

# Application of the Naturally Optimised Revenue Demand in Communities NORDIC Model to Improve the Workforce in Sweden

Jan Stenis

Correspondence: Jan Stenis, Sweden. E-mail: [jan.stenis@icloud.com](mailto:jan.stenis@icloud.com)

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## Abstract

The Naturally Optimised Revenue Demand in Communities (NORDIC) model was employed to improve the workforce. The proposed model produced constructed shadow costs to be inserted into the public accounts to induce economic incentives to increase the employment-to-population ratio. The resulting shadow cost, and its impact on the PSBR, constitutes a single key factor that by one digit only, expresses how successful the labour policy is over time. The launched model considered and promoted the health of the workforce and reduced the costs of non-employment. This case study showed how the workforce in the Swedish society could be improved by application of the NORDIC model, that is the system of cooperation between workers and employers. The results point at a promising methodology for improving the health of the workforce and increasing the employment-to-population ratio by using economic instruments. The study concludes that the versatile NORDIC model could be used to improve the Swedish workforce and its quality of life, particularly for seniors. Possible end users include labour authorities and politicians that want a comprehensive tool to redesign the labour policy. The NORDIC model is recommended to apply to labour issues, and employ to improve the health of the workforce. Further research should focus on developing algorithms for certain sections of the workforce.

**Keywords:** economic instrument, labour policy, unemployment rate, key factor

## 1. Introduction

Much attention has been devoted to the issue of unemployment. A high employment-to-population ratio has positive effects on the Gross Domestic Product (GDP) (Employment-to-population ratio, 2019). This paper aims to address the nations' unemployment-burden. The objective of this study was to provide a new and practical method of improving the workforce by designing a decision-support tool for authorities, politicians and other citizens interested in labour policy issues to facilitate the daily use of the Naturally Optimised Revenue Demand in Communities, NORDIC model (Stenis, 2020; Stenis & Hogland, 2019). The hypothesis of this work was that the flow of unemployed people through nations' labour authorities could be improved by applying the NORDIC model. The research question was whether the workforce could actually be improved by employing economic instruments and whether this approach was feasible. The research was focused on accomplishing a change. The method selected was case studies of stakeholders to obtain information. An analytical approach was used. The research design featured a logical approach in a historical context. This design supported the hypotheses that the logic was inherent in the mathematics employed by the NORDIC model, and backed up by historical data; therefore, a quantitative research methodology was predominant. The theoretical implication of the study was the achievement of an enhanced scientific background to decision-making. The provided tool expanded the theoretical knowledge.

Relevant know-how was accumulated. The practical implications of this study were better circumstances for the unemployed and enhanced opportunities for leaders to logically explain reasons for initiating certain actions, other than based on emotional causes. The research gap that this study could fill is the need for new economic instruments to manage the employment sector. The study could contribute to improving the economy, which in turn would improve the living conditions in communities.

## 2. Review of the Literature

A review of works by other scholars on employment, shadow costs and models was done. Haveman and Weimer (2015) developed estimates of the opportunity costs of hiring or releasing an employee during periods of high unemployment. Khoury and Arayssi (2008) developed a labour-based model to determine the amount of insurance a worker was willing

to work for and purchase while maximizing utility and deriving the shadow price of job-related risk. Shadow costs in relation to the labour market have also been studied by Verhaest and Omeij (2009) who applied a shadow price approach to examine the relationship between over-education and job satisfaction. They found that largely a wage increase at the start of the first employment cannot compensate for involuntary over-education, and that wage increase at the start of the first employment is likely to induce negative productivity costs. Among other labour model-approaches, Munoli and Gani (2016) proposed a control policy for an unemployment model to derive and analyze how to provide employment to unemployed persons and create new vacancies. Whereas Wrede (2015), similar to our approach, considered quality of life aspects when investigating the willingness to pay for regional amenities and quality of life when wages, rents, and unemployment risk compensate for local amenities and disamenities. They demonstrated that the traditional approach gave too much weight to the wage differential. More recent works by Huws, Spencer and Syrdal (2018) on latter days labour market with work managed via online platforms ('crowdwork') concluded that future research should not only focus on crowdworkers as a special case but also focus on new patterns of work organisation in the regular workforce. The present study takes this and other aspects of labour policy into account because its' approach uses currency to express relevant labour-factors. There are no approaches similar to the present that simultaneously improve the unemployment rate and the quality of the workforce, including its quality of life by just a single key factor, like the NORDIC model does.

### 3. Research Methods

The basis for this work was the existing NORDIC model (Stenis, 2020; Stenis & Hogland, 2019). The components of the NORDIC model were studied and adapted to workforce issues.

#### 3.1 The Subjects

The new approach was tested on the workforce in Sweden in a case study with real-world facts and figures. The nation of Sweden was chosen because it offers an extensive tradition of powerful labour authorities that provide a wealth of data relevant to this study.

#### 3.2 The Study Procedures

##### 3.2.1 Experimental Interventions

Other than personal computers, no mechanical apparatus were used due to the detached approach selected by the author. Therefore, no direct intervention was administered.

##### 3.2.2 Sampling Procedures, Sample Size and Ethical Considerations

The plan was to find data that was most recent as well as reliable. Data was collected from public sources on the internet. No agreements or payments were made to obtain this information. The sample size was the entire workforce in Sweden. No agreements were made with any institutional review-board. Ethical standards were therefore met because no living individuals or animals were involved in the study. Thus, no safety monitoring procedures were required.

##### 3.2.3 Measurement Approaches

The methods used to collect data consisted of observations of relevant study-groups from online sources. The reliability of the observations was established by only consulting reliable sources on the internet. Evidence of cultural validity was based on the use of mainly impersonal, socio-economic data.

##### 3.2.4 The Research Design

The introduction provides the background and motivation for conducting the study from a scientific point of view. The theory for the NORDIC model has been outlined. This will be followed by a description of how to use the NORDIC model for labour policy issues in the analysis section below. Thereafter, a case study to illustrate how the NORDIC model in practice can improve the workforce in the nation of Sweden is presented. This exemplification is followed by the results and discussion, conclusion, benefits of the proposed model, and recommendations for authorities, politicians.

### 3.3 Theory Foundation

The NORDIC model computes the constructed shadow cost  $S$  as shown below:

$$S = (X / Y) * Z * W = [(V - C) / Y] * Z * W \quad (1)$$

where

$S$  is the Shadow cost to be additionally inserted in the accounts of the organisation;  $X$  is the phenomenon to be optimized =  $V - C$  ( $V$  is the Value of  $X$ ;  $C$  is the Cost of  $X$ );  $Y$  is the total value of the organisation;  $Z$  is the value of the entities connected to  $X$ ;  $W$  is the Weight factor for the general impact of  $X$  on society, during a certain period in a certain, administrative unit.

Possible sorts to apply are USD, kilogram, litre or Joule. The  $W$  factor has no sort, it is a mathematical decimal number.

### 3.4 Application of the NORDIC Model to Employment

$$S_{unemployment} = [(V - C) / G] * H * A \quad (2)$$

where

$S_{unemployment}$  is the Shadow cost for unemployment in a nation impacting the Gross Domestic Product (GDP); X is the workforce of the nation =  $V - C$ ; V is the economic Value of the nation's unemployed people on the labour market; C is the Cost for the unemployment in the nation; G is the GDP of the nation; H is the Health care-cost for the unemployed people in the nation; A is the Average age for the unemployed in the nation. Period: annually. Sort: US dollars.

Table 1. The nation's public budget

Revenues
Expenses
$S_{unemployment}$
Public Sector Borrowing Requirement

Table 1 shows the principle for the use of the shadow cost  $S_{unemployment}$  (Ekonomifakta, 2019). In this example, the shadow cost  $S_{unemployment}$  is added to the nation's expenses, the parameter H being a cost that negatively impacts the result.

### 3.5 Analysis

A decreased Public Sector Borrowing Requirement (PSBR), due to a lowered  $S_{unemployment}$ , points to a more successful labour policy. If the PSBR increases over time due to a raised  $S_{unemployment}$ , this calls for action by labour authorities.

### 3.6 Manual for Practical Application of the NORDIC Model to Employment

The following steps are used when applying the NORDIC model to employment issues.

1. Estimate the value of the parameters in Equation (2) by consulting public information sources.
2. Calculate the constructed shadow cost  $S_{unemployment}$ .
3. Regularly estimate the parameters in Equation (2).
4. Regularly calculate  $S_{unemployment}$  to follow its development over time.
5. Take actions if  $S_{unemployment}$  increases to improve the employment-to-population ratio.

Several parties e.g. relevant labour authorities, should collaborate to use the NORDIC model. Subsequently, the workforce and the employment rate can easily be improved in nations where the NORDIC model is applied.

### 3.7 Case Study: Application of the NORDIC Model to the Swedish Workforce in 2017

$X = V - C$  given by the Swedish expenditure on social protection for unemployment was USD 4.6 billion (SEK 45 633 million) (Statistics Sweden, [SCB], 2019a).

G by the Swedish GDP was USD 462 billion (SEK 4621 046 million) (SCB, 2019b).

H by the Swedish expenditures for paid sick leave was USD 6 billion (SEK 60.5 billion) (SCB, 2019c).

A the average age for unemployed Swedes, excluding full time students, was 38.8 years ((52 000 persons \* 20 year (range 15-24 years) + 59 000 persons \* 30 years (range 25-34 years) + 45 000 persons \* 40 years (range 35-44 years) + 40 000 persons \* 50 years (range 45-54 years) + 39 000 persons \* 60 years (range 55-64 years) + 5000 persons \* 70 years (range 65-74 years)) / 240 000 persons) (SCB, 2020)

An exchange rate of 1 USD = SEK10 (November 2019) was used for this case study.

Equation (2) gives

$$S_{unemployed} = (USD 4.6 billion / USD 462 billion) * USD 6 billion * 39 = USD 2330 million \quad (3)$$

$S_{unemployed}$  was added to the public budget of Sweden. Table 2 shows the impact of the constructed shadow costs S on the public finances of the nation of Sweden.  $S_{unemployed}$  was inserted in the table as an expense, due to being a cost.

Table 2. The public budget of Sweden considering the shadow cost S of unemployed

Revenues
Expenses
$S_{unemployed}$ (MUSD2330)
PSBR (+MUSD2330)

An increased PSBR by approximately USD 2.3 billion led to actions by the Swedish labour authorities to improve the workforce. If the next estimation of  $S_{unemployed}$  showed a lower shadow cost, it pointed out that Sweden had become better at reducing unemployment and improving the health of the work force. Actions would then be taken based on repeated estimations of S.

3.8 Sensitivity Analysis of the Proposed Theory

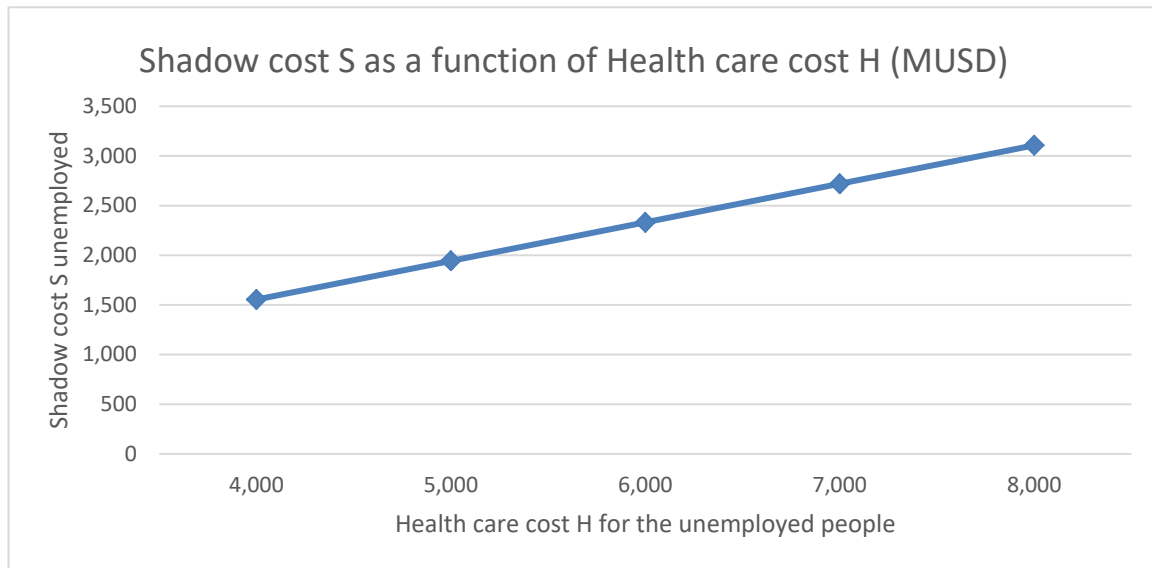


Figure 1. Relationship between the shadow cost and the health care cost when applying the NORDIC model

Figure 1 shows how the resulting shadow cost S varies with the main parameter H when the NORDIC model is applied to the Swedish workforce. The relationship is linear, illustrating that the proposed theory provides a stable outcome regardless of input.

4. Results and Discussion

The objective of this paper was to provide a new and practical method to improve the workforce. A review of similar literature showed that this objective was been accomplished as a decision-support tool has been provided for use by labour authorities, politicians and citizens interested in labour policy. The H factor in Equation (2) was successfully employed in case studies selected to valuate the health of the workforce in Sweden, in general. The age-factor A promoted a healthier workforce over time due to the shadow cost  $S_{unemployment}$  decreasing with a larger number of employed persons, and hence a healthier senior population. According to Table 1, PSBR decreases, which is favourable. If the wellbeing of younger employees is to be promoted, A occurs in the denominator in Equation (2), not in the numerator. Authorities have options.

The main goal was to facilitate the daily use of the NORDIC model by labour authorities and labour managers. This goal was met by successfully adapting the NORDIC model to employment issues in this paper, shown by the mathematical accuracy of the revised, and easy to use, model. The authenticity of the case study supports this statement. The hypothesis of this work was that the flow of unemployed through nations' labour authorities could be improved by applying the NORDIC model. This was proven by the mathematical logics and the fidelity of the case study illustrating usefulness of the NORDIC model for these purposes. The case studies produced realistic and reliable results regarding improvement of the employment in a nation. The scientific problem and question to be solved and answered were if the workforce actually could be improved by employing economic instruments? Was that approach feasible or not? The useful design of the developed equation and the promising possibility to apply the shadow cost-approach to the labour sector, provide an affirmative response to this question.

The case study exhibited a shadow cost of USD2.3 billion. This result points at the utility of the proposed methodology

in practice. Thus fulfilling the general objective of this study to provide labour authorities with a useful tool. This model is hinged on it's consideration for the health and quality of life of the nation's workforce.

Politicians and other concerned parties in particular, are provided with a practical tool to be used over time to study the development of their nation's workforce-quality. This improves the economy and welfare and reduces human suffering.

The NORDIC model does not determine in detail which solutions to implement. It provides managers with an overview of a general picture of the prevailing situation. This is how economic instruments work. The NORDIC model also includes a stepwise, practical manual presented in section 3.6 that gives a quick introduction on how the NORDIC model is used.

The disadvantage of this model is its inaccuracy in pinpointing specific sub-groups of relevance for the labour sector. Further research should preferably focus on developing algorithms for certain sections of the workforce.

The analytic treatment of data consisted of the usage of numerical values in the developed expression. The methods used support their analytic burdens due to Equation (2) mirroring the reality that is to be influenced. The methods are robust to violations of the assumptions that underlie them and provide clear insights into the data. Ancillary analyses for statistical error rates are less important to perform in this study because basic and easily available data were used throughout. Interventions or experimental manipulations were not used. The object groups of interest were approached in an impersonal way and not directly affected during the performance of the work. The author was highly detached when conducting this research.

The correctness of the calculations in Equations (2) and (3) plus realistic outcome from the case studies demonstrate the reliability of this study. The study's validity is illustrated by the use of common economic theory as basis for this work.

## 5. Conclusion

The NORDIC model can indeed be used to improve the workforce in a nation. In particular, the labour model presented enhances the health of the workforce by employing the NORDIC model in a societal context to improve welfare.

This work contributes to the literature by providing novel solutions to promote employment and workers' health, and to improve the labour authorities' performance. An improvement in management practices, mainly in a nation's public sector, is this paper's main contribution to scientific knowledge. These findings also impact the private labour sector.

The main finding from this study was that the NORDIC model represented a versatile theory to improve the workforce in various entities, such as nations, which subsequently experienced a reduced burden, in economic and social terms. The evidence for this statement was in the results of this case study based on real world data. The novelty of my approach was the innovative usage of shadow costs to create economic incentives to improve the workforce.

The introduction of a single key indicator ( $S_{\text{unemployed}}$ ) to monitor most aspects of interest for a workforce was a major highlight of this work. The most interesting findings from this study were methods to facilitate labour managers' policy decisions, and the positive impact of the launched methodology on the health situation as expressed by the H-factor in Equation (2). This was also a major, or key attributing, factor of this work.

### 5.1 Benefits

1. Personal suffering would be reduced due to improved health of the workforce.
2. Labour authorities would obtain a versatile tool to decrease the unemployment rate.
3. Employing combined methods based on common economic and mathematic theories.

### 5.2 Recommendation

I recommend applying the NORDIC model to labour issues and employing the NORDIC model to improve the health of the workforce.

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