

Innovation Policy-making and Foresight in Tunisia: A preliminary study

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Abstract

Since 2011 Tunisia has embarked on a new path of socio-economic development based on democracy, the rule of law and the creation of an inclusive society. This promising and challenging context calls for a profound revision of the way policies are conceived, implemented and evaluated.

The policies related to Science, Technology and Innovation require particular attention because of their strategic role in achieving a long-term inclusive growth.

Historically, it was at the beginning of the nineties that Tunisia recognized the need to develop specific policies for Science, Technology and Innovation.

When analyzing the results of these policies, it appears that they were dominated by financial instruments and a top down approach. From the National Innovation System (NIS) perspective, the key components of the system are there but evolving more or less independently; knowledge flows and interactions between the sub-systems, which are the source of innovation, are very weak.

A new approach is therefore necessary in order to overcome these drawbacks and make the case for new policies that will enable innovation to support the creation of shared social and economic value. This is particularly urgent because the challenges faced by the country are numerous, complex and sensitive.

Among the instruments (policy mixes) that can be used to achieve this objective Foresight offers an interesting tool and approach.

In Tunisia, foresight was institutionalized in the early nineties with the setting up of the Tunisian Institute of Strategic Studies which conducted several prospective studies and allowed the development in the country of a knowledge base in this area. However, despite their pertinence, the impact of these prospective analyses was rather limited. When identifying the causes of these failures, it appears clearly that they paid very little attention to the role of players and stakeholders.

In this paper, we present the results of a preliminary study on the dynamics and futures of the Tunisian Innovation System based on an analysis of the role of players.

Three scenarios for the Tunisian NIS have been explored: Dislocated system, Dynamic islands and Connected system. The scenarios vary in terms of their consistency, the interactions between their components and their performance potential.

The Connected scenario is the most desirable option because it reflects the potential to improve strongly productivity, competitiveness and social inclusion. However, various institutional and political factors are prone to drive the whole system towards the “Dynamic islands” scenario which is not conducive to resolving the main socioeconomic problems affecting the country.

The second part of the paper addresses the role of key players involved directly or indirectly in the innovation system. A mapping of the players is undertaken to analyse their attitudes and behaviour. The paper provides a number of important insights on the challenges ahead, namely that the private sector and firms would have to take the lead in the future; and that the minor players would have to work side by side to be able to direct the NIS to the Connected scenario.

Keywords: Tunisian National Innovation System, Foresight and Re-alignment of innovation policies, National Innovation System Key Players.

Introduction

In Tunisia, Science, Technology and Innovation are recognized as a major concern of public policy over the last three decades. Over this period, a comprehensive framework to support innovation has been established, specific programmes to harness science with economic purposes have been launched and a new culture of entrepreneurship and innovation has gradually emerged in society. Notwithstanding the achievements so far, STI policy has had limited impact on the economic growth of the country. This policy was characterized by a top-down approach, and strong emphasis on the production of knowledge (Khanfir).

From the NIS perspective, this policy succeeded in strengthening the individual entities of the system but failed to achieve the linkages between them. Knowledge flows and interactions between the sub-systems, which are the source of innovation, remained very weak.

A new approach based on the involvement of the actors and systemic efficiency is therefore necessary in order to overcome these drawbacks and make the case for new policies that will enable innovation to support the creation of shared social and economic value. This is particularly urgent because the challenges faced by the country are numerous, complex and sensitive.

Among the instruments that can be used to achieve this objective, Foresight – as a systematic, participatory process, collecting future intelligence and building medium to long term visions, aimed at influencing present day decisions and mobilizing joint actions- offers an interesting tool for this endeavour (Havas *et al*).

In Tunisia, foresight was institutionalized in the early nineties with the setting up of the Tunisian Institute of Strategic Studies which conducted several prospective studies and allowed the constitution in the country of a knowledge base in this area. However, despite their pertinence, the impact of these prospective analyses was rather limited. When assessing the causes of these failures, it appears clearly that they paid very little attention to the role of players and stakeholders.

In this paper, we present the results of a preliminary study on the dynamics and futures of the Tunisian Innovation System based on a scenarios approach and including an analysis of the role of players. The scenarios approach has been explored in the past through another study (Chaabouni *et al.*).

Methodological approach

In this paper, the aim is to apply an analysis of the actors - their interests, behaviour and outlook- in order to anticipate the NIS path for Tunisia. For this purpose, the methodology used here is based on Godet's original work (Godet *et al.*). A simplified analysis sequence (Bouzaïane and Mouelhi) is applied in this paper as described below.

This paper makes the case that the Innovation system in Tunisia in its current state is disconnected and is not sufficiently productive as a result. A desirable future envisages the development of a well performing system which is dynamic with integrated components functioning together to address a set of objectives shared by the stakeholders. It is important for decision makers to be aware of the features of a desired scenario. But this knowledge is not sufficient to ensure that decision makers design appropriate long-term policies. The reason is that they often lack sufficient power over stakeholders to ensure they act in the right direction. The paper addresses this intriguing double layered question: what are the interests and

involvement of the NIS actors vis à vis the desired scenario? What can one learn from the actors' interests and mutual power for decision making about the path to get to this desired scenario?

The methodology approach is then conducted following the steps below:

1. Mapping of the NIS stakeholders in the context of Tunisian economy. Up to 17 actors are identified. An actor is a player who has power over the variables and can shape part of the system. Every actor may have some influence over other actors. This influence ranges between three types: merchant and financial, administrative or elective hierarchy and lobbying, voicing and networking. The mapping is based on experts' opinions and desk-based research. A cross matrix is designed to present the influence of a given actor on each of the other actors. The rows describe the extent of the influence of the given actor on the columns for every one of the other actors. The influence of the actor is scored on a scale from 0 to 4. If actor *i* has no influence, the score is 0. If actor *i* has an influence on the way that actor *j* behaves the score is 1. If actor *i* has an influence on the projects that actor *j* is performing the score is 2 or 3. In the extreme case (survival of actor *j*) the score is 4. Based on this mapping, a chart is drawn outlining the influences of the actors (the sums of the row cells) and the dependencies of the actors (the sums of the column cells) relative to the whole set of other actors in the system. The chart shows who is dominant in the system (the most influential and less dependent) and who is dominated (the less influential and most dependent). One can understand therefore who might lead the system and what are the alliances needed to reverse the hierarchy. These alliances depend of course on the attitude and preferences of the actors in relation to the functioning of the system, its objectives and the outcome.
2. Identification of the objectives of the system. The transition from the current situation to the desired scenario implies that some objectives need to be achieved. In this paper, seven objectives are identified as they are best practices in shaping integrated NIS.

According to expert opinion, a ranking of these objectives is done according to the double criteria of (i) the relative importance and role to ensure that the transition occurs in the right direction and (ii) the degree of implementation of these objectives and good practices in the Tunisian case up to now. The ranking provides insights as to the challenges facing decision makers in addressing the most important objectives and yet those which are less achieved.

At this point of the analysis, decision makers will be aware on the one hand of actors' power through the mapping and on the other hand of the challenging objectives. The next step of the analysis will allow insights on whether the actors would be willing to push the NIS toward the desired scenario or if to expect some inertia and from whom.

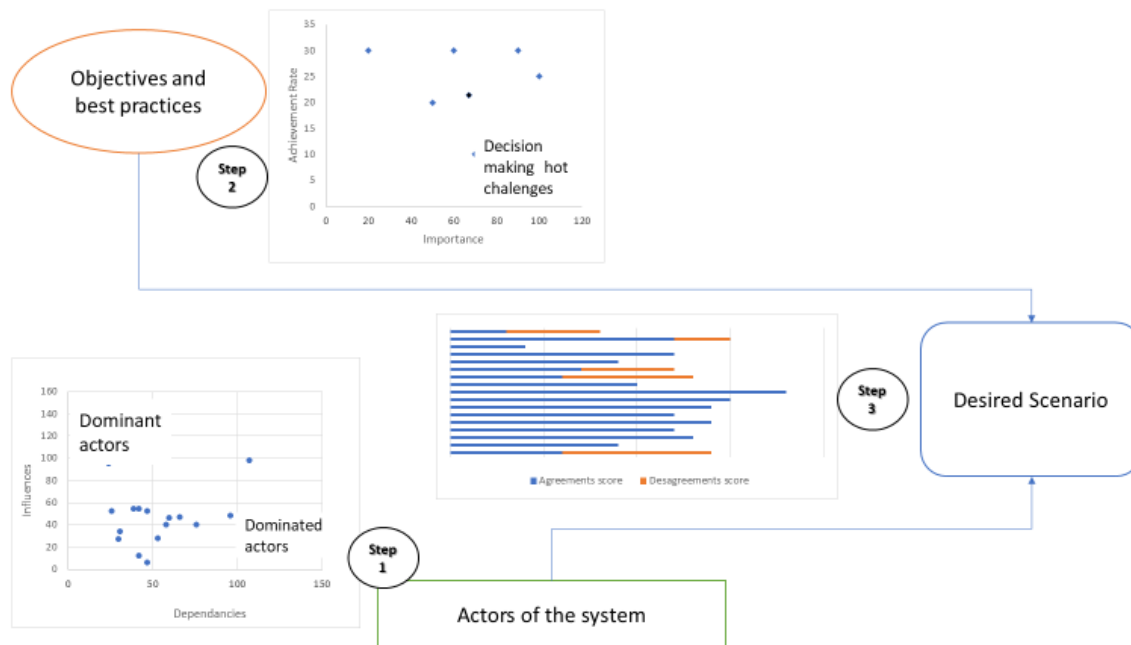
3. Determining actors' engagement in desired NIS objectives. Experts have been asked to score each actor's involvement in relation to each objective. A cross matrix is developed depicting 17 actors in the rows, the seven objectives in the columns. A cell with a positive score indicates that the actor *i* supports the objective *j*. A negative score indicates that the actor is acting against the objective. The scores range from 0 to 4 depending on the importance of the involvement of the actor toward the objective.

The sum of row cells, of positive and negative figures for each row show how much a given actor is involved and in what direction in terms of the transition process. Similar information

is drawn from every column. This indicates the level of support or otherwise for a given objective on the part of the actors.

Figure 1 below is an illustration of the steps undertaken in the analysis.

Figure 1: Three-Step Actors analysis



Results, discussion and implications

1. Evolution and Dynamics of the Tunisian National Innovation System

1.1 Characteristics of the System

Observations on the ground and discussions with experts and stakeholders allowed us to identify the key trends, invariants, recent evolutions and seeds of change in the Tunisian NIS.

In terms of key drivers of the NIS, four major trends were identified:

- the increasing number of graduates at all levels of the education system,
- the increasing number of graduates in Science and Technology,
- the strong constraints on the quality of the educational system,
- the increasing diversity of the productive sector,

In terms of the invariants and inertia of the system, we have identified three main elements:

- the predominant role of the State in the governance and activities of the system,
- the lack of clearly defined priorities and strategic choices,

- the low interactions between the various components of the NIS,

Recent developments affecting the system relate to five major elements:

- the multiplication of interfacing structures,
- the growing importance of support programs for business start-ups,
- the evolving international scope for research and innovation activities, (this is particularly highlighted by the participation of Tunisia as a partner country in the H2020 European Framework Programme),
- the emergence of a dynamic innovation ecosystem in the ICT sector.

Finally, with regard to the seeds of change, we have identified three significant trends:

- the growing role of the private sector in some dimensions of the NIS (private universities, business accelerators and business incubators),
- the relaxation, with the democratic transition, of the political constraints that were hindering the interactions between the actors of the innovation system,
- an increase in the international mobility of actors and stakeholders.

1.2 Scenarios for the evolution of the Tunisian SNI

On the basis of these findings, three scenarios for the evolution of the Tunisian NIS have been envisaged: Dislocated system, Dynamic islands and Connected system. The scenarios are defined based on their consistency, the interactions between their components and their performance potential.

Table 1: Characteristic of the Tunisian NIS Scenarios

Attributes/Scenarios	Connected NIS	Dynamic Islands	Dislocated NIS
Set of Components	Complete		Truncated
Interactions	Widespread	Little and fragile	Random Ties
Performance Potential	High	Moderate	Low

Obviously, the “Connected” scenario is the most desirable one because it reflects the potential to improve strongly productivity, competitiveness and social inclusion. However, various institutional and political factors are prone to drive the whole system towards the “Dynamic islands” scenario which characterize more or less the actual situation and even, in the worst case, to drive it to the “Dislocated System” scenario.

1.3 Main objectives to be achieved for achieving the desired scenario

The main challenge facing the country is to make a breakthrough leading to a coherent and well articulated NIS. It is clear, that the orientation towards the desired scenario is largely contingent upon the adoption and adaptation of policy instruments and best practices that prevail at the international level and the subsequent achievement of the objectives that these best practices target.

We have identified seven key objectives whose achievement will be decisive for moving from the current situation (Dynamic islands) to the desired state (Connected NIS).

The identified objectives are based on recognition of the "stakeholder involvement" role within a context of high quality institutions. This central goal is a driver of the system. Its realization will be decisive for orienting the system towards the desired scenario. In other words, it will promote the emergence of other practices in terms of policy-making that encourage the participation of all stakeholders. In OECD countries this imperative has been recognized for almost two decades, with the recognition that the effectiveness of policy depends also on the involvement of a broader range of actors than those formally in charge of policy decisions (Kuhlmann). The quality of institutions is based on their accountability, flexibility, and autonomy while evolving in a competitive market and targeting innovation. From this perspective, the list of objectives for driving the transition to the desired scenario is presented below:

Objective 1: Achieve a good governance of the system and ensure strong involvement of the actors in policy co-design: (abbreviation: Involvement),

Objective 2: Achieve greater transparency and better accountability of the institutions in the system (Accountability),

Objective 3: Realize an effective autonomy of the institutions in the system (Autonomy),

Objective 4: Promote market competition and act against rent situations (Competition),

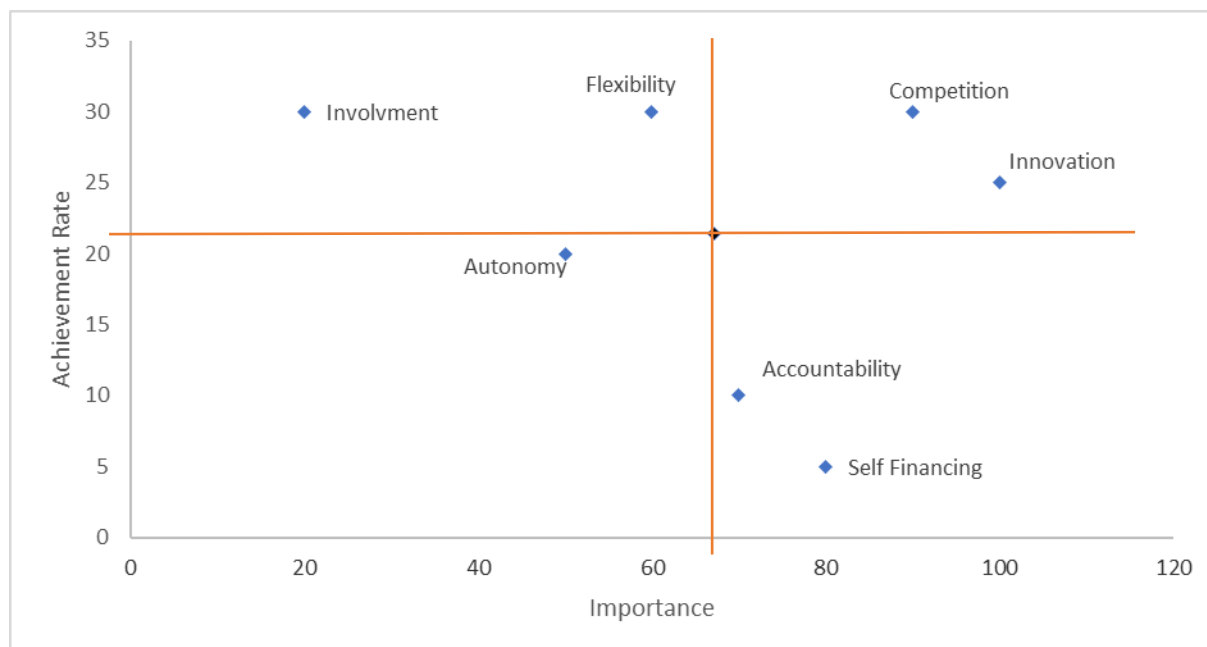
Objective 5: Introduce more flexibility in the job market and in career development (Flexibility),

Objective 6: Promote the financing of innovation by the private sector (Self-financing),

Objective 7: Promote dissemination of existing knowledge and innovation activities rather than focusing on the production of new knowledge (Innovation).

Based on consultation with a panel of experts, we have prioritized these objectives and determined their current rate of achievement. The results obtained are shown in figure 2 below:

Figure 2: Achievement Rates and Relative Importance of NIS Objectives



The main conclusions that can be drawn from this analysis are the following:

- The average rate of achievement of the objectives weighted by their relative importance is 20, 6%, which indicates that there is still a long way to go.
- Accountability and self-financing are two highly important objectives, but their realization is the least advanced
- According to the achievement criteria, involvement and autonomy ranks are better than those of accountability and self-financing. This indicates that stakeholder involvement lacks good quality institutions.

2. The role of actors and stakeholders

2.1 Identification of the actors

The first step in this approach is to identify the main actors of the NIS. As a broad definition we can say that NIS actors are the institutional entities that have the power to act on the variables and parameters that determine the future of the system. Conceptually, we can distinguish between three types:

a) Actors belonging to the country's institutional and economic spheres:

- Politico-administrative authorities (government, administration, regional councils, etc.),
- Groups of interests (unions, associations, media, etc.)
- Banks
- International donors.

b) Actors belonging to the NIS. These actors are in charge of the main functions of the NIS, (production and diffusion of knowledge, transfer of technology, regulation, etc.)

c) Actors belonging to the enterprises sub-system of the NIS (large firms, SMEs, public or private.)

Within each category we selected the most prominent actors and this resulted in a total of 17 actors.

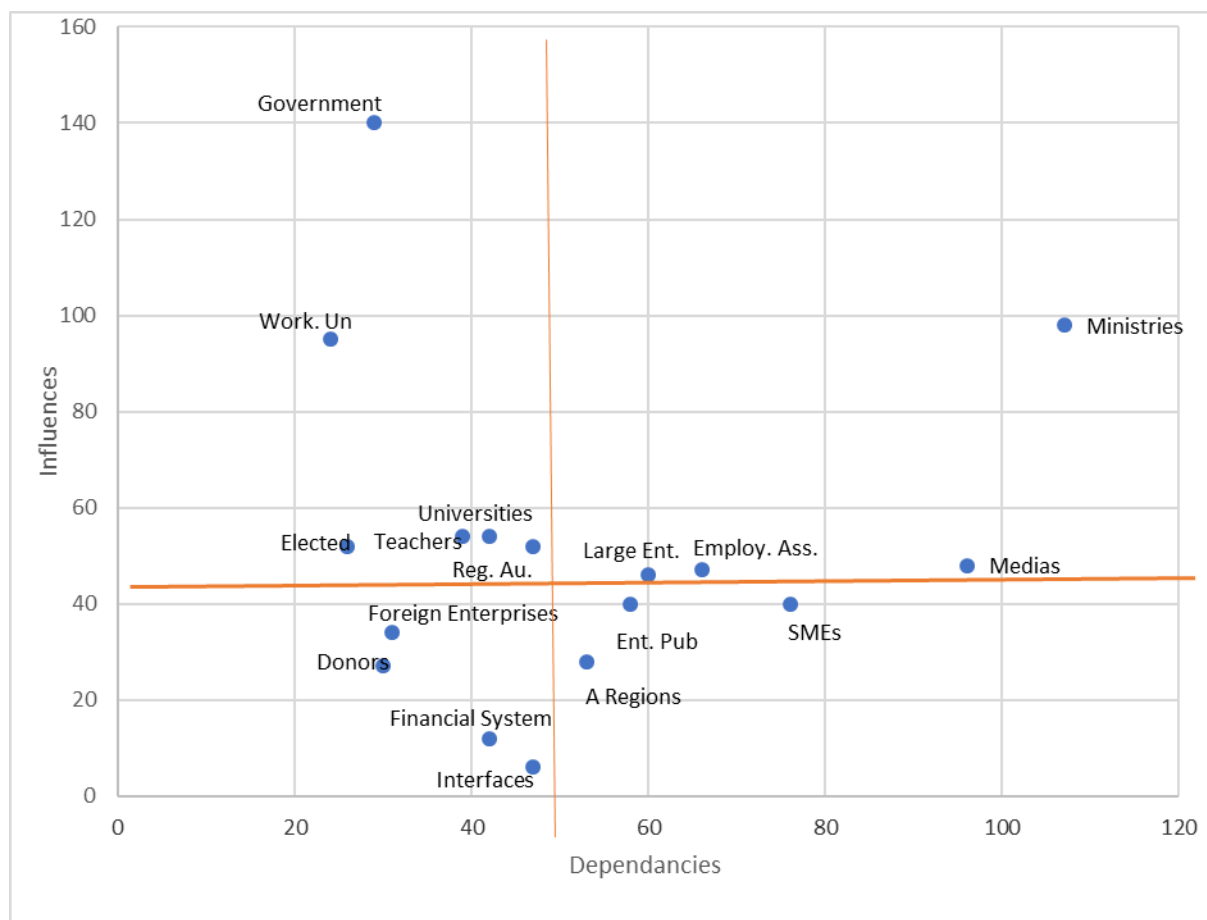
Table 2. List of Actors

N°	Actors	Short Label	Categories
1	Banks and Venture Capital Companies	Financial System	Actors belonging to the entire institutional and economic sphere of the country
2	International Donors	Donors	
3	Ministries	Ministries	
4	Presidency of the Government	Government	
5	National and local elected representatives	Elected	
6	Regional Authorities	A Regions	
7	Media / NGOs / Associations	Medias	
8	Employers Associations	Employ.Ass.	
9	Workers' Trade Unions	Work. Un	
10	University Teachers and Researchers	Teachers	Actors belonging to the SNI
11	University Governing Bodies	Universities	
12	Technology transfer centers and related entities	Interfaces	
13	Regulatory authorities	Reg. Aut.	
14	Private Large Companies	Large Ent.	Actors belonging to the enterprise sub-system of the SNI
15	Public Companies	Entr Pub	
16	Multinationals companies	Foreign Enterprises	
17	SMEs and Starts Ups	SMEs	

2.2 Direct and Indirect influences between actors

The key step in this approach is the determination of direct and indirect influences and dependencies between actors. The results are represented in figure 3.

Figure 3: Hierarchy of NIS Actors by Influences and Dependencies¹



2.3 Main conclusions on the relative power of actors

It appears clearly from this analysis that:

- The "private sector" actor is dominated,
- The central public authorities (government and administration) and the workers' union are more influential than the specific actors of the NIS (researchers, universities, interface structures, etc ...),
- The elected representatives, universities, researchers, regulatory structures are actors who have an intermediate influence,
- The actors directly concerned with innovation are less influential than the public authorities and the trade unions,
- Foreign actors have little influence on the system.

¹ The graph shows direct and indirect (second degree) influences and dependencies. The square of the cross- impact matrix provides the effects of influence and dependency of one actor on another through the influence and dependence that it can exert on third actors in the system. In the graph, each actor is represented by the coordinates that give the sum of the direct and indirect influences and dependencies.

2.3 What are the implications of this balance of power between actors for achieving the desired scenario?

- First of all, governmental authorities and the trade unions, which have the most power in the system, need to make difficult compromises between social motivations which guide their actual behaviour and the future NIS, whose effects on the economy may appear in the medium term. Therefore, their commitment to the path leading the desired scenario is not obvious.
- Starting from the premise that the private sector is committed to the desired scenario, the imperative for the system to move in this direction implies that the private sector needs to have more power. Other actors, in particular those strongly integrated in the NIS also need to act according to the good practices and objectives of a highly integrated NIS.
- Elected officials, universities, regulatory structures and researchers could play a supporting role given their relative importance in wielding influence in the NIS.

2.4 Degree of commitment and mobilization of the actors against the objectives

The future of the system and the chances of orientation towards the desired scenario will depend ultimately on the commitment of the different actors to the good practices and the objectives we described in the precedent section.

To verify and refine these implications, we considered:

- The degree of stakeholder involvement in terms of interests and participation in the achievement of the stated objectives,
- The degree of mobilization around the objectives, whether in terms of agreements or disagreements with the content of the objectives.

The two graphs below present the results of this analysis. They are based on a matrix filled by a panel of experts with in line the actors and in column the objectives. Each line i of the matrix has been attributed a score from 0 to 4 depending on the interest of the actor of the line in each of the objectives j . The score is positive if the actor agrees with the objective and negative if the actor is opposed to the goal. The sum of the numbers of the same sign in the rows and that of the columns gives an indication of the extent of agreement (for the total of the positive numbers) and disagreement (for the total of the negative numbers).

Figure 4 below represents the actors' involvement around the whole set of objectives and the transition towards the desired scenario. While Figure 5 represents the aggregated level of actors' involvement around each of the objectives.

Figure 4: Actors' Involvement Towards the Desired Scenario

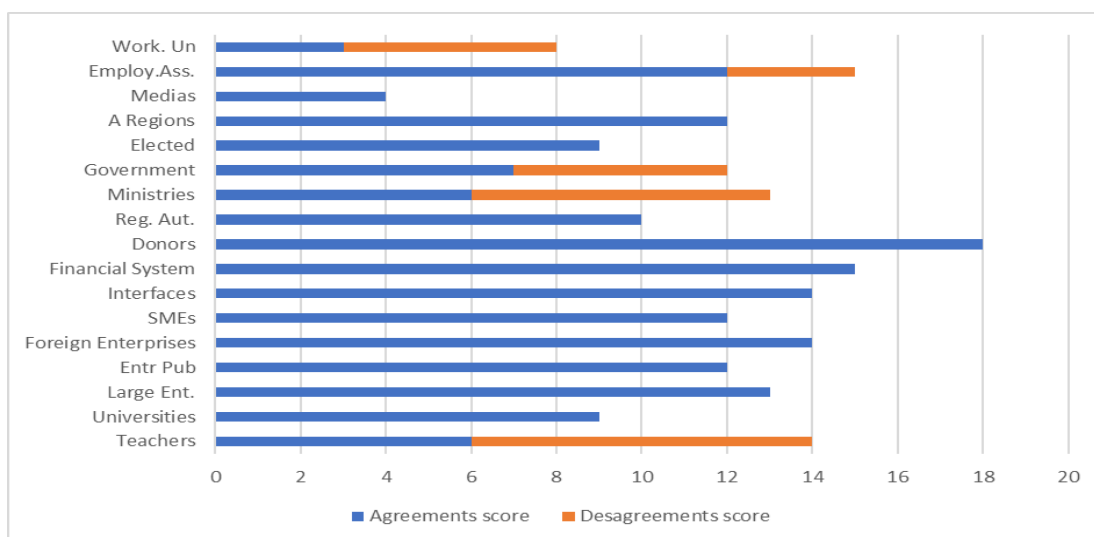
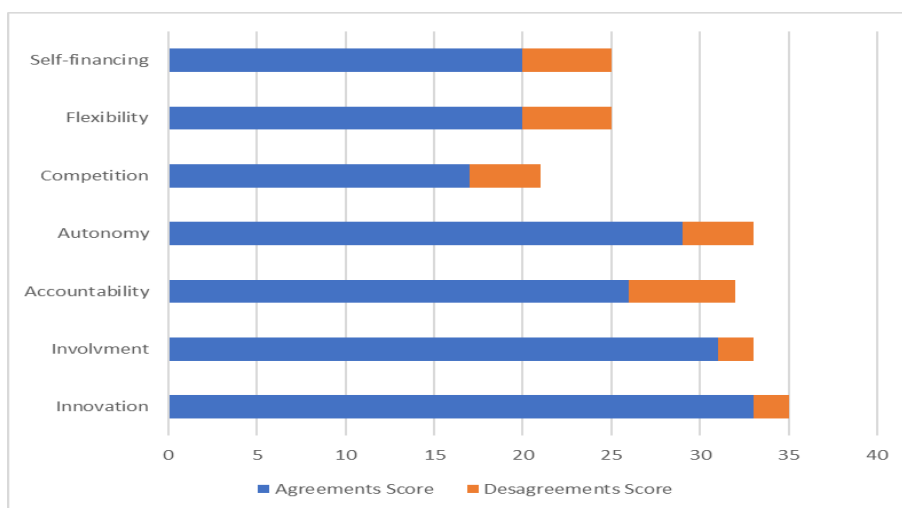


Figure 5: Actors' Involvement Towards Objectives



2.5 Main conclusions about the involvement of the actors:

- The majority of actors are engaged in the objectives towards the desired scenario,
- Disagreements with objectives appear in the case of the most influential actors, namely central authorities and trade unions.
- The actors showing the most inertia are government structures, unions and university teachers.

These findings are logical since the transition from the present situation to a new one calls into question the acquired interests of the dominant actors. Therefore, two imperatives should be tackled:

- Governmental authorities have to make difficult trade-offs between social constraints and economic efficiency,
- Questioning vested interests and set up compensation mechanisms.

To move in the direction of the desired scenario and overcome the inertia and resistance, it is therefore imperative to act in two directions. First, there is an urgent need to reinforce the alliances between the private sector and the actors in favour of the desired scenario. But this is not enough, it also necessary at the same time to set- up compensation mechanisms to soften the actors who are the most reluctant against the change.

There are two objectives for which the level of of disagreement in relation to the required mobilization is limited. The first is the orientation towards innovation. This objective could be considered as among the most important for the transition to a new, more efficient system. The second relates to the extent of stakeholders involvement.

Competition, flexibility and accountability benefit from a high level of agreement. But the level and extent of disagreement (intensity of disagreements / intensity of involvement) are relatively high and may constitute minorities of blocking or at least a slowing down of the decision-making process.

Conclusions

The prerequisites for achieving the desirable scenario are there but there is significant level of resistance to moving forward from central authorities and from vested interests.

The most stubborn resistance concerns competition, accountability and private financing.

The private sector has, until now, little influence on the national innovation system.

The private sector must take the lead and seek to establish relations with universities, research centres, transfer and interfacing structures by adopting a more proactive approach.

Public authorities should increase competition and fight against rent situations.

A coherent compensation mechanism must be conceived and implemented to overcome the obstacles that hinder the shift towards the desirable scenario.

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