down on payments to the employees and invest more into equipment that could aid in the pizza company. Furthermore, combining all these elements together, we can get a competitive edge on the opposing pizzerias by allowing us to

² Alfa Forni, 2020, *Pizzeria quality pizza in the home oven? Find how.*

<https://www.alfaforni.com/en/pizzeria-quality-pizza-in-the-home-oven-find-how/>

³ Refer to appendix 2

freely adjust the price of select pizzas to further gives incentive to buy the products sold at our pizzeria instead of our opposing pizzerias.

Comparison, old vs new

I will now be comparing the two pizza manufacturing systems closely to get a hold of the differences and the similarities between them. The modern-day pizza companies have a strict way of making the pizzas and the formula for the production of pizzas has always been the same. Take the dough out, knead it, apply necessary ingredients, bake it and box it. Those are the essential steps to making a pizza in a modern-day pizzeria in Denmark. The proposed change mentioned beforehand, shakes up the formula a tiny amount to better enhance the production process of the pizzas. Preparing the dough, the day before it's going to be sold, requires some extra necessary steps to execute correctly, but if done correctly, it can yield an approximate 30-40% reduced time on the pizza production. But by implementing said change, the owner of the pizzeria would have to invest some money into buying a new freezer that can hold an estimate 300 pizzas at one time⁴. Such large freezers can cost as much as 90 thousand DKK to purchase but the payoff would be much greater than the initial cost after a few months.

An ordinary margherita pizza costs 50 DKK for the consumer to purchase. This price is locked in at 50 in any pizzeria you may visit. That's why with the mentioned setup improvements, you can choose not only to lower the price of the margherita pizza, but you can also lower all the prices of pizzas. Due to that you can produce more pizzas an hour to sell to the customer, and with the reduced price, more and more customers will buy the pizzas at your pizzeria. The downside to this proposed idea can vary depending on the owner's decision making. If the owner decides that he will reduce the price of the margherita pizza by 5 DKK, the price will be 45 kr. If he then sells 100 of this type of pizza, instead of yielding a 5000 DKK income the owner will only earn 4500 DKK, which over a large time period, can lead to a bigger loss in revenue than expected⁵.

The biggest difference between the two systems is the time saved. The approximate time it takes for a pizza to be made from start to finish, not utilising the proposed change, is anywhere from 10

⁴ Owner of a pizzeria – Moussas pizzeria

⁵ Refer to appendix 1

to 12 minutes. the majority of the time is in the kneading and shaping process since not any employee can do this. Furthermore, it'll take a long time to train a single employee to master the skill of kneading and shaping to perfection which in the end will cost a lot of man hours to train up. By having the store owner do all the kneading beforehand, they can have less employees doing less work for less money and the customer has to wait less time to get their desired pizza.

Discussion

In this paper I have been trying to discuss the possibility of a change in the production of pizzas to further amplify the rates of which the pizzas can be produced on an hourly basis. This would be done by having the dough kneaded and prepared the day before they needed to be sold. Through this tactic, the amount of time we can save per pizza was around 30-40% seeing as most of the time spent on a pizza is kneading it and shaping it to the desired shape.

The reason I would like to improve the overall speed of production is that some pizzerias have been needing to shut down as a result of not being able to sell enough pizzas⁶. Furthermore, it would drastically change the pizza industry if the owners of pizzerias would implement small changes such as my idea from earlier. Though the consequence of such changes isn't known yet, so a full implementation of such system might not be a great idea without proper testing and tweaking. I will be discussing some of the pros and cons of the proposed manufacturing system changes further, to get a better understanding of how it can affect the owner of the pizzeria.

The pros

The pros surrounding the proposed change to the production process of the pizzas can be as followed. A whole pizza can be made in five to seven minutes by preparing the dough the day before it's being used, therefore selling more pizzas per day. The store owner can employ less workers that at lower wages, which in turn gives him additional earnings at the end of the day.

⁶ Owner of a pizzeria – Moussas pizzeria

The cons

The store owner has to invest in a large freezer to store all the pizzas in, putting him at a loss for 3 months considering the average salary for the pizzeria CEO is approximately 30 thousand DKK a month. Furthermore, the pizza quality may worsen in the freezer overnight, which can cause a loss of costumers. Also, the owner of the pizzeria has to put in more effort than usual since he will be preparing all the dough by himself, which in turn means more hours of work but this does also mean that if he prepares a large quantity of pizzas, the need for him to do the preparation isn't needed for as long as the pizzas are stocked up.

Conclusion

After having researched and talked to a pizzeria owner and having them review my proposition for the system change, I can conclude that the idea of having a system change is a possibility and my idea to be specific is also reasonable. Though it has to be noted that it is just a theory and it can end up ruining an entire business if not executed properly. That's why it is advised to further develop this idea and test it a bit at a time to make sure that it is stable enough to run in the long run.

Appendix

Owner of a pizzeria – Moussas pizzeria

Alfa Forni, 2020, *Pizzeria quality pizza in the home oven? Find how.*

Available from:

<https://www.alfaforni.com/en/pizzeria-quality-pizza-in-the-home-oven-find-how/>

[Accessed 29 March 2020].

UKEssays. November 2018. Manufacturing process of pizza. [online]. Available from:

<https://www.ukessays.com/essays/management/manufacturing-process-of-pizza.php>

[Accessed 1 April 2020].

Appendix 1

If in one full day 216 pizzas can be produced, and the hourly rating for the employees is 120 DKK, we can start off by see how much 216 margheritas can make the owner in 1 full day.

$$216 * 50 = 10800$$

If, however he sells them for 45:

$$216 * 45 = 9720$$

Now let us deduce the employee payment:

$$120 * 6 = 720$$

That is for one employee. In the pizzeria there's three employees

$$10800 - 2160 = 8640$$

$$9720 - 2160 = 7560$$

That means, theoretically speaking that if the pizzeria sold 216 margheritas a day the profit would be:

For 50 DKK: 8640 DKK

For 45 DKK: 7560 DKK

If in one full day 216 pizzas can be produced, and the hourly rating for the employees is 200 DKK, we can start off by see how much 216 margheritas can make the owner in 1 full day.

$$216 * 50 = 10800$$

If, however he sells them for 45:

$$216 * 45 = 9720$$

Now let us deduce the employee payment if the owner of the pizzeria pays 200 DKK an hour:

$$200 * 6 = 1200$$

That is for one employee. In the pizzeria there's three employees

$$10800 - 3600 = 7200$$

$$9720 - 3600 = 6120$$

That means, theoretically speaking that if the pizzeria sold 216 margheritas a day the profit would be:

For 50 DKK: 7200 DKK

For 45 DKK: 6120 DKK

Appendix 2

If a pizzeria can produce 6 pizzas in 10 minutes, that's going to be 36 pizzas an hour. A pizzeria is open for approximately 6 hours, so by multiplying 36 with 6, we get 216 pizzas a day.