AN ANP MODEL TO DEVELOP A NATIONAL TRANSFORMATION PLAN[1]

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ABSTRACT

In October 2015, the Saudi Council for Economic and Development Affairs unveiled an austerity plan in response to a drop in the price of oil to around US $26, which threw the country into an unexpected deficit of about $100 billion. Later on, an austerity plan evolved into the National Transformation Plan (NTP) 2020. The NTP focused on the key drivers for economic growth. Although only an outline of the NTP was released at the time, we speculate on what will be the best implementation policy. Knowing that the government is taking a developmental approach that is inclusive, transparent and accountable to all stakeholders in society, we opted to address this question as a multi criteria decision problem formulated in an Analytic Network Process (ANP) model. The ANP is a sound methodology for structuring the problem to find which policy to focus on to make the transformation as effective as possible, taking into account social and political factors in addition to economic ones. The ANP model showed that to make the transformation effective through blending socio-economic and political factors, policy-makers must give priority to management reform over privatization and fiscal reform policies. *https://doi.org/10.13033/ijahp.v9i1.481*

Keywords: Analytic Network Process; economic transformation; strategic planning, Saudi Vision 2030

1. Introduction

Countries dependent on natural resources are vulnerable to the volatility of the prices of these resources on the international market. A recent fall in the international oil price

[1] Acknowledgements: We are grateful to Hussein Alkahily of Almoragham Investments Holding Co. for sharing his expertise with us during the course of this research, and to Rozann Saaty and Elena Rokou of Creative Decisions Foundation for their assistance in using SuperDecisions software and comments on an earlier version of the model.

prompted the Saudi government to attempt to protect the economy from this adversity through the National Transformation Plan (NTP) 2020. The NTP's main aim is to accelerate economic growth through diversification and offset the impact of falling oil prices. Nevertheless, such a plan is often subject to risks and opportunities in addition to the benefits and costs. Therefore, the decision makers face the crucial question of what is the best direction to pursue.

Our objective is to identify the most effective policy to this end. Knowing that the government is taking a developmental approach that is inclusive, transparent and accountable to all stakeholders in society, we implemented the Analytic Network Process (ANP). It is a sound methodology for structuring the problem to determine which policy to focus on in order to make the transformation as effective as possible, taking into account social and political factors in addition to economic ones.

The problem can be best addressed through multi-criteria decision-making (MCDM). This paper uses the ANP with its dependence and feedback approach to prioritization to guide decision-makers in clarifying its complexity. We contribute to the literature on economic transformation policy in a number of ways. Our study is pioneering in its assessment of the scrutinizing the probable pros and cons of the proposed NTP in terms of social-economic and political aspects. We consider the most plausible empirical framework in assessing the policy incorporating multi-dimensional parameters. The findings of this study are of paramount importance in terms of the implementation of, and further amendments to the NTP.

In what follows, a condensed literature review on the natural resource curse and how other countries have dealt with being dependent on the instable market for natural resources is presented. Then a brief introduction to the ANP, followed by our proposed framework for the NTP model; finally obtained results and conclusions derived from this research are reported.

2. Literature review

Literature on natural resource wealth and its potential adverse impacts on different economies is reviewed, and examples of countries that have successfully avoided the 'resource curse' by adopting reform programs are presented. Finally, the disclosed contents of the Saudi NTP are discussed with regard to this study.

Abundant natural resources, particularly oil (known as 'black gold'), were traditionally viewed as a great boon for exporting states. Over the last few decades, however, numerous researchers have focused on the curse effect of abundance of resources instead of them being a blessing for many countries (e.g. Gelb, 1988; Auty, 1990; Sachs & Warner, 1995, 1999, 2001). Sachs and Warner (2001) documented that oil-dependent countries such as those in the Gulf Cooperation Council (GCC), Nigeria, Mexico, and Venezuela during the twentieth century were characterized by sluggish and stagnating economic growth, while resource-poor countries such as Singapore, Taiwan and Hong Kong enjoyed sustained economic growth. Generally, dependency on the export of key resources in countries prone to the resource curse is associated with massive state intervention in the economy, over-employment in the state sector, and a stunted private

sector lacking in diversity. This latter description very much represents the case of Saudi Arabia.

Earlier literature argues that there are two channels through which the resource curse can be explained. First, in terms of the negative impact on an economy from anything that gives rise to a sharp inflow of foreign currency, such as the discovery of large oil reserves. The currency influx leads to currency appreciation, making the country's other products less price-competitive on the export market. This phenomena is called 'Dutch Disease' and it occurs when oil-exporting countries receive a massive influx of foreign currency, leading to an appreciation of the real exchange rate that reduces the international competitiveness of resource-abundant countries and adversely affects growth by shifting resources from high-technology and high-skilled sectors to low-technology and low-skilled sectors (Al-Mamun et al., 2016). Second, the resource curse induces rent-seeking motives among private companies lobbying for the management of natural resources, which creates a skewed distribution of the benefits of oil rent. Van der Ploeg (2011) concludes that whether natural resources can be considered a curse rather being a blessing depends on various factors, including rent seeking, governance and institutional quality, although the latter was deemed to be independent of economic growth by Brunnschweiler (2008). Prior literature also contends that institutions are not a channel to augment resource-led growth, but rather an outcome of the resource. Thus, poor institutional quality is the result of natural resources, as natural resource dependence leads to market and institutional failures that inhibit economic growth (Matsuyama, 1992; Auty, 1990; Sachs & Warner, 1995; Gylfason, 2001; Bhattacharyya & Hodler, 2014). Such consequences of poor institutional quality would be valid in the case of Saudi Arabia, while the country is characterized with a moderate score in institutional quality (0.58 according to the International Country risk Guide (ICRG). Norway, however, presents an example of substantial economic development despite the major role of petroleum in its national economy. Holden (2013) argues that resource attributes comprise a blessing in the case of Norway due to a well-functioning policy for, and management of, them. Norwegian oil resources are realized as a blessing by virtue of a distributional philosophy, whereby the oil resources are held to belong to the nation; the benefits of revenues from them are therefore to be dispersed among the nation, including future generations. Clearly, the fact that this socialist-esque vision was eschewed by the comparable North Sea oil power, the UK, after the IMF Financial Crisis in 1976 is evidence for this. The Norwegian parliament unanimously adopted ten basic principles in June 1972, focusing on supervision, a sufficient national supply of oil, competition among oil extracting firms, environmental conservation, proper use, rules and regulation, national interest, and on collaboration between national and international oil companies on oil discovery (Holden, 2013).

A recent investigation by Mironov and Petronevich (2015) has detected the presence of Dutch Disease in Russia, which is a major international power as well as an oil-exporting country. They argue that a substantial inflow of foreign currency from oil exports precipitated the appreciation of the ruble, which made Russian exports less competitive and thus inhibited growth in the manufacturing sector. Yet the service sector experienced corresponding growth that offset the decline of manufacturing, and the government launched a new tax policy which was targeted to accrue the major part of oil revenues for the national budget under Putin's reforms in the 2000s. The new tax regime has,

however, been inefficient as it did not target gas extraction and metallurgy, and price elasticity remains relatively high (Mironov & Petronevich, 2015).

Among countries who underwent economic transformation, Malaysia is an instructive case, whose Economic Transformation Plan 2020 was implemented by stimulating a thriving private sector since the 1990s (Nair et al., 2014). Natural resources function as a blessing in the case of Malaysia due to the proper management and distribution of resource revenues. Oil revenue coupled with trade liberalization, massive industrial growth, privatization and foreign direct investment fueled the economy. Doraisami (2015) documents that economic diversification and a solid development program helped the country to reduce dependence on earnings from natural resources. Oil rent accounts for about 4.8 per cent of the GDP and contributes a moderate proportion of government revenue, despite a global position of twenty-ninth in terms of the volume of crude oil exported, and twenty-fourth as a natural-gas producer. Malaysia enjoyed about 7 per cent economic growth over the last 25 years. Nevertheless, the challenge of diversification faces all economies dependent on oil and gas exports (Al Bassam, 2015).

Paz (2014) evaluates the implementation of a resource-based industrialization strategy in the Brazilian oil sector, revealing that a substantial augmentation of oil production and exports can generate the effects of currency appreciation (Dutch Disease), which is counterproductive for economic development. And yet, the implementation of resource-based development strategies under the continuity of macroeconomic policy is necessary to overcome such phenomena. Looney (1990) investigates Dutch Disease in the context of Saudi Arabia, finding that an appreciation of the exchange rate for Saudi currency has both positive and negative macroeconomic impacts, and identified some specific policies to overcome such problematic outcomes, including more active state involvement in the industrial sector and equalizing wages between the tradable and non-tradable sectors by manipulating exchange rates.

Saudi economic growth is resource dependent; it is therefore vulnerable to several threats. A more direct impact of resource dependency is economic vulnerability to fluctuations in the price of the key resource; any fluctuation of oil prices in international markets has massive impacts on both exporting and importing states. For instance, although great efforts are underway to diversify the national economy, all socio-economic development in Saudi Arabia is currently conditional on the oil sector. There have been initiatives to reduce reliance on oil since the 1970s through various economic development plans, particularly after 1982. In 1985, the non-oil-value addition accounted for about a 77 % share of the GDP. This percentage oscillated between 60 % and 72 % during the period 1986–2010. Choudhury and Al-Sahlawi (2000) documented that a significant increase of GDP from the non-oil sector could be explained as a success of diversification since the Fourth Development Plan (1985–1990) and subsequent plans. An increase in the non-oil sector as a result of the fluctuation in the world's oil demand reflects swings in world oil prices, and ultimately affects the oil sector (Hassan et al., 2011).

Oil, in Saudi Arabia, contributes nearly 90 % of export earnings. An abrupt fall in the price of oil towards the end of 2015 caused the country to incur an unexpected deficit of $100 billion, which might grow to 50 % of the GDP if the international oil price remains low, unless the Kingdom generates alternative sources of revenue to balance its budget.

In response to this drop, the government reacted by developing a long-term plan known as 'Vision 2030', followed by a proposal for the NTP 2020 (www.vision2030.gov.sa/en). When we initiated this study, not many details were disclosed about the vision. The main motive was, however, to generate income to offset the sudden drop in oil prices via a variety of possible policies. Our objective is to identify the best policy to achieve the NTP goal using the ANP methodology, which has not been used in previous related studies on NTP plans.

3. The Analytic Network Process

To make decisions on complex government issues that encompass all the determinant factors/criteria including tangible and non-tangible factors, the ANP developed by Saaty (2001, 2008b) easily lends itself to handling such decisions. The ANP operates on interaction and feedback both within clusters of elements and between the clusters themselves to capture the effects of complex interaction in societies particularly when alternate decisions involve risk and uncertainty. The uniqueness of the ANP is it scales judgments of alternate decisions showing the distribution of influence among different factors and clusters of factors affecting or effected by the alternate decisions.

Each alternative is evaluated with respect to its BOCR on each strategic criterion. "Benefits (B) are the good things that would result from taking the decision; opportunities (O), are the potentially good things that can result in the future from taking the decision; costs (C), are the pains and disappointments that would result from taking the decision; and risks (R) are the potential pains and disappointments that can result from taking the decision" (Saaty2008b, 134). Each of these BOCR merits has a system of control criteria to help understand the influence of each separately. For example, the political influence is different from the social influence on a decision and each must be examined in a separate network then combined. So, control criteria and their sub-criteria under each merit are defined, and a subnet and its connection for each control criterion is developed. Next, they are pairwise compared to determine the best outcome for each control criterion, the alternatives will be combined in the "ideal form" for all of the control criteria under each of the BOCR merits (Saaty, 2008b). Next, the best alternative under Benefits will be selected and used to think of benefits, and the best one under Opportunities, which may be different to the one under Benefits, will be selected to think of opportunities and so on for costs and risks. Finally, these four merits must be rated with respect to the strategic criteria using the ratings mode of the AHP to obtain priority ratings for each merit (Saaty, 2008a). Then priorities are normalized and used to combine the four vectors of the outcomes for each alternative under BOCR to obtain the overall priorities. The overall priorities can be obtained through the ratio BO/CR, alternatively, by using the ratings to weight and subtract the costs and risks from the sum of the weighted benefits and opportunities. The super matrix and its powers are the fundamental tools used to establish all the priority vectors resulting from pairwise comparisons of each ANP network. For further details of the ANP methodology, readers are referred to Saaty (2009; 2008a & b).

To sum up the ANP analysis is performed in these steps:

1. Developing control criteria and sub criteria for each of the BOCR, performing pair wise comparisons and then prioritizing them.

2. Developing decision networks and synthesizing their priorities for each of the control criteria and then also for each of the BOCR.
3. Rating the BOCR merits with respect to the strategic criteria to obtain their priorities and weight the four priority vectors of the alternatives with respect to the BOCR and derive the final outcome.

The ANP has already been successfully used during the last decade and proved very successful in decision making in many industries and fields namely; location selection; predictions societal, political, business and even sports; strategic planning; e-business; resource allocation in transportation; project selection; knowledge management; electrical project portfolio; factors affecting success in enterprises; safety manufacturing systems; to name a few (Cheng et al., 2005; Saaty and Ozdemir, 2005; Bahurmoz, 2006; Raisinghani et al., 2007; Wey and Wu, 2007; Liang and Li, 2008; Percin, 2010; Smith-Perera et al., 2010; Karpak and Topcu, 2010; Silvestri et al. 2012).

4. Structuring the ANP model for the Saudi NTP

The model we used is structured as follows:

1. Top-level network: a single network that contains the benefits, opportunities, costs and risks nodes (the BOCR nodes), and the strategic criteria that are used to evaluate the importance of the BOCR nodes for identifying which policy is best for implementing the proposed NTP.
2. Control criteria networks: each of the BOCR has a subnet attached to it containing three control criteria, Economic, Political and Social, and sub-control criteria.
3. Decision networks: a decision subnet is created for the most important control criteria or sub-control criteria. A cluster of the alternatives is included in every decision subnet in addition to other influencing elements such as stakeholders. Restricting decision networks to the most important criteria is intended to eliminate lengthy comparisons.

4.1 The NTP model

We developed the NTP model for the Saudi case as follows. Our goal for this model is which policy the government should follow in order to realize the Saudi NTP2020 objectives

4.1.1 The alternatives

The NTP was first proposed in October 2015 in reaction to the accelerating drop in oil prices that year. The Council of Economic and Development Affairs (CEADA) invited experts and senior government officials to attend a workshop in Riyadh to discuss proposals and initiatives to establish a landmark plan to bring about national transformation.

The plan aims to relieve the national economy from its dependence on oil, initiating a set of economic measures to minimize dependence on oil, attaining maximum efficiency for public sector organizations, combatting corruption, creating more jobs for Saudis, and developing health and municipal sectors through privatization. More investments in the untapped mining sector were to be attracted, creating obstacle-free environments to exploit the abundance mineral resources, and minimizing expenditures.

No information has been released on how these objectives will be attained. However, one can conclude that the government needs to pursue at least one of the following policies to save its economy from the so-called resource curse, and to continue sustainable growth:

1. Fiscal reform: fiscal policy involves generating revenue through altering levels of government spending and tax rates to influence aggregate demand in the economy. For the case of Saudi NTP2020, it involves decreasing, and eventually eliminating most subsidies that Saudi society has enjoyed for decades, in addition to cutting if not eliminating benefit packages that most civil servants used to have and imposing a package of fees for many other services in addition to income tax on non-citizens. There has been a long debate on whether the fiscal policy will work or not. For instance, Husain et al. (2008) and Pieschacon (2009) argue that fiscal policy works as a transmission mechanism to manage the oil price slack in a macroeconomic context. On the other hand, Sachs and Warner (1995) said that government spending on public services such as unemployment benefits, education, health, and subsidies among other things results in the rise of prices of non-tradable goods (e.g. health, education and public services relative to tradable goods). Therefore, resources are shifted to a less productive sector, which in turn unfavorably affects growth in the long run. Saudi policies are not exceptions to this rule, having so far focused mainly on socio-economic welfare depending on abundant oil income.

Furthermore, when adopting a fiscal policy of deficit financing, the government borrows a large amount of capital and leaves less for the private sector, which drives up interest rates for private sector (i.e. productive) borrowing. Consequently, private investment falls because of higher interest rates and generally high costs (and risks) of investment, which is known as crowding out theory. Unfortunately, the Saudi economy is currently in the midst of this scenario, which might lead to a recession and social resentment as the government starts implementing this policy.

2. Management reform: failure of bureaucratic models in responding to the accelerating demand on governmental organizations to operate in a business fashion models yield new concepts for public management (NPM). NPM essentially emphasizes "the role of performance measurement, transparency, and accountability in strengthening the link between public administration and the citizens" (Mauri et al., 2012). It adopts many quality concepts that focus on customer satisfaction. Mauri et al. (2012) state that "transition to a new management model is not without problems at any level of public administration and the cultural systems of public organizations seem to have an important role". The public sector in Saudi Arabia is similar to many other bureaucratic systems and suffers from inefficiency and ineffectiveness in spite of having a very inflated budget. According to the Bertelsmann Transformation Index (BTI) 2016, Saudi Arabia ranks 101 among 129 countries, although it ranks 49 in terms of its market economy status. This ranking is based on its performance between February 2013 and January 2015. The Vision 2030 called for transparency, accountability, and responsibility: pillars for any successful transformation, and if they were to be applied to management, the result would be effective use of resources. Hence, NPM or management reform based on output measurement rather than on input measurement will likely greatly reduce the civil service budgets, which will enable the government to direct these saved resources to more productive areas.

3. Privatization: transfer several public services to the private sector such as education and health. This results in the downsizing of the public sector, generating jobs and participating towards its GDP. A successful example is Britain's experience in privatization. Eastern European countries offer another example of adopting privatization as a key micro reform in transforming Saudi Arabia's economy. Generally, the discipline of a free market will force businesses to be efficient and thereby achieve improvements in economic welfare. And yet, it might only lead to monopoly with the private sector simply assuming the role previously occupied by the public sector. Saudi Arabia's initial transformation plan has indicated this direction in its NTP.

4. Status quo: do nothing; as a safeguard, we include this alternative in our analysis to give the expert the option to reject all the previous three alternatives.

An effective NTP needs to implement all three policies. However, one would ask which of the four policies, should have priority over the others in terms of being attempted first. Prioritizing the four alternatives should consider the BOCR merits and the interests of all actors in the light of the clearly defined strategic goals of the Saudi Government. Implementing the ANP will guide us to prioritize those four alternatives to determine where the government should focus initially in order to achieve its NTP goals over the next five years.

4.1.2 The strategic criteria

The sequential Saudi development plans (2004–2020) indicate the following long-term strategies that the government is committed to achieve via its planning:

1. International competitiveness.
2. Social well-being: human well-being and socio-economic growth.
3. Sustainability

4.1.3 Merits

Three control criteria are used to define the influence of each merit. These are Economic, Political and Social factors. We consulted a pool of experts (Table 1), to answer 12 basic questions exploring the most expected economic benefits, political benefits, and social benefits, and the opportunities, costs, and risks respectively. The following common points were extracted from these interviews and used to design the BOCR part of theANP model.

1-Economic benefits

1. Decreased tariff barriers on Saudi exports: by removing subsidies on petrochemical feedstocks, Saudi exports will be more accepted on the international market; tariffs, barriers, and restrictions will be removed.
2. Diversification of the economy: there will be an increase in exports facilitated by Saudi Arabia's massive infrastructure and manufacturing base.
3. Effective public performance and managing resources efficiently: removing subsidies on utilities (water, electricity, and petrol) will increase efficieny and effectivness in using resources.

Table 1
Details of experts consulted in building up the ANP model

Expert #	Title	Area of Expertise
1	Professor, UNU-Merit. Ex minister of education.	Innovation and policy, Governance and institution
1	Professor	Education, social and welfare services/ NGO
1	Associate Professor.	Business/ Municipality affairs.
2	Assistant Professors	Petroleum, Energy and Resource Economics
2	Assistant Professors	Finance/ Banking/ Corporate Finance
1	Assistant Professor	Decision Analysis/ Public Affairs
1	Finance Consultant, CPA (Texas). Ex City bank.	Saudi finacial market and Banking system.
1	Head of research centre chamber of commerce.	Attended the initial workshop held by SEADA
1	Consulting Member of national committee for consulting in the Council of Saudi Chambers	Human Resources development. Private sector. Strategic Planning

2-Political benefits

1. Better relations with countries who put tariffs on Saudi products due to high subsidies. As a result of the removal of subsidies, both for the citizens and for industry, Saudi Arabia will have better relations with importers and close the door on 'unfair competition practice' complaints, especially from large importers such as India, China, Japan, and the EU, who have already voiced concerns on Saudi subsidation of its industry. This will be a major political step, leading to harmony with the international trading world.
2. Competitiveness: as a productive country and not relying only on oil. On a local Saudi level, there will be more harmony within society when the economy is more productive/competitive and diversified, and not reliant solely on the fluctuating price of oil.
3. Stability through sustainable growth: a broadly based and diversified economy gives the country a strong base and foundation for a sustainable economy.
4. National cohesion: a diversified, sustainable economy—based on nationwide agreement on clear goals—gives the country a sense of strength and cohesion, with a common future to strive for.

3-Social benefits

1. Productive society: empowered individuals will be more productive through substituting dependency for self-reliance. Removing subsidies on petrol and utilities will make society move from a dependent model to self-reliance; it will thus become more productive as they will be paying their utilities and petrol on cost.
2. Social awareness: an efficient society in its use of water and electricity, and a healthier society as a result of higher taxes on tobacco and soft drinks. With the efficient use of utilities coupled with rising rates due to consumption, society will be equitable; the poor will pay a lower rate, while the rich, who consume more, will pay a higher rate. It is a means of narrowing the income gap.
3. Sustainable future for economic growth: as a prelude for expenditures in education,

research, and health. With the removal of subsidies, these funds will be directed to investments in education, research, and health; these investments will be future pillars and precursors of economic growth.

4-Economic opportunities

1. Economic efficiency: the removal of subsidies will lead the private sector to focus on domestic high value added industry and services that will also be augmented by government development investment fund.
2. Empower private sector by reducing its dependence on the government. The NTP will only be implemented by the involvement and empowerment of the private sector, thus minimizing the imbalance in the economy that is heavily reliant on government. Here, private sector involvement means both local and foreign direct investment (FDI), (Yazdan & Hosain, 2013)
3. Increase government resources: the broadening of the economic sector by increasing private sector involvement will increase the base for employment and government revenues in fees and taxes/zakat.

5-Political opportunities

1. Compliance with World Trade Organization (WTO): improves WTO legitimacy. With the drive to increase involvement of the private sector, both local and FDI, Saudi Arabia will improve its ease of doing business for foreign investors. This will improve its standing internationally and with the WTO.
2. International partnership: improved Saudi business standing will enhance the transfer of knowledge/technology and expertise. Attracting FDI, together with greater involvement from the local private sector, will improve business.
3. Leadership and making a change: due to its highly developed infrastructure and well-educated youth, Saudi Arabia can easily attain leadership when preciptating change to come out of the bottleneck of solely depending on government handouts that are stagnating the economy.

6-Social opportunities

1. Transparent society: as the economy moves towards efficiency with greater private sector involvement, it will be forced to become more transparent, and nepotism will therefore be suppressed.
2. Skill development will be the focus of education: education will a play stronger role to emphasize this point. Even though Saudi Arabia has a high literacy rate with a highly urbanized society, education will also be directed towards market demand, i.e. an emphasis on skill and technical education rather than pure academia.
3. Aligning social segments: economic efficiency and the shift in education towards skills development and a technically adept society will align the conservative forces with modernizing forces based on the empirical evidence of the alternative Saudi Arabia has to take to survive a changing world.

7-Economic costs

1. Inflation: the major risk from this transformation is inflation, especially for lower income Saudis. To mitigate this effect, rates for utilities will be based on consumption; this will place a smaller burden on lower income Saudis. The government is also talking about a social safety net where the lower income Saudis will get financial support. It is important that the government gives due consideration

to the cost of subsidy removal on lower income Saudis.
2. Central planning problem: without a clear regulatory framework, involvement of the private sector might not be as efficient as planned. Given that the programme is a dramatic one for private sector involvement, efficiency in the shift from a central planning stage (top to bottom) must be carefully considered. Private sector intelligentsia involvement could mitigate the efficiency risk in transformation shift.
3. Programme cost: the NTP is a dramatic and daring one that will overhaul the economy, but it has not yet addressed the cost of the programme, both directly and indirectly, and how it will be absorbed.

8-Political costs

1. Resentment if the NTP is not well presented:
2. Power sharing: in return for funding the NTP, the private will ask for a share of the power in return; this is a new phenomenon for the Arab world, and the government has to adapt to a new concept as such.
3. Credibility at stake. By nature humans resist change; more so if the NTP is not well presented to all stakeholders. This is a major risk the government needs to address and have social scientists/demographics experts get involved to address vulnerable segments and implement social safety nets.

9-Social costs

1. Burden on the consumer: especially those with lower incomes. Cost of living will be higher for the lower income strata of society. Those who live on the safety net will be greatly affected. The unravelling of society from a patronage to a market-oriented model runs the risk of placing a major burden on it, particularly the vulnerable segment; this has to be addressed with great care.
2. Reduces job opportunities for those with low education levels, or those who are not skilled enough to adjust to new job market demands. Until the labour market adjusts, there is a major risk of having a segment of the work force that is not prepared to adapt. Training and re-training of the labour force will be paramount to alleviate this risk.

10-Economic risks

1. Environmental changes: the NTP's main element is to get the economy more connected to world finance and will thus be more dependent and interrelated to its regional and international environment; starting from the well-being of world economy to regional tensions and peace.
2. Corruption: a major concern accompanying the implementation of privatization is a lack of transparency during that process, as witnessed in other countries.
3. Underestimate the requirements of the NTP: It is expected that as NTP is implemented, new requirements and costs will show up along the way. The government has to be prepared to expect this and must have a plan how to tackle these issues.

11-Political risks

1. Resentment at the higher cost for Saudi companies: higher costs for Saudi companies will create resentment from the business class. Saudi companies have been accustomed to operating in a relaxed mode that is dependent on government handouts/lavish expenditures. Opening up the economy to FDI will put pressure on

local companies to adapt.

2. Natural resentment to change: local companies will also resent changes as they have always been protected from foreign competition.
3. Credibility at stake: addressing these issues will put the credibility of the NTP and the government at stake. The government should have contingency plans for unexpected resentment.

12-Social risks

1. Marginalizing the middle and lower classes. The NTP represents a major shift in the thinking of society and the way that the economy operates. There is a high possibility that the middle and lower classes will be marginalized. The government should expect this and have plans to address it to mitigate the effect.
2. Transition period might take longer. A major shift the NTP is planning to implement in a society that has been on patronage for decades will definitely take a long time to implement. The government should be aware of the potential for a longer transition period, and thus work on programmes to mitigate costs; an efficient social safety net is therefore of paramount importance.

Figure 1 shows the strategic criteria and BOCR. The control criteria, and their sub-control criteria are embedded in subnets under each of the four merits (BOCR).

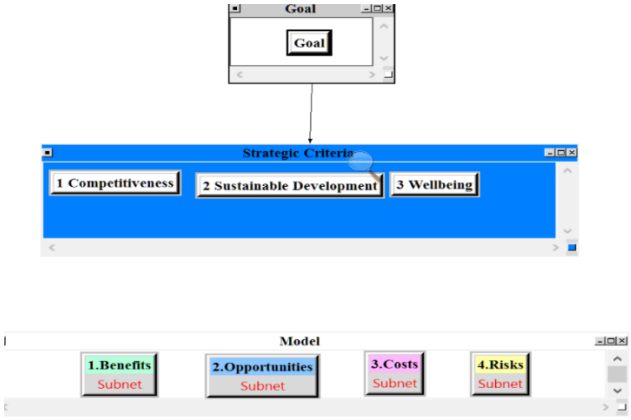

Figure 1. Top-level network of the NTP model

4.2 The control criteria network

For each merit a subnet containing the control criteria but with different control sub-criteria is created. Figure 2 exhibits the benefits control criteria subnet. The three control criteria are pairwise compared with regard to the benefits (Figure 3). Then, in the decision subnet under the economic control criterion, sub-criteria of economic benefits: decrease tariff barriers, diversification, and effective public performance are pairwise compared with respect to economic benefits, and so on for the political benefits and the social benefits. These comparisons result in priorities for all the control criteria and sub-criteria. (Table 2).

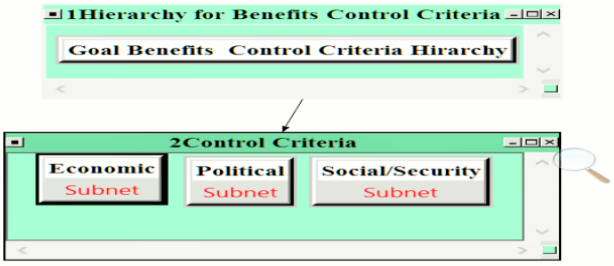

Figure 2. Subnet benefits control criteria for the NTP model

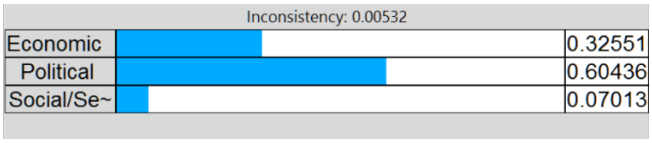

Figure 3. Results of prioritization of the control criteria with regard to benefits

Table 2
Detailed priorities of BOCR

Merits	Control criteria	Control Sub-criteria	Local priorities	Global Prior.
Benefits (0..23)	**Economic (0.33)**	Decrease tariff barriers on Saudi exports	0.23	0.017
		Diversification of the economy	0.44	0.033
		Effective public performance	0.33	0.025
	Political (0.60)	Better relations with countries impose tariff on	0.11	0.008
		Competitiveness	0.16	0.022
		Stability through sustainable growth	0.42	0.058
		National cohesion	0.31	0.043
	Social (0.07)	Productive society	0.33	0.005
		Societal awareness	0.32	0.005
		Sustainable future for economic growth	0.35	0.006
Opportunities (0..25)	**Economic (0.76)**	**Economic efficiency**	0.3	0.057
		Empower private sector	0.31	0.059
		Increase government resources	0.39	0.074
	Political (0.14)	Compliance with WTO	0.37	0.013
		International partnership	0.27	0.009
		Leadership	0.36	0.013
	Social (0.10)	Transparent society	0.33	0.012
		Skill development will be the focus of education	0.37	0.013
		Aligning society segments	0.3	0.011
Costs (0.18)	Economic (0.11)	Inflation:	0.39	0.009
		Central planning problem	0.29	0.006
		Program cost	0.32	0.006
	Political (0.22)	**Resentment if program was not well presented**	0.64	0.025
		Power sharing	0.36	0.014
	Social (0.67)	**Burden on the consumer**	0.48	0.058
		Tightening job opportunities	0.52	0.063
Risks (0.34)	Economic (0.09)	Environmental changes	0.48	0.015
		Corruption	0.3	0.009
		Underestimate NTP requirements	0.22	0.007
	Political (0.28)	**Resentment for higher cost for Saudi companies**	0.36	0.034
		Natural resentment to change	0.33	0.031
		Credibility at stake	0.31	0.030
	Social (0.63)	**Marginalizing**	0.74	0.159
		Transition period might take longer	0.25	0.054

Economic opportunities and Political benefits are the most important on the positive side (.76 & .60). However, the rates of the social costs and the social risks are also high (.67

& .63).

Global priorities are computed by multiplying the local priority of the sub-control criteria times the priority of its corresponding control criterion times the weight of its corresponding merit, which has been obtained from the rating system (as will be explained later). For example, the global priority for decreased tariff barriers on Saudi exports equals: .23 × .33 × .23 = .017, as shown in Table2.

4.3 Decision networks

There is more than one option when building the decision networks. One can either select the highest sub-control criteria, or the high-priority control criteria, and build a decision subnet for each, or build a decision subnet for each control criterion. We have chosen to exclude all sub-control criteria whose control criteria priority is less than 0.25, and all sub-criteria whose priority is less than 0.03; then we created decision nets for the remaining factors under their corresponding control criteria. Thus, we will focus on the most important criteria gathered in six decision subnets. Each one contains three clusters; both of the alternatives cluster and a cluster contains the stakeholders who influence decisions in relation with the control criterion. The third cluster contains the sub-control criteria (whose global priority is ≥0.30) and corresponds to each control criterion (whose priority is ≥.25). Figure 4 shows the decision network under economic benefits. This decision subnet has two clusters in addition to that containing the alternatives.

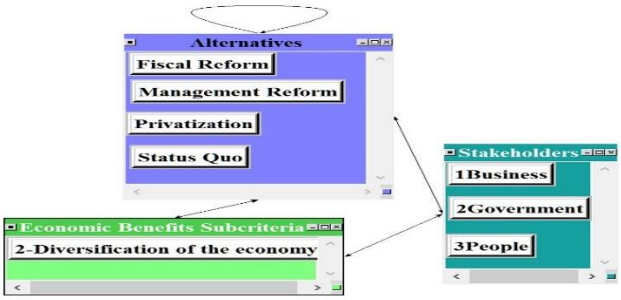

Figure 4. Decision network under economic benefits

While each alternative affects each stake holder, those stake holders have influence on the decision of the CEADA in addition to backward interactions between the alternatives and the economic benefits criteria and the stakeholders. Priorities of the alternatives resulting from pairwise comparisons are idealized and weighted by the normalized value of the control sub-criterion of the economic benefits subnet. Results are shown in Table 3. This procedure is repeated for the political benefits subnet as well.

The overall priorities of the alternatives with regard to benefits are shown in Table 4. The same procedure is repeated for opportunities, costs, and risks. Overall priorities results for alternatives ranking from BOCR merits in ideal format are reported in Table 5.

Table 3
Alternative rankings from the benefits: economic sub-net

Alternatives	Total	Normal	Ideal	Ranking
Fiscal reform	0.0884	0.1944	0.5132	3
Management reform	0.1143	0.2513	0.6634	2
Privatization	0.1722	0.3788	1.0000	1
Status quo	0.0798	0.1756	0.4635	4

Table 4
Alternative rankings from the benefits net

Alternatives	Total	Normal	Ideal	Ranking
Fiscal reform	0.4504	0.1763	0.5074	3
Management reform	0.8878	0.3474	1.0000	1
Privatization	0.8761	0.3428	0.9869	2
Status quo	0.3411	0.1335	0.3843	4

Table 5
Alternatives ranking from BOCR merits in ideal format

Name	Benefits	Opport.	Costs	Risks
Fiscal Reform	0.5074	1.0000	1.000	1.0000
Management reform	1.0000	0.5137	0.2310	0.4378
Privatization	0.9869	0.9148	0.6069	0.7221
Status quo	0.3843	0.1502	0.5232	0.4997

4.4 Rating the BOCR with respect to the strategic criteria

In a highly complicated decision Benefits, opportunities, costs and risks are not equally important; in order to determine their importance in a BOCR analysis they are prioritized with respect to the strategic criteria (Saaty, 2008a). The strategic criteria which the government has committed itself to achieve in the long term are: international competitiveness, social wellbeing, and sustainability. Their Priorities are shown in Table 6. Intensities will then be determined to indicate the degree of fulfillment for benefits and opportunities, or impact for costs and risks. The intensities are categorized into high, medium, and low. Then they were pairwise compared: high (1.0), medium (.25), and low (.125).

Table 6
Prioritizing the strategic criteria with respect to goal

International competitiveness	.0750
Social wellbeing	.5917
Sustainability	.3332

These intensities and their priorities are used for each strategic criterion. To select the rating given in Table 7, we pose the question, what is the highest-valued alternative for benefits in the synthesized results for the benefit control subnet. From Table 5, the highest priority alternative is management reform. Keeping that highest alternative in mind, i.e, management reform, perform ratings across the Benefits row as to how it

contributes to fulfill each of the three strategic criterion. This can then be repeated across the opportunities row for highest value alternative therein, which is, fiscal reform, and so on. Note that, the highest alternative will be the worst one for costs (risks), so the question to ask is: how does this worst alternative, for costs (risks) affect the strategic criteria? From Table 5, the most costly and risky option is Fiscal Reform. So we ask, how does each impact the Kingdom's strategic polices?

The overall priorities for each of the BOCR merits are computed by multiplying the merit rate times the priority of the corresponding strategy and adding across each row. For example, to calculate the benefits priority: .0750*.25+.5917*1.0+.3332*1.0 = 0.9437. To normalize it, we divide .9437 by the summation of the BOCR totals. The normalized priorities are given under the priorities column in Table 7.

Table 7
BOCR priority ratings

Idealized intensities: high (1.00), medium (.250), low (.125)

Merits	Priorities	Totals	Competitive 0.07591727	Sustain. 0.591727	Wellbeing 0.333216
Benefits	0.312413	0.943707	M	H	H
Opport.	0.215891	0,652144	M	H	L
Costs	0.162389	0.490530	L	M	H
Risks	0.309307	0.934325	L	H	H

5. Results

The synthesized results for each alternative are obtained in two ways. The first is by directly implementing the multiplicative formula (BO/CR) and normalization (Table 5). Alternatively, and more importantly for our case, we apply the negative additive formula *b*B+*o*O-*c*C-*r*R to synthesize the outcomes, where *b, o, c* and *r* are the values for the BOCR as determined in the ratings (Table 7) are used to weight the four vectors under BOCR (Table 5), which were obtained from the synthesized results. The latter formula might give negative numbers. This means that those alternatives with negative numbers are undesirable. If all are negatives, then we choose the least negative one as the best alternative. The multiplicative formula gives the best alternative for the short term, while the additive (negative) gives the best alternative for the long term. The outcome for each formula is shown in Figures 5 and 6 respectively. It is clear that the option for the NTP is to focus on management reform in order to attain its goals with minimum costs and risks. Once management reform has taken place, privatization then assumes priority over fiscal reform.

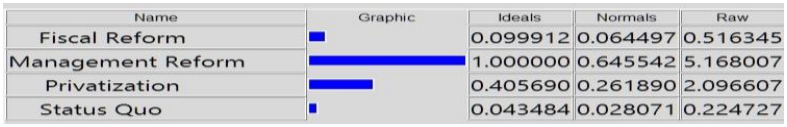

Figure 5. Synthesis of the alternatives in multiplicative formula

Name	Graphic	Ideals	Normals	Raw
Fiscal Reform		-0.325047	-0.133386	-0.075605
Management Reform		1.000000	0.410358	0.232597
Privatization		0.764531	0.313732	0.177827
Status Quo		-0.347318	-0.142525	-0.080785

Figure 6. Synthesis of the alternatives in additive (negative) formula

Sensitivity analysis

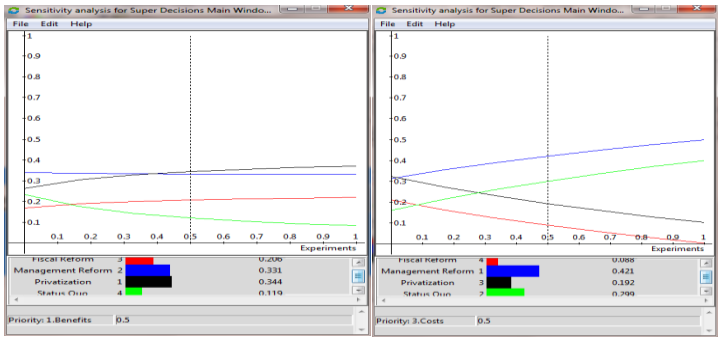

Figure 7. Sensitivity Analysis

Figure 7 shows that when benefits exceed .35, privatization is best. It appears that management reform succeeded because it is cheap in comparison to the other alternatives (see the costs sensitivity). It is also less risky, but it seems that costs drive the decision towards management reform. When we examine the costs control criteria, it shows that the political cost is the highest (Table 2). In summary, management reform and privatization should be addressed first; only after these two policies are well established can one consider fiscal reform if there is a need for it.

6. Conclusions

Given that this study was conducted after the idea of the NTP (known later on as Vision 2030) was introduced in a workshop in Riyadh, and given that nothing was released apart from very vague ideas and many speculations, the study here was therefore completed before Vision 2030 was made public on 25 April 2016 and followed immediately by far-reaching internal government alterations. Several royal decrees renamed and merged a number of ministries, and other ministries and commissions were reformulated in an effort to improve government responsiveness and efficiency, giving top priority to management reform. The detailed NTP 2020 was published four weeks later. It provides a concrete idea of many policies the government intends to pursue between now and 2020. These policies reflect austerity measures and focus on fiscal reform.

Changing and merging ministries might not ameliorate the situation unless accompanied by rigorous institutional changes. The philosophy of the NPM, which is based on implementing a set of management techniques and practices, mostly associated with private sectors, must be fully adopted. The concepts such as lean thinking and total quality management will yield huge savings and eliminate resource wasting, which is very common in the current bureaucratic system. These sort of changes might be

challenging and take time to produce results, but they can be implemented given that the current leadership is serious about real transformation.

Focusing on fiscal reform in order to generate revenue quickly, even though it might help in the short-term as a 'quick-fix' solution, is far more damaging in the long-term as it might result in accumulated dissatisfaction given that the country is suffering from unemployment, low salaried jobs, and the shrinking of the middle class. Attempting to impose any further financial duties on the public in general will not help. Fiscal reform must be preceded by a radical management reform, and must be accompanied by involving people in the decision and the process.

The ANP model enables us to include different factors that would influence the Saudi NTP performance despite their qualitative and contradictory nature. Upon examining the global criteria priorities of all the proposed elements (Table 2), "marginalizing the public" is the major political risk that might hinder performance of the proposed NTP. It has the highest global score 15.9%. This indicates the necessity of involving the public and making them part of the planning process. Implementing the ANP approach made it possible to recognize the magnitude of the risk of such an element.

Our model findings have proved robust; only a few months after implementing the Saudi Vision 2030 which focused on financial reform the government has reversed its priorities. Royal decrees on 23 April 2017 restored financial allowances and bounces for civil servants and military personnel that had been abolished under austerity measures last September. Two members of the cabinet have been removed, one is subject to an impeachment trial. There were many changes that address institutional reforms in response to the people's voice, and an attempt to keep the economy from sinking into depression. This direction conforms to the ANP model developed in this study.

ANP has an advantage over other decision making methodologies in that it does not require detailed data that is a must for other decision methodologies. For the ANP, the expertise of the decision-maker and their deep knowledge of the problem are more important than detailed data. This bring us to the limitation of this study; our model results are based on consulting academics and practitioners who are not fully involved in the NTP due to the difficulty in accessing these people. It is worthwhile to organize a workshop for those who are involved in the NTP and elicit their own judgments.

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