
NAV unemployment measures in labor market crises

TDT4259 – Group 15

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List of Acronyms

BMC - Business Model Canvas

NAV - The Norwegian Labor and Welfare Administration (Ny arbeids- og velferdsforvaltning)

RPD - Rich Picture Diagram

SSB - Statistics Norway

1 Introduction

1.1 About NAV

The Norwegian Labor and Welfare Administration (NAV) is a public agency under the Ministry of Labor and Social Affairs that is responsible for organizing and financing labor market measures, social security benefits and social assistance. NAV is one of the largest public agencies in Norway and manages a third of the state budget through several different schemes. NAV aims to establish a well-functioning labor market through assisting in job seeking and job-related activities. They also function as a service-provider for special needs in the labor-market, with services for user adaptations and special requirements. Their third function lays on the administration of welfare and benefits for users that require benefits at the time of unemployment and pension.

To summarize NAVs task and goals (NAV.no, 2019):

- Establishing a well-functioning labor market.
- Adapting users for the labor market, either through special requirements or needs.
- Comprehensive and efficient labor and welfare administration.
- Getting more people to work or work-related activities.

NAV has approximately 19,000 employees. Of these, approximately 14,000 are employed by the state, and approximately 5,000 are employed by the municipalities (NAV.no, 2019).

1.2 NAV Data

NAVs comprehensive task-list includes also establishing statistics for the labor-market and is thus the largest supplier of statistics and analysis. This includes the following: *number of people laid-off, measures of people unemployed, amount of vacancies in industries and recipients of benefit support, statistics of unemployment in different industries, job-seekers and unemployment benefit recipients*. This data can also be divided further into different categories as gender, geographical location and in some cases, age.

The data sources are updated monthly with both historical and current statistics open for the public. The analysis done by NAV has a wide scope, with labor market forecasts, actions that could improve the employment rate and much more. Although to limit our scope for this paper, the developments in the labor market are the most relevant to include. Nevertheless, future challenges and economical aspects of different analysis may also be addressed. These analyses are more of a predictive course of action, which lays the groundwork for how NAV achieves their goals (NAV.no, 2021).

1.3 Problem description

Hindsight this year being the fall of 2021, the COVID-19 pandemic has ravaged the world for almost two years and many people have lost their jobs or been temporarily laid off. This is not the first major event that has laid off people in masse. Thus, the group was curious about the unemployment rate during a state of crisis, and what the state (in this case Norway and NAV) was doing to return eligible people to work. Our identified problem then became this:

What course of action(s) does NAV use during a state of crisis to decrease unemployment rate, and does it work?

Our goal is to determine what program, initiative or other courses of actions NAV is using during a nation- or worldwide crisis that causes a massive unemployment spike, and to see how the actions correlate with the unemployment. The group has chosen three events that caused a significant increase of unemployment in Norway.

1. COVID-19 pandemic, 2020 - fall 2021*
2. Sudden decline of crude oil prices, 2016-2017 (Hvinden & Nordbø, 2019)
3. The financial crisis, 2008-2009 (E24, 2020)

* Any available data that is gathered does not include the year 2021.

Using NAVs datasets of unemployment statistics and what NAV are doing to counter spikes of unemployment we will analyze if there are any repeating successful courses of action that further NAVs tasks and goals.

1.4 Description of the crises in question

A common denominator of the crises in question have been high unemployment and economic hardship. Three of the major crises in the last 20 years have been the financial crisis between 2008-2010, the price fall of crude oil between 2016-2017 and lastly the COVID-19 pandemic (NAV.no, 2021).

The financial crisis was triggered by defaulted mortgages in the United States, which were overvalued by rating agencies which led to an international recession. The economic hardship through 2008-2010 resulted in huge layoffs in the labor market globally, which increased the unemployment rate in Norway to 5,2% (NAV.no, 2021).

The second economic hardship occurred during 2016 to 2017 where a sharp fall in oil prices from \$114 a barrel to below \$30 gave a downturn in the oil-related business sector, which Norway is a

big part of internationally. The unemployment rate in Norway was again increased to 5,2% (NAV.no, 2021).

Thirdly, the pandemic which ravaged the world in March 2021 resulted in a massive increase of unemployment. Most notably in March with a rise of unemployment rate to 15% - The highest since 1930. It is also worth noting that oil prices fell in the same period, which again increased the economic hardship of this period. The big difference in the pandemic from the two other crises, is the speed of unemployment - It took only 2 months to achieve the biggest unemployment rate, rather than 18-24 months the other two crises took. 9 out of 10 jobseekers stated that they were laid off. The redundancies were due to the lockdown of the country that started in March -20 (NAV.no, 2021).

1.5 Group Description

Group 15 consists of 5 members that all are on their 5th semester in the study program Digital Business Development at NTNU in Trondheim. We all have similar study experience, and we chose to be a group because of the tight bond we have accumulated over the course of our time in Trondheim. During our study we have previously been working on some of NAVs digitization processes, and it will be interesting to see if some of NAV's actions for unemployment have changed in recent times.

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Table 1: Contributors

2. Background

2.1 Project objectives

The primary objective of this project is to find out if there are any courses of action from NAV that they implement during a state of crisis, which is consistent in reducing the spike of unemployment in Norway. NAVs annual report for 2020 states their four overall goals (NAV.no. 2021):

1. More people at work.
2. Good living conditions for the disadvantaged.
3. Secure financial rights through good performance management.
4. Available services with good service.

Given these overall goals and the identified problem, these specific objectives for this project have been selected:

- Identify and classify the different courses of action NAV is using in everyday life.
- Identify and classify the different courses of action NAV is using in a state of crisis.
- Describe how different these two courses of action are and explain why NAV is differentiating on these (if any).
- Give a predictive and prescriptive analysis of NAVs courses of action.
- Present visualizations of significant findings.

2.2 The approach

Approaching the case, we needed to use a systematic procedure that comprehends and maps the complex situations and environment that NAV exists in. We decided to use the Business Analytics Methodology (BAM) developed by Hindle and Vidgen (2018) (Hindle, & Vidgen. 2018), which divides the process into these four steps:

1. Problem situation structuring
 - Illustrating how complex the situation is between a user and NAV, while focusing on available jobs and external factors.
2. Business Model Mapping
 - A business model canvas is presented and briefly explained.
3. Business Analytics Leverage
 - Here we do a quick analysis of the BMC and potential business values, the outcome will be put into a leverage matrix which we will use to decide the most promising business analytics applications.
4. Analytics implementation
 - In this step we will use data to build and deploy models.

BAM Step 1: Problem situation structuring

As explained in chapter 1 NAV is a large organization handling complex and difficult tasks. Working with struggling humans in our society is a great responsibility. To showcase the complexity, we have used the SSM technique of rich picture diagramming (Checkland & Poulter, 2006).

Since NAV is a government agency their daily business is mostly dictated by legislation passed by the parliament. During the pandemic, they passed several pieces of legislation, both short term and long term, to give NAV the ability to deal with the rapid increase in unemployment. Some examples of these temporary legislations have been either altering or adding; Unemployment and sickness benefits, income security for workers across the national border, compensation scheme for self-employed and freelancers, supplementary benefit for people with a short period of residence in Norway (FriFagbevegelse. 2021).

From the process of creating the rich picture diagram we have identified these strategic issues connected to unemployment for NAV during a state of crisis, focusing of the COVID-19 pandemic:

- Being able to cope with the rapid growth of unemployment in a crisis
- Having good solutions for people to contact NAV when they are struggling
 - Digital presence
 - Physical presence
 - Better user meetings
- Help unemployed back to work
 - Offer relevant and effective training and courses

Drawing on the BAM methodology we started with a rich picture diagram of NAVs relationships to have an easier overview of NAVs most important connections, to see where the data comes from and what it may provide to NAV. The diagram is not specifically detailed, as we use this to get a more general overview of where the policies, users, and market influenced NAV and their data.

RPD explained: Starting with a national or international crisis, we see a significant increase in unemployment rates, which leads to more users of NAVs services because of an decrease in available jobs. During a crisis the government issues new policies and budgets to Nav in accordance with politics from the parliament and EU. The new policies are directed to help users get back to work by affecting the labor market, or to help them financially as per NAVs overall goals. When the crisis is over it will again create a waterfall effect in the matrix for the situation to be normalized.

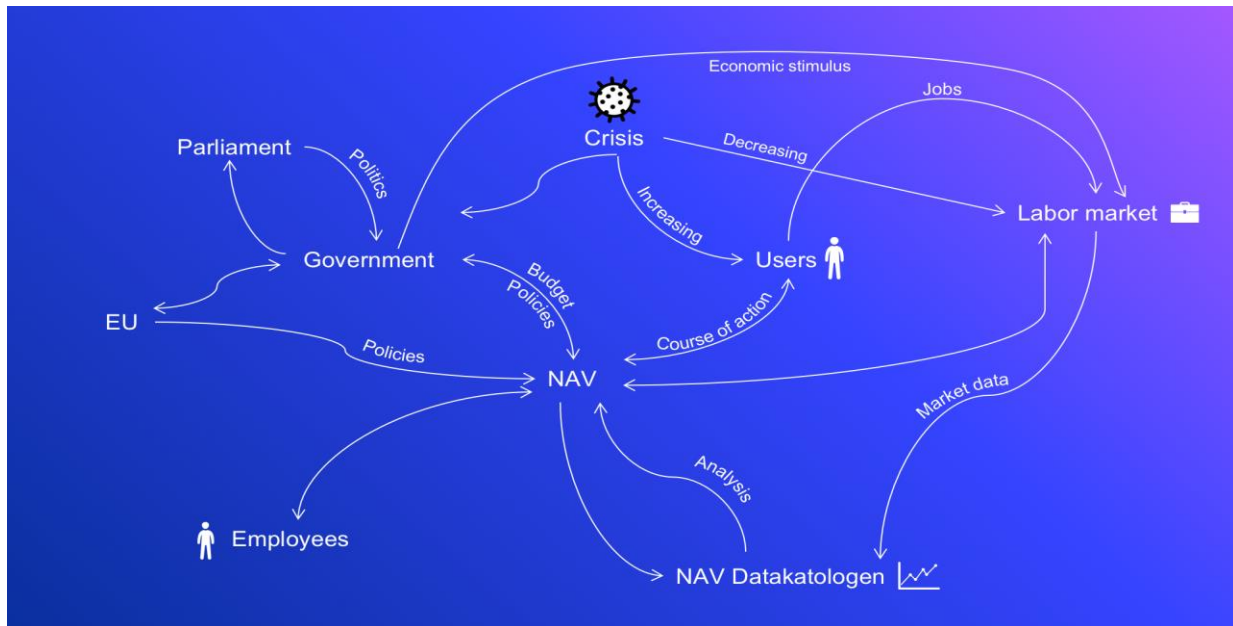


Figure 1. RPD of NAV relationships

BAM Step 2: CATWOE & BMC

The next step is to try to map the business model of NAV with focus on work initiatives. To do this we use a CATWOE analysis to help fill in the necessary segments in a business model canvas, because we found that to understand how NAV is working towards their goal, we need to look at them as a whole and not on a single process or department.

CATWOE	Application to NAV
Customer (who benefits/disbenefits?)	People in Norway that are not in full- or part-time jobs for any reason.
Actor (who performs the transformation process?)	NAV, the government, employers.
Transformation (what is it?)	To help people get back to work, either after they have been sick or, in our case, laid off.
Worldview (what makes the transformation meaningful?)	People who don't choose to be without a job should have a place to seek help with finding a new one. Being without a job can make a person feel left out of society, with no money and a worsened life quality.
Owners (who can stop the transformation?)	NAV, the government, employers who stop opening job positions.

Environmental Constraints (what aspects affect the business unit)	Natural disasters like a pandemic, big changes in the job market and demand, governmental policies.
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Table 2: CATWOE

Given the results in the CATWOE analysis the business model canvas was developed, this produces a better understanding of NAVs organization and their key focus areas.



Figure 2: BMC for NAV

BAM Step 3: Value extraction

Map out possible value extraction/difficulty

- Front office business analytics opportunities matrix
- Back office (operational) business analytics opportunities matrix
- Perceived difficulty and potential for value creation
 - Quick wins (easy and high value)
 - Major projects (hard and high value)
 - Fill-ins (easy and low value)
 - Hard slogs (hard and low value)

In this step we have taken the individual elements of the business model canvas and asked an appropriate business question. These questions can give Nav some valuable analytic insight into that specific element of their business model canvas. Furthermore, we have identified potential

applications of analysis, which are use cases that we will prioritize based on analytic difficulty, and potential value as illustrated in figure 3.

Element of canvas	Business question	Potential application of analytics
Channels	<ul style="list-style-type: none"> • What channels do NAVs user groups usually prefer? • Is there any change in preference with different user groups? 	<ul style="list-style-type: none"> • Analyze the most effective way to communicate with different user segments • Analyze weak links in communication channels
Value proposition	<ul style="list-style-type: none"> • Do immediate actions in a crisis work to reduce unemployment? • Could NAV have more predictive actions to reduce unemployment? • Can NAV reduce workers' churn rate in the labor market? 	<ul style="list-style-type: none"> • Analyze workers churn rate during a crisis for the unemployment rate • Develop a score from different actions and their effect.
Customer Segment: Unemployed workers	<ul style="list-style-type: none"> • Are effects of the crisis geographically distributed? • Are effects of the crisis distributed by industry? • Are effects of the crisis distributed by other demographics like age, gender, or profession? 	<ul style="list-style-type: none"> • Analyze geospatial and demographic data during crisis • Effects from NAVs actions during crisis by geographic location

Table 3: Front office business analytics opportunities matrix

Canvas element	Business question	Potential application of analytics
Key activities: Social security network management, actions, and services	<ul style="list-style-type: none"> • Where should NAV have physical presence? • Does a digital presence substitute a physical presence? • What actions work under a crisis? • Do some municipalities perform better at assisting the unemployed? • Does NAV have the right 	<ul style="list-style-type: none"> • Geospatial analysis and visualization of users and NAV offices • Analysis of which actions are used in the different geographical locations • Analysis of the effect of different actions

	resources to assist the unemployed?	<ul style="list-style-type: none"> • Visualization of NAV staff compared to unemployed in municipalities • Predictive modelling of future NAV demands
Key Resources: NAV user data	<ul style="list-style-type: none"> • Does customer data at NAV provide information about the current state of the labor market 	<ul style="list-style-type: none"> • Modelling of data quality • Modelling and analysis of data flow between NAV and staff agencies.
Key partners: Staff agencies, municipal and counties	<ul style="list-style-type: none"> • How are staff agencies performing? • How well is the government tackling the causes of unemployment? 	<ul style="list-style-type: none"> • Analysis of performance of staff agencies, NAV offices and government actions
Cost structure	<ul style="list-style-type: none"> • Does a crisis increase costs? • Can cost be reduced? • Can actions during a crisis reduce the cost? 	<ul style="list-style-type: none"> • Modeling a cost structure • Compare costs of different crises • Comparative analysis of actions and costs

Table 4: Back office (operational) business analytics opportunities matrix

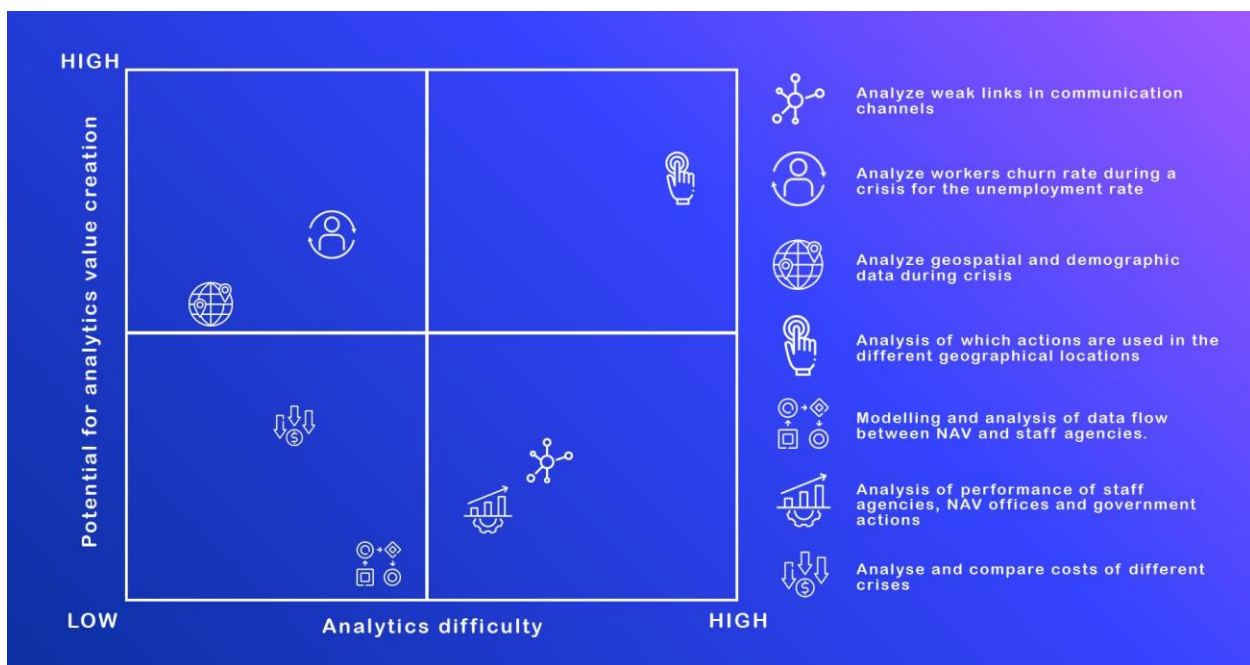


Figure 3. Leverage analytics matrix

For the leverage analytics matrix we chose to take one potential application from each canvas element to find the most promising business analytics applications for our study. The result included (1) Analyzing workers' churn rate during a crisis, (2) Analyzing geospatial and demographic data during crisis and (3) Analysis of which actions are used in the different geographical locations.

BAM step 4: Analytics implementation

BAM step 4 consists of implementing the analyses we have landed on through BAM step 1-3. This will be done in chapter 4 and 5 of this report. As we decided in BAM step 3, we will go on by analyzing workers' churn rate during a crisis, geospatial and demographic data during crisis and which actions are used in the different geographical locations. We will end it by recommending an implementation plan for how NAV should prioritize different actions during a crisis, and possibly different actions they can take.

2.2 Data strategy

Deciding on the right data strategy for the project is essential to be able to impact the business. As mentioned, NAV is a large and complex organization that has a direct effect on how people perceive the welfare state of Norway. Therefore, we wanted a data strategy that emphasized the complexity and business aspects of NAV. The Business Analytics Methodology maps the business model with internal and external factors and defines how the business delivers value to its customers/users. Thereafter it explores how data can be used to improve the different aspects of the organization by brainstorming different business questions and the potential application of analytics. This approach lets us decide on what data we need and how we should use it. Considering none of the members have a lot of experience in machine learning or AI, the approach lets us land on analysis that is not too technical. Regardless, it is important to mention that the data does not magically improve the business. It does not help with tons of data if you do not know how to use it to improve the actual business - And that does not have to be too technical.

Furthermore, the data strategy is based on the results of the first three steps of BAM. Simplified the creation of our data strategy consisted of these steps:

1. Map the organizational context and business of NAV.
2. Identify business questions that align with the business strategy.
3. Identify analysis and data we can use to answer the business questions.
4. Carry out analysis and visualizations through exploratory data analysis (EDA) to gain insight
5. Make recommendations for future analytics capabilities and data collecting for NAVs course of actions.

3 Method

In this section, we will describe the data that is being analyzed and how we have gone about analyzing them. The overall purpose of this endeavor is to extract useful insight to hopefully answer the business questions we have set.

3.1 The data sets

Nav does not exclusively publish one large dataset, but divides up different aspects like demographic, age, county, actions taken etc. therefore we must choose several datasets which helps the given objective for this paper. We also include one dataset from SSB.

3.1.1 Total initiative participants by year

The first dataset we are looking at is NAV's listings of eligible workers enrolled in their programs designed to help the participants back to work. This dataset is collected from NAV and divided into before and after 2009, hence the divided graphs.

The dataset can be sorted in many different ways, e.g. age, sex, location, and type of initiative. While these graphs only show the total amount each year, we will go into more detailed initiatives where it is required.

3.1.2 Worker churn rate during a crisis for the unemployment rate

In this dataset we decided to use for the task was NAV's "Helt ledige 2020" (NAV.no, 2021). This data set contains an overview of how many registered unemployed workers there are, how long they have been unemployed, which work field they come from and their age, gender and location. NAV publishes data each month and a yearly dataset summarizing them. This comes in an XLS file with numerous tables for each category. This is to protect the privacy of their users. We also added data from 2021 on how long they had been registered unemployed. The main goal for this dataset was to explore the churn rate for unemployed and which groups that were affected.

Pre-processing

Because the data comes in numerous tables, we had to combine each table to the corresponding month to be able to further analyze the data. This was done manually, as it was simply a copy-paste task in Excel. This was quite time consuming and was a tedious format to work with. By creating a pivot table, we could easier manipulate the data and perform the analyses.

Method for analysis

We mainly focused on exploring the data and trying to visualize different aspects of it. This included doing small calculations like subtracting this month to the previous month to determine the increase and decrease of unemployment.

3.1.3 Geospatial and demographic data during a crisis

The fourth dataset for this task is “Arbeidsledighet per kommune utvikling 2002-2020”, which publishes the unemployment data for each municipality for every month from 2002 until 2020. This helps when we look at the geographical consequences of a crisis, where we can pinpoint the areas that experience the highest drops in workers and/or which sectors are the most likely to be targeted negatively by the crisis. It can also be used to see the local impact of measures NAV put in place when a crisis is happening, and which actions are used in different geographical locations (NAV, 2020A).

Pre-processing

This dataset was relatively large, with one data point for every month, in every municipality for every year. This ended up being a total of 95010 lines of data which needed to be sorted. The goal for this dataset was to create a heat-map that could give us a possibility to explore the data geographically, with the intent to analyze it further. There were several municipalities that had no recorded unemployment rate in certain timeframes, thus we decided to remove these data points. The quickest and easiest method was making the whole dataset available in a pivot table in Excel, and thereafter filtering out the points without data. This resulted in a reduction of 1,78% of the dataset.

Method for analysis

As mentioned, we needed to explore and visualize the unemployment rate geographically, thus we decided for a heat-map with both municipalities and counties in Norway and their representative average unemployment rate. This is mostly for context of the next step of our analysis - where we look at which actions were used in different parts of the country, and therefore to have a reference point for the unemployment rate would be ideal. Thus, this would be an exploratory analysis to accompany the other datasets.

3.1.4 Participants in labor market initiatives and registered unemployed

This dataset is collected from SSB (statistisk sentralbyrå) and, as the headline suggests, shows us how many people are enrolled in labor market initiatives and registered unemployed. The attributes in this dataset are a bit different from NAVs since this is SSB, who collects information directly from the labor market while NAV requires employers and employees to register themselves. The attributes we use in this dataset are “participants in labor market initiatives”, and “registered unemployed”. Data from SSB is a bit easier to clean since it is coherent from years past, unlike NAVs datasets. We have chosen to look at participants from 2008 until 2020 to cover the crisis in question. Only the total amount is presented, the disregarded data is the number of

residents, employed, enrolled in education, disability benefits, old-age pension, and “other”, since these are not eligible workers not currently in a job.

3.2 Discrepancy between the data sets

The data sets we have chosen to have either come directly from NAV themselves, or from SSB (Statistics Norway. 2021). While these are quite reliable sources, there are some differences in what they include in their statistics. The data from NAV lists only the job seekers that have registered themselves in NAV’s system and excludes those who choose not to do so. SSB’s statistics, however, includes anyone who fulfils the requirement of being without work (Statistics Norway. 2020).

The datasets are mainly from NAVs own database, and this makes the comparison a little difficult for a couple of reasons. Firstly, NAV is the result of a merger that happened in 2006, thus some datasets have not been coherent from different time periods. Secondly, Norway has been undergoing a series of county mergers at different years (Regjeringen.no, 2019). For example, the counties Nord-Trøndelag and Sør-Trøndelag were merged to Trøndelag on 1st January 2018, and six new mergers were completed on 1st January 2020. This creates some difficulties when comparing data due changes in geolocation, number of inhabitants, county names, and change in data structure. We have tried to clean the datasets so that we have the data from before the mergers integrated into the new and are following the current counties as per autumn 2021.

3.3 Tools

Benefits and Cons of Power Bi, Ease of Use, Correlation to Type Of Data

The tool we have chosen for data analysis is mainly Power BI. This choice was made because of its relative ease of use when it comes to presenting data in a clear and informative way, without being clunky or very specific in its purposes. The tool gives us access to different analysis options of the data we have, and we can compare the data side by side or merge it to achieve the results we are after. It also correlates to the type of data we have, which is delivered mainly in a spreadsheet format instead of the more popular choices in programming such as csv or json. That means it’s easier for us to go with Power BI than to convert the data into something else before working with it, which makes it the more logical choice. The cons of using Power BI are that we have less options to customize the way the analysis works by programming it by ourselves, since we only have the option to use what comes with Power BI. This is not a dealbreaker for us, as we think we are still more likely to come out with a better result with Power BI compared to other options.

When we tried to import the data directly into Power BI, it produced inconsistent results and other oddities. As an example, it puts Trøndelag and Agder, two regions in Norway, in some random places in France. Therefore, we concluded that the data needed to be cleaned, before it could be used. PowerBI has some built-in tools to view and manipulate the data directly, when it was

difficult to clean in Power BI we chose to clean directly in excel instead. We chose Excel as we are familiar with it from before, and it offers quite reliable and powerful tools to manipulate data.

Tableau

Tableau was used specifically for visualization and easy access for all members through Tableau's Public interface, which easily publishes the visuals with control-options on a website. Only one member had some experience of Tableau, thus the use was limited only to visualizations such as heat-maps where several members needed access for further analysis.

4 Analysis

4.1 Analyze workers churn rate during a crisis for the unemployment rate

Analyzing the churn rate and looking at who gets unemployed can give NAV insight about the user group and which actions they should take accordingly. When we talk about churn rate, we mean people that stop being defined as unemployed. We are here focusing on the most recent crisis, the COVID-19 pandemic, as this dataset has the most detailed monthly description of unemployment rates. Note that the graphs start at 0 in January, to read the waterfall graphs one should disregard the 0 and read from the top of the column. This means that January is about the same level as February in all the following waterfall graphs.

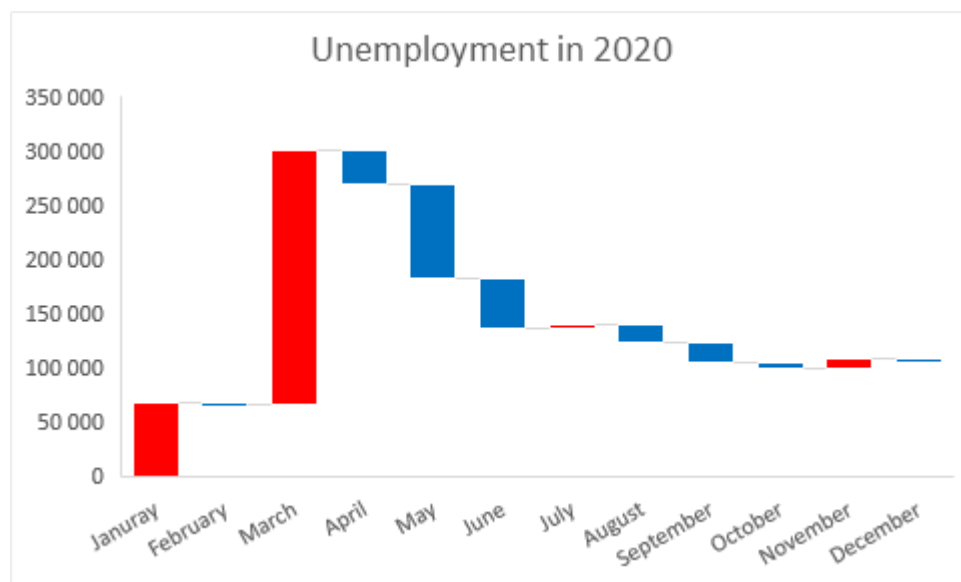


Figure 4. Unemployment in 2020

As we can see in figure 4 “Unemployment in 2020”, we have a massive increase in March just as the pandemic hit Norway. Not unexpectedly some of the industries hardest hit were “Tourism and Transportation” and “Shop and Sales”, “Office work” was also hit but to a somewhat lesser degree. Tourism and transportation layoffs were because of the global lockdown and travel restrictions, this hit the industry hard, and it did take time for it to recover, only to take a second hit during the second lockdown in November. At the end of 2020 it was 14 245 more unemployed compared to the start of 2020. Most of the people laid off worked as service staff and chefs. Shop and Sales, and Office work came back relatively quickly, people needed to shop even if there was a pandemic, and office workers could work from home or had even more work than before.

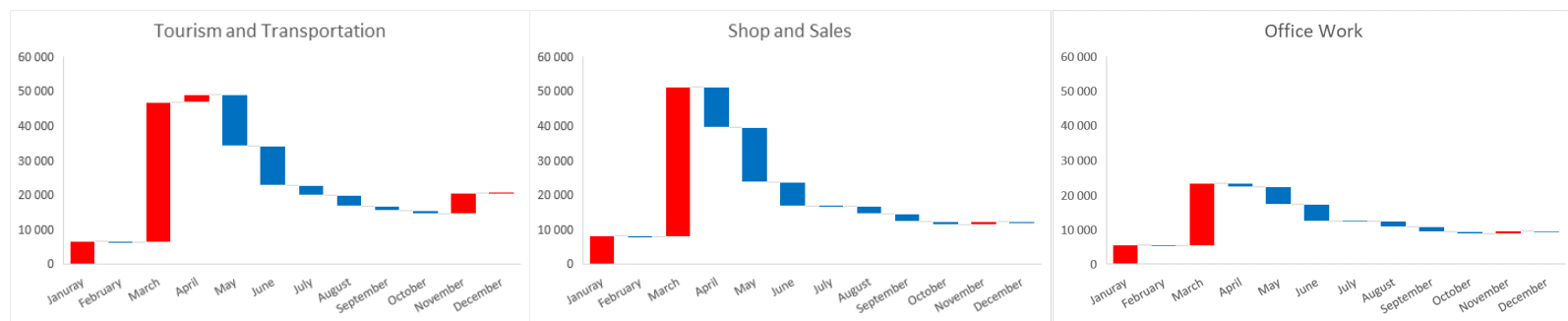


Figure 5. Unemployment rate in three professions

The trends we see in the three professions are the same for all the professions we have looked at, but the scope varies.

Long Term Unemployed

There is a problem of people not getting back to work after long term unemployment. Long term unemployed are defined as “people who are unemployed 26 weeks or more”, and we see a great increase in these numbers in September - 20 about 26 weeks after the initial pandemic lockdown on 12th march. The number of people defined as Long Term Unemployed has increased with 18 015 during 2020. As we can see from figure 8 “Long Term Unemployed”, the graph has a big spike during March and is relatively stable the next four months after they got status as long term unemployed. It is also worth noting that the biggest age segment here is from ages 30-39. Considering more people aged between 20-29 were unemployed in March, this indicates that those aged between 30-39 have a harder time getting back to work. But this stays true without the pandemic too, as the percent of the different age groups are quite stable both before and during the pandemic.

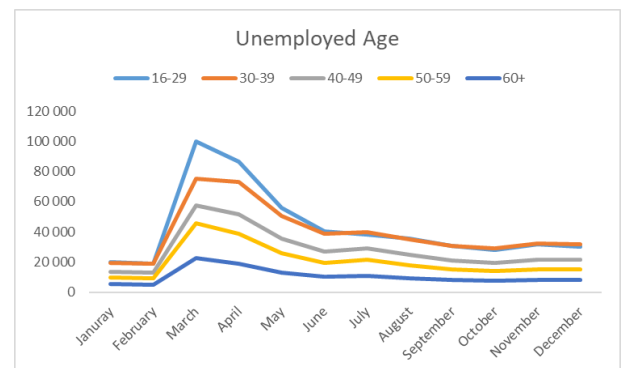


Figure 6. Unemployed Age

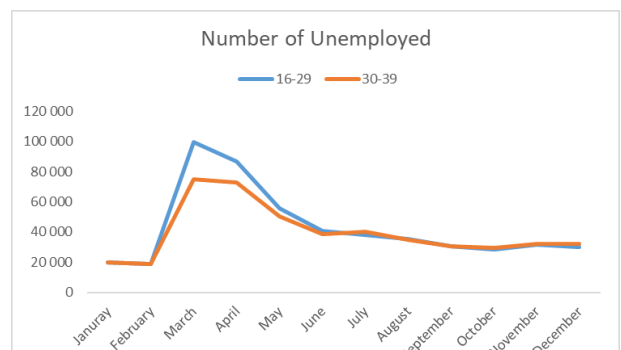


Figure 7. Number of Unemployed

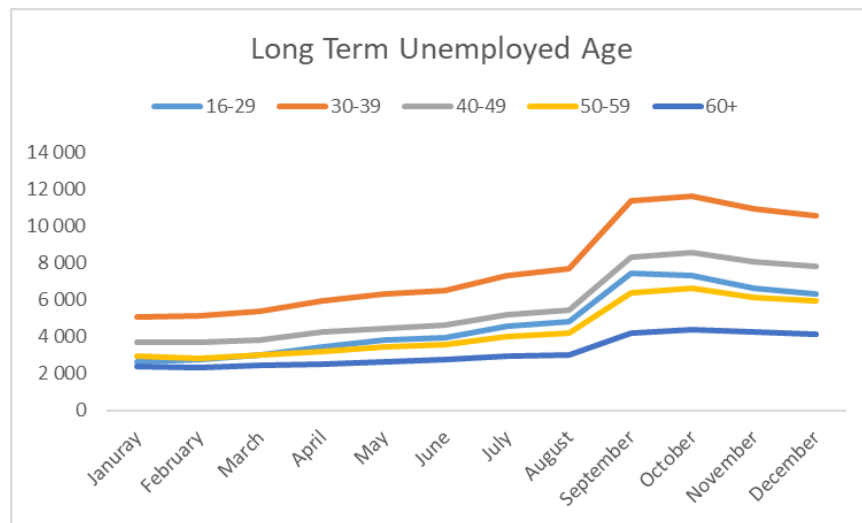


Figure 8. Long Term Unemployed Age

While the number of unemployed keeps decreasing after March the amount of people being long term unemployed keeps increasing. For the people who were unemployed before the impact of the pandemic, this raises the competition to get back to work. Considering it is harder to find a new job the longer you are unemployed, this group might have a harder time finding a job after the pandemic.

The two graphs Long Term Unemployed (figure 9) and 81 Weeks or More (figure 10), shows the flow of unemployed from month 1 (January 2020) to month 22 (October 2021). As long term unemployed have a huge increase then starts decreasing, those unemployed for 81 weeks or more have a stable increase, then a small decrease and ends with a huge increase in October 2021. This bolsters the point in the paragraph over.

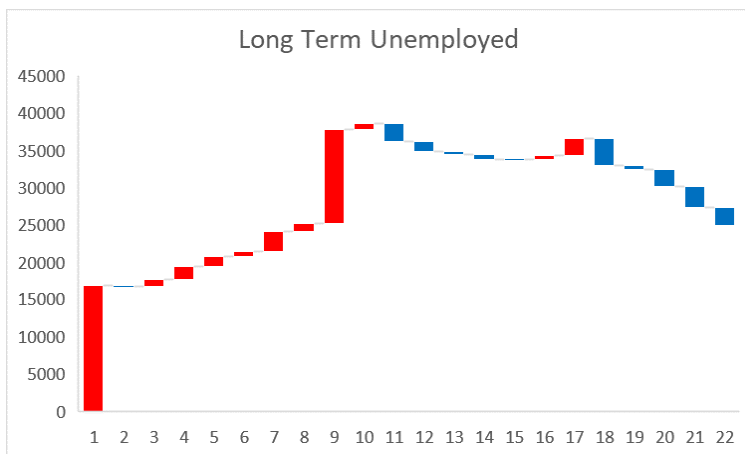


Figure 9. Long Term Unemployed

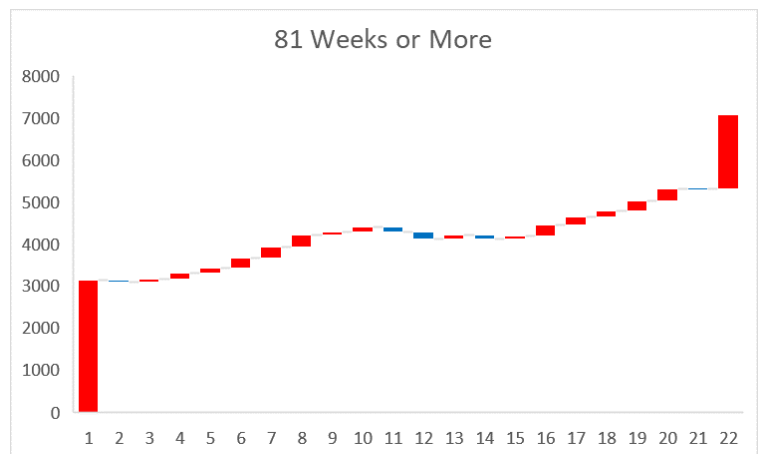


Figure 10. 81 weeks or more

4.2 Analyze geospatial and demographic data during crisis

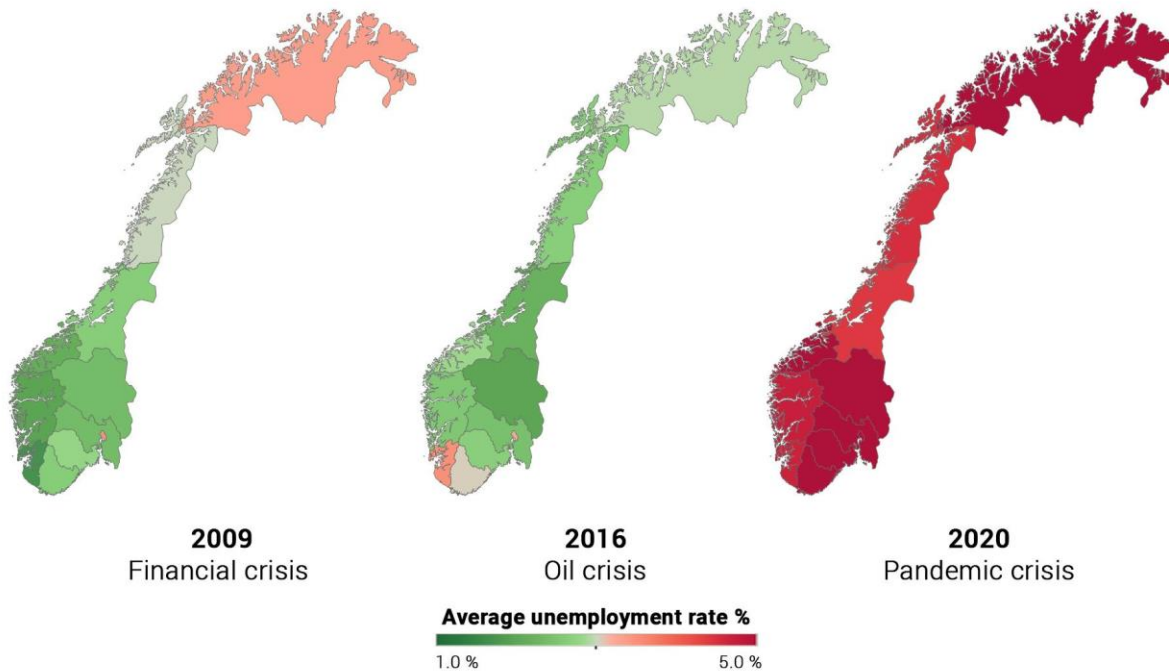


Figure 11. Unemployment rate during a crisis



Figure 12. Average unemployment rate 2018-2019

The dataset described in chapter 3.1.4 provided us with this heat-map illustrated in figure 11. This comparison gives us a general impression of the unemployment rate for each county during the three last major crises, although only the financial crisis and oil crisis gives us a more specific area affected by the crises within Oslo, south-west and northern parts of Norway. Whereas the pandemic gives an obvious visual impression of the whole country as an affected area.

To compare these crises, we also need a control which tells us the more normal unemployment rate, which is shown in figure 12. We averaged the years 2018 and 2019 to apply as a control. The average unemployment rate for these years is 2.05%. If we include every year in this dataset combined (2002-2020), including crises years - the average is 2.66%

Financial crisis

The financial crisis which started out in December of 2008, had most of its impact in 2009, with a rather small impact compared to other crises. We have therefore used mostly numbers from 2009 to examine. We can see from the heatmap that mostly the two counties Oslo and Troms og Finnmark were affected. According to the CEO of Sparebank 1 Nord-Norge at that time, the overall outcome from the financial crisis in Troms og Finnmark was not as bad as the rest of the country (Norum, Guldahl, Enoksen, 2009). The industry workers were the ones who suffered most during the crisis (Sunnanå, Bjørnstad, 2009) especially industries with international customers. Partially due to the high employment rate in the public sector in Troms og Finnmark, and the creation of regional jobs, the region of Troms og Finnmark is considered one of the “winners” during the financial crisis who had the lowest increase in unemployment rate. The heat-map for this region is red because the unemployment rate was a bit high from before the crisis started. In Oslo who also were red, the unemployment mainly came from international businesses who suffered the greatest losses.

Oil Crisis

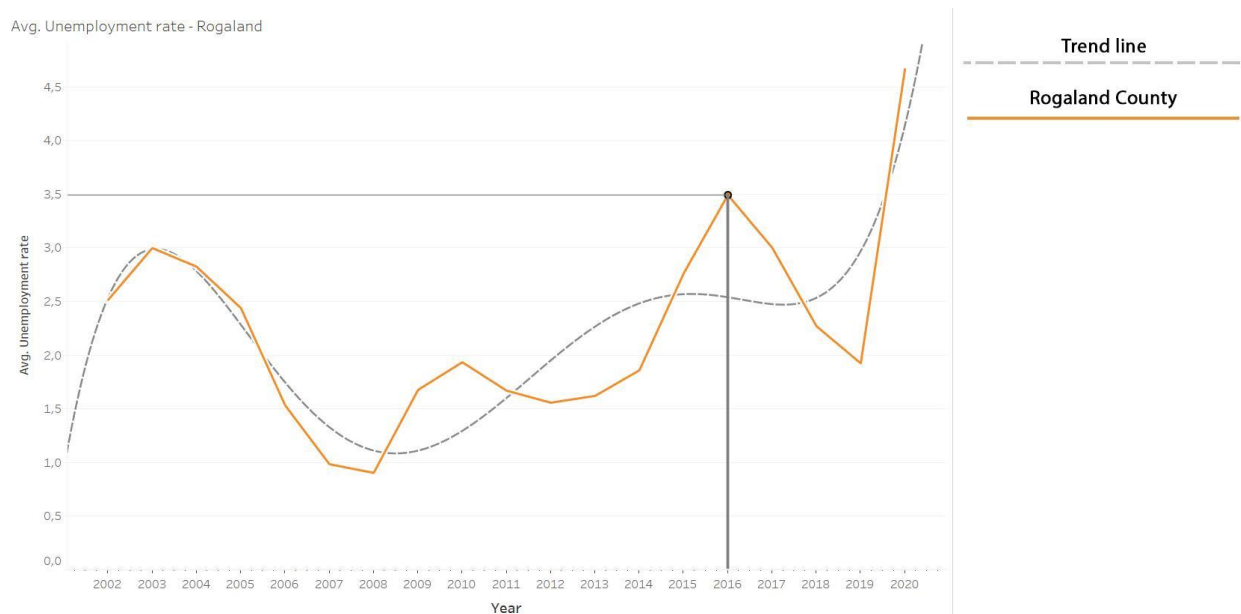


Figure 13. Avg. Unemployment rate – Rogaland

The oil crisis had a rather bigger impact, whereas some regions would be more affected - Rogaland, the biggest county for oil-industry, rose from 2014 to top in 2016 as shown in figure 13. This was because the oil industry mainly had workers living on land in these areas, and the “oil regions” therefore got the highest unemployment. However, the rest of the country remained stable in unemployment. This led to NAV having to increase measures specifically in these regions to combat unemployment locally.

COVID-19 pandemic crisis

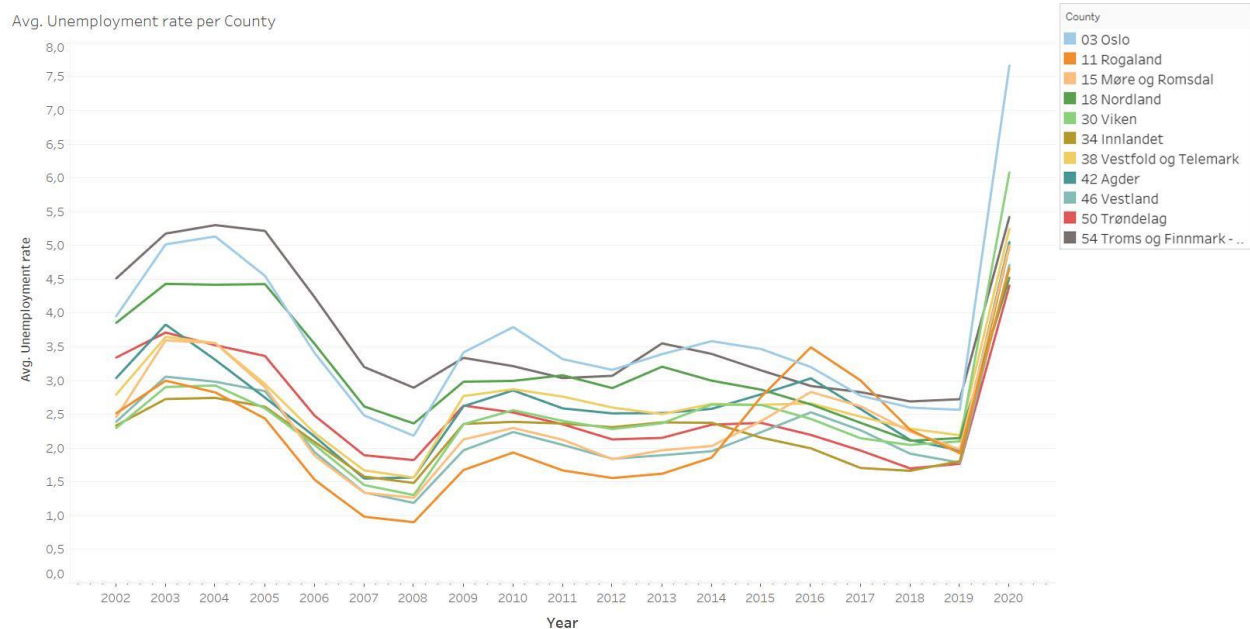


Figure 14. Avg. Unemployment rate per County

The COVID-19 pandemic made NAV's job significantly harder when unemployment doubled almost overnight. From February to April in 2020 the number of job seekers increased by 360% (NAV, 2020B). Any organization with a 360% increase in inquiries in a month is guaranteed to get problems with handling the surge. NAV did several measures to automate the process of registering as a job seeker and getting unemployment benefits, which helped lessen the strain. As for measures during this period, a lot of measures were hard to implement because the number of people needing jobs increased rapidly, and the number of companies needing workers decreased rapidly. One can see an increase of follow-up measures, but a decrease of all other measures during the period visualized in figure 16. After a 6-month period, many had gotten their jobs back, but NAV still had a lot more job seekers than pre-pandemic numbers. We can then see that the courses of action increased slowly until the end of the year, to combat the long-term unemployment caused by the COVID-19 pandemic. This was also because of a gradual re-opening of companies and the economy, making an increase in measures possible.

4.3 Analysis of which courses of actions are used

For this analysis we will talk about different actions used, the regional use of them during 2020, and the number of participants. Since these names can be translated into English in any number of ways, we have decided to standardize some of the translation of the specific initiatives in the table below.

English	Norwegian
Benefits	Avklaringstiltak
Follow up	Oppfølging
Training	Opplæring
Wage boost	Lønnstilskudd
Work experience	Arbeidspraksis

Table 5. Translated courses of action

Here we have what kind of labor market measures that were used by different regions in the year 2020. We can see that they use a mix of all the available measures, but the exact percentages vary greatly between the regions. We can see here that Oslo is using training a lot more compared to the other regions, they also have a large percentage of people who they follow up. We also see that Viken has a greater percentage of follow-up measures, and lower wage boost measures in 2020.

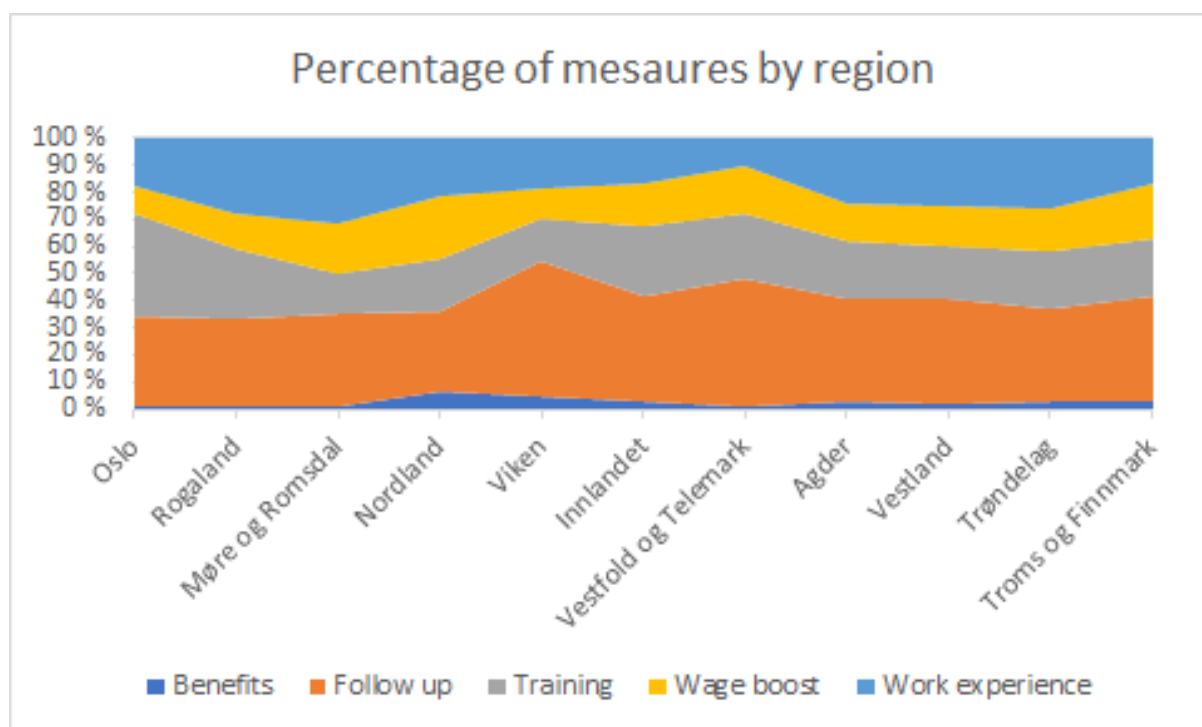


Figure 15. Percentage of measures by region 2020

The following figure 16 “Participants in courses of actions” shows us the total number of participants in different courses of actions from NAV from 2009 to 2020. This is a subset from the dataset described in 3.1.1 “Total initiative participants per year”, which divides the total amount

into the different initiative segments. If you look at the table we can immediately rule out “clarification measures”, “employment measures, leave and substitute”, and “other” as big and influential initiatives, these are a fraction of the total participants and provide little overall impact. It is a little difficult to read the data from the financial crisis in 2008 and the aftermath since our data begins in 2009, but we can see that “work practice” and “training” are the two most common initiatives, these are initiatives that are not so common in the financial world and more towards practical industries. Thus, we assume the financial crisis did not affect participants in this sector. From the year 2012 to 2015 we see a variation on both increase and decline in different initiatives, this we consider to be normal labor force variations and of little concern. However, from 2015-2016 we see a steep climb of participants across the board. In 2016 the oil crisis happened, and many people got laid off or reassigned, as shown in figure 11 the hardest hit location was the county of Rogaland. People reported to NAV as their job got lost and assigned to appropriate initiatives, from this graph it is difficult to see what course of action the participants benefited the most from. We can also see an increase in ads and positions on the labor market from 2016 (NAV.no. 2021), this suggests that even though people lost jobs from the oil industry, the other industries saw fit to acquire experienced and highly educated workers who previously would have stayed in oil. This may be confirmed by the sudden drop of participants across the board from 2017, that people who got laid off or suspended with or without pay got headhunted into other jobs. (Røhnhold, 2017)

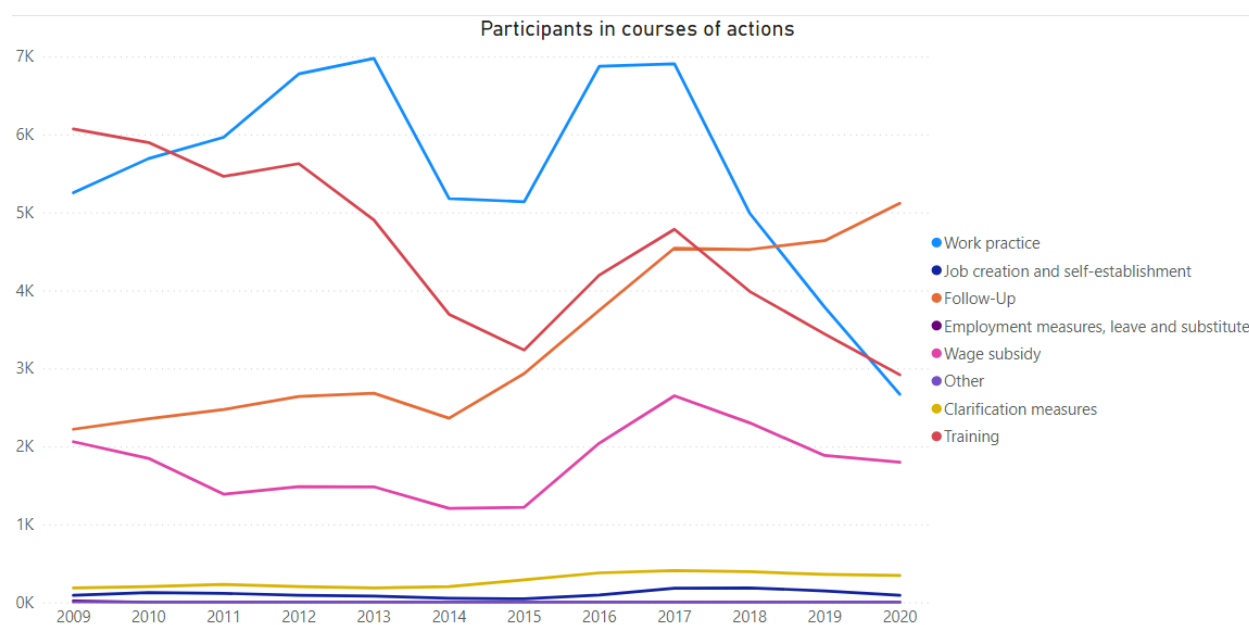


Figure 16. Participants in courses of actions

Data after 2017 shows a decline in every course of action except “follow-up”; that initiative does have an overall increase from the beginning, especially during the oil crisis and pandemic. Maybe NAV has figured out that close follow-up of participants reduces the churn rate of unemployment. The follow-up initiative includes activities like job application courses that are mandatory and

forces participants to apply to jobs while within NAVs facilities. It is one of the more direct ways NAV is using to get people back into work, by making them do it themselves.

When we look at the next graph, the number of actions compared to unemployment 2020 derived from NAV, we get a closer look at the unemployment rate during the first year of the pandemic. It is hard to miss the spike in March, sending literally hundreds of thousands of people into unemployment. This spike had a steady decline the following months until about August/September where it stabilizes. What is curious to observe is the actions taken by NAV, this has no increase during the first months of the pandemic even the sudden spike of unemployment. The amount of actions instead went a bit down during mid-summer and rose above the original levels during autumn. As we shall discuss a bit later under interpretations this may have some correlation with the churn rate of eligible workers, given that people return to their jobs or a new job before a 6-month period - thus giving NAV the opportunity to enroll people who are defined as long-term unemployed into the necessary course of action. It is not clear from these graphs alone what courses of action NAV should use during a sudden state of crisis; this will be further discussed during chapter 5.

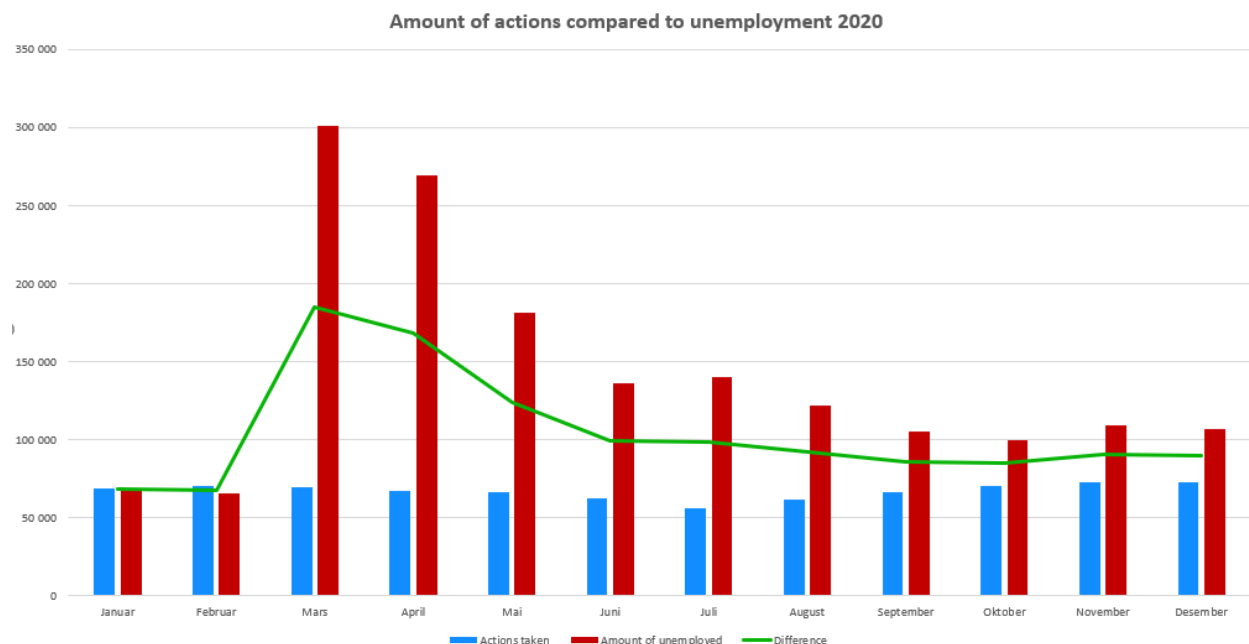


Figure 17. Amount of actions compared to unemployment 2020

5 Interpretation & recommendation

5.1 Discussion

These three major crises have each impacted the Norwegian labor market in its own way. The financial crisis had mostly an impact on international industries and the finance market, leading to unemployment in these sectors, but as a private individual you were probably better off as the government deployed interest cuts, it was a strong increase in salary payments, and due to a lower price growth. (Sunnaå, Bjørnmestad, 2009). The oil crisis had a rather direct impact on the oil industry, reducing crude oil prices led to the downfall of many jobs with high educated demand. This led to a massive regional spike in Rogaland, the “capital” county of the oil industry in Norway. Luckily, other industries saw their opportunity to acquire highly skilled and educated workers - thus the churn rate of unemployment went down rather quickly, and other industries bloomed. COVID-19 sent the whole world into a lockdown, possibly one of the (if not THE) biggest global impact from a single event since WWII that has lasted for almost two years at this point. Causing millions of deaths, nations imposing travel bans both internationally and domestic, and ravaging commerce and the daily life of all people. All while a scientific community battle to create the first and best vaccine.

There is a big difference in how these crises hit the labor force market in Norway, so it is not so straightforward to compare these. Therefore, we decided to divide the crises in two categories: 1. Area or Industry specific, and 2. Nationwide. This divide makes sense since two of the major crises affected specific industries, preferably international commerce, and were partially region specific. While the pandemic hit nationwide and is hard to divide further down to specific regions or businesses. Given this divide we can now take a closer look on the different courses of actions taken by NAV these crises.

NAV is using a variety of actions to try to help eligible people back to work. These include initiatives like work practice, training, wage subsidy and follow-up. The way NAV operates makes it up to each municipality and their NAV offices to arrange the different initiatives, as briefly illustrated in figure 15. NAV has national laws and regulations to follow but decide themselves what course of action is best for each participant if they are eligible to work. Thus, the numbers of participation in courses of action often vary.

When unemployment rises quickly and in the whole nation, like in the pandemic. There is a lot of pressure on NAV to support all the new unemployed and a lot of administrative work. Those that were unemployed before the pandemic therefore do not get the follow up, they might need. NAV as an organization is not designed to handle such a rise in unemployment so quickly. And the old unemployed drowned in the wave of new unemployed.

Another discussion is if the actions NAV takes might restrain those professions that are the most impacted by the crisis. An example of this are professions connected to service or tourism during the pandemic. Considering they were unemployed for a long time; a lot of the people might change professions during the crisis. When the injunctions get removed, these professions might have a hard time recruiting enough people to satisfy the demand. That would mean helping people back to work as soon as possible would not always be the right answer, as some professions may suffer. This would be an interesting subject for further analyses.

5.2 Recommendations for crises

It appears clear to us that NAV must divide the courses of action into the same categories as the crisis, simply because an initiative could not be as effective as intended if that initiative would be used on the wrong user group or time period. We suggest dividing the initiatives into the following crisis category based on the findings in the analysis, where these initiatives should be prioritized during this category of crisis, but not neglected in the other category.

Area or industry specific	Nationwide
Work practice	Unemployment benefits for short- to mid-term unemployed
Training	See what courses of action are available for long-term unemployed
Wage subsidy	Stimulation packages for companies to take in more workers
Follow-Up*	
Work experience	
Job-creation and self-establishment	
Employment measures, leave, and substitute	

Table 6. Courses of action divided to crisis category

** Joint course of action*

Given the courses of action and the very nature of the crises is different, we must make two separate implementation plans - one who follows each crisis category.

5.2.1 Implementation plan: Area and industry specific crisis

This plan suggests the priority of the different courses of actions we believe NAV should follow to help minimize unemployment rate in an area or industry specific crisis. The table is divided into three segments describing the length of the given crisis, inspired from the churn rate analysis in chapter 4.1.

Area or Industry specific Crisis	0-6 months	6-18 months	18+ months
Follow up	10	5	2
Training	2	6	10
Work practice	4	8	8
Wage subsidy	9	3	1
Clarification measures	3	6	2
Self establishment etc.	1	4	7
Employment measures etc.	4	9	10

1 = Low - 10 = High priority

Figure 18. Implementation plan: Area of industry specific crisis

We believe that this prioritization will help reduce the unemployment rate in this category of crisis, based on the given analysis we have done. Notice from this table that “Follow-Up” and “Training” are about the opposite of one another. This is because follow-up measures are designed to help people get back the job they may have lost, or at least within the same profession or industry. After time goes by and the crisis rages on, the individual need for follow-up would decline as the training and work practice measures take higher priority. Training in this NAV case refers to initiatives like helping to write a CV, job application and general job searching. Work practice is the initiative where employers report they have vacant positions and NAV fills these vacancies with eligible workers, this is so that people can gain experience in the field and at the same time may be offered a permanent position. We consider “Follow-Up” to be about the opposite of “Training” and “Work practice”, because as time goes by the need for re-training and a new job increases if the original employment does not get reinstated.

5.2.2 Implementation plan: Nationwide crisis

Nationwide crisis	0-6 months	6-18 months	18+ months	
Follow up	10	5	6	1 = Low - 10 = High priority
Unemployment benefits	8	8	8	
Stimulation package	2	8	5	
Long-term unemployment measures	1	10	4	

Figure 19. Implementation plan: Nationwide Crisis

In figure 19, we give the different measures a score of relevance during a nationwide crisis. As we can see, follow-up measures were the most common in the COVID-19 pandemic, and we can deduct that another nationwide crisis is going to have mostly follow-up measures increasing, although it may also lead to an increase of other measures if it's not a virus or something similar that shuts the economy down. After 6 months, follow up measures are not as relevant as before because the possibility of starting in your job again after 6 months is reduced.

As for unemployment benefits, they remain relevant throughout the whole crisis to take care of the unemployed throughout the whole period, regardless of the length of their unemployment. This helps secure a portion of the former salary, so the job seekers' economy remains stable throughout their unemployment. Stimulation packages can lead to an influx in the economy in a state of crisis, and as the COVID-19 pandemic has shown, many companies can get back on their feet after a stimulation package is implemented. They then need their workers back, so the packages can work as a good measure if the timing is right, and it's given when society is starting the transition back to normal.

When a nationwide crisis occurs, it's expected that long-term unemployment increases in the period after the crisis. Therefore, long-term unemployment measures need to be in place after it's clear that there are several job seekers that are unable to return to their former jobs, even though the crisis has cooled down somewhat. This includes traditional NAV measures like training, work practice and self-establishment. The more time passes after the crisis, the more likely it is that these measures need to be implemented for the job seekers to get them back in employment. Therefore,

this is a tool that's not looked at right away, but rather when the situation is more clear and the crisis has stabilized itself somewhat. This also includes those that were unemployed before the crisis hit. These need extra attention as they drown in the sea of new unemployed and are already in a disadvantaged situation.

5.3 Limitations

Even though NAV publishes data every month, they take privacy seriously. Therefore, they make it hard to break down the data so that you can identify persons from the information. This makes the analysis on the churn rate lacking because we can't follow the unemployed through their unemployment and makes it hard to identify which groups that are struggling the most and classifying the unemployed. Therefore, we decided on using the groups defined by NAV.

The ongoing pandemic has not yet shown the full results of its impact on the world. This may lead to inconsistencies of produced data, and things we do know now may be altered, or even completely wrong, in the future. The disclaimer here is that we do not yet know the full extent of a nationwide crisis and so there should be another analysis of this event sometime in the future.

We have mentioned it before, but again, the difference in datasets from previous years did not always include detailed monthly data. Thus, we have more detailed graphs and tables from the year 2020 than from before.

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