The mission statements of public research centres in Egypt

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ABSTRACT: The backbone of the transformation to a knowledge-based society in Egypt is the governmental research sector, given the long history, size, diversity, international linkages and political support it enjoys. In this article, the content of mission statements of public research centres in Egypt is analysed using advanced network analytic procedures. Initially, the authors discovered that over 90% of observed statistical units have published their mission statement on the Web. The most frequent words in the mission statements analysed were research and development. The authors, then, established a network of keywords with relation *co-occurrence* among them, and seven clusters were identified: research, development, future, education and learning, collaboration and a cluster with mixed words. The results of this article clarify the direction for public leaders to start a governance shift in public research centres (PRCs) by revisiting the process and content of their mission statements in order to realise their desired local, regional and international role as catalysts and doers.

INTRODUCTION

Moving towards a knowledge-based society has become an essential goal for the success of any nation. In Egypt, the backbone of such transformation is the governmental research sector, given the long history, size, diversity, international linkages and political support it enjoys. For a developing country like Egypt, enhancing scientific research policies, mechanisms, as well as the governance of such vital governmental sector have become unavoidable steps in reaching such an ambitious goal [1]. The governmental research sector in Egypt has a role of special importance not only locally as it produces the majority of the country's research outcome, but also regionally as it acts as a central node among North African countries [2] and is a key scientific research hub in the Arab World.

On the funding level, despite the low budget dedicated to R&D that persisted for a long time, the government has recently reinforced its commitment to scientific research and has set an increased budget target of 1% of GDP. At the policy level, Egypt launched the Decade for Science and Technology 2007-16 in order to foster co-operation with developed economies and to strengthen national scientific research capabilities [3]. According to the Egyptian Science, Technology and Innovation Observatory (ESTIO), the governmental research sector includes all research centres at different ministries. This covers eleven public research centres (PRCs) directly affiliated to the Ministry of Scientific Research (MOSR) and thirteen central PRCs affiliated to all other line ministries [4].

By the end of 2015, the distribution of Egyptian researchers among PRCs, private and not-for-profit institutions shows clearly the importance of public versus private components in the Egyptian research formula. Governmental universities constitute an integral part with a total of almost 90,000 researchers affiliated to 114 PRCs in 24 universities nationwide. The number of researchers affiliated with line ministries reached almost 23,000 with the majority of them working in agriculture research compared to only 4,000 researchers in all private and not-for- profit sector institutions [4]. The bulk of research policy implementation and R&D activities are carried out within PRCs, whereas the contribution of the business sector to research and innovation is essentially insignificant.

The study of mission statements started with several attempts to define these roadmap strategic statements. For the past three decades, scholars have been advocating different descriptions, yet almost all of them suggest a similar track. A mission statement (MS) is a broadly defined overarching framework that declares the strategic intent, fundamental purpose, philosophy, identity, core values, ethics and norms, goals, business model and the unique competencies of an organisation [5-8]. As a multi-dimensional managerial tool, a mission statement is considered the *raison d'être*, which encapsulates the answers to key questions concerning the present and future paths of an organisation, such as: *Who are we?*; *What do we do?*; *What are our core values?*; *What is the scope of our operations in terms of products/services and market?*; *What makes us unique?*; *What do we strive to achieve?*; and *Where are we headed?* [9][10].

In contemporary mainstream literature, scholars agreed that a mission statement serves as an important strategic planning tool which reflects management's vision, guides its decisions and actions, and communicates its message of purpose to incumbents and external stakeholders alike. One piece of research suggests a recipe for a better crafted MS emphasising that it should be treated as a unifying action declaration (UAD) channelling groups' formation forces into task performance [11]. Mission statements offer an opportunity for senior management to assert their leadership and serve as a foundation of organisational survival and growth. There are six major advantages of having a mission statement, which are frequently cited in management literature [12]:

1. it publicly communicates the purpose and direction of the organisation to internal and external parties-at-interest;
2. it serves as a controlling mechanism to keep the organisation on track;
3. it helps in making non-routine decisions and daily operations;
4. it inspires and motivates employees to realise the shared purpose of their organisation;
5. it serves as a cultural glue or an emotional bond through which the social reality for employees is created to help them pull together the organisation in the same direction;
6. it is the vision's implementing arm, the first step and the core building block in formulating the overall strategy of an organisation [6][13][14].

Empirical studies revealed that organisations with mission statements achieve a 50% increase in organisational effectiveness, and doubled the chances that their employees will follow directions and priorities compared with organisations without mission statements [15]. In a counterargument, a few scholars advocate an anti-mission school of thought. They mainly claim that mission statements are usually not actionable, people often mistake them with vision statements creating more confusion than clarity, and they only serve as symbols especially when they are highly politicised or designed without the engagement of all stakeholders [12][16]. The literature positively argued the advantages of having mission statements versus their disadvantages when they are lengthy, poorly crafted or unclear. In a comprehensive study conducted to evaluate the achievement of a mission statement's core objectives, the authors found that in reality most of these statements did not meet all recommended objectives and were rarely a high quality management tool [12]. Moreover, the positive relation between MS and organisational financial performance remains an open question and a literature void, unless some intermediary and intervening variables are taken into account [9][17].

Consecutive empirical studies suggest up to 25 components of mission statements which are classified and categorised in different ways. The reason for such a long list is that researchers were neither able to build specific categorisation nor to establish a clear link between specific components and organisational performance [18][19]. Academics and practitioners, however, suggest that the quality of mission statements depends on the existence of a shorter and more precise list of nine components that are widely used among various organisations [8]. Later, a shorter and more specific list of only three components - purpose, business and values - were found in non-for-profit and socially responsible organisations. Whether the components construct a detailed or short list, these ingredients certainly have an impact on the quality of mission statements.

Despite the fact that the content of a mission statement is a key factor in its effectiveness as a managerial tool, many researchers suggest that the process and rationale behind creating mission statements, as well as the purpose behind their formation are more important than the content itself. Such a rationale should determine their content in terms of mission ends and mission means [7]. Other scholars claim that today's mission statements have witnessed a shift in their focus, have become more sophisticated, and reflect new elements of the emerging global challenges [20].

Although there is a gap in the literature to specify certain components preferable for each type of organisation [21][22] and it is quite difficult to observe a specific pattern that exists in specific types of organisations, socially responsible organisations, non-governmental organisations and governmental organisations should share commonalities or themes reflecting their unique social nature. Their mission statements should also witness a shift to accommodate the new forces of international governance [20].

Content analysis has been widely used during the past decades to detect the quality of mission statements [21]. Researchers usually depend on organisations' homepages to find mission statements as the use of the Internet has grown so rapidly. The on-line availability of mission and vision statements both in native and English languages has become crucial for internal functioning and for communicating future directions with current and perspective external stakeholders. As homepages allow for purposeful and controlled communication content that uses specific message frames, organisations nowadays heavily use such an open, accessible and reliable platform to communicate their creeds [23][24].

In this article, mission statements of PRCs affiliated with Egyptian ministries were collected through three sources to come up with a holistic analysis of all publicly affiliated research centres. First, mission statements were accessed through PRCs' Web pages (usually two clicks away from the homepage - under *about us*); second, a book entitled: The Landscape of Research Centres in Egypt issued by the Ministry of Scientific Research *in Arabic* was reviewed to find mission statements, which were not available in the PRCs' Web pages; and finally, through the database of all research centres in Egypt available at the Central Authority for Mobilisation and Statistics (CAPMAS).

RESEARCH METHODOLOGY

The authors searched for mission statements of public research centres in Egypt on their Web sites. Out of targeted 127 mission statements from associated research centres, 115 mission statements were found and downloaded. This amounts to 90.55% of all possible units. The dataset, therefore, included 115 units, but the text should be pre-processed. For this purpose, the authors rewrote all letters using lower case letters, removed blank spaces, and also removed punctuation. Even then, in the text a lot of redundant words (called also stop-words) appeared. The authors identified and removed 447 stop-words. Some words with the same meaning, e.g. synonyms, were also identified and they fixed 239 synonym sets.

Frequency analysis was followed by network analytic procedures. The network in general is defined by actors and relation(s) among actors [25]. In this case, the initial network of mission statements of public research centres in Egypt was determined by words appearing in mission statements (representing actors). Relation is determined as co-appearance of two adjacent words in the same mission statement (presented as links among adjacent words). Using a cut method, the authors extracted from the initial network links with higher weights (and consequently words with higher frequencies). The PathFinder algorithm [26] was used to remove less important links from the network. At the end of the analysis part, nodes were clustered using the Louvain method [27].

Programs for transforming data into a useful format and for producing networks were written in R [28]. R is a free software environment for statistical computing and was also applied for classical statistical analysis. For the analysis of networks, the Pajek program was used [29].

RESULTS

After the authors deleted all stop-words and accounted for all synonyms, 939 words were left in the database. In Table 1, one can find a list of 20 of the most common words in mission statements. For each word, the authors presented how many times it appeared in mission statements (frequency in total). To exclude multiple appearance in same mission statements, they also calculated for each word in how many different mission statements it appeared (frequency by mission statement).

Table 1: The most frequent words in mission statements of public research centres in Egypt.

Word	Frequency in total	Frequency by MS	Percentage of all MS	Degree
Research	126	71	56%	745
Development	107	60	47%	664
Egypt	49	40	31%	535
Science	48	32	25%	434
Product	44	28	22%	433
Universities	44	22	17%	311
National	41	31	24%	484
International	38	28	22%	447
Serve	38	30	24%	390
Field	35	28	22%	396
Applicable	33	28	22%	466
Environment	33	26	20%	372
Industrial	33	19	15%	364
Education	32	19	15%	258
Communities	30	21	17%	277
Agricultural	29	14	11%	305
Local	27	21	17%	299
Quality	27	23	18%	384
Programme	26	21	17%	366
System	26	17	13%	295

The most frequent word in mission statements is the word research, it appears 126 times in 71 mission statements (in 56% of all mission statements in the database), followed by development (appears 107 times in 60 mission statements, which is 47%). The words research and development share significantly higher frequencies compared to other words and at this stage of the analysis, they seemed to be the most important. Correlation between frequency in total and frequency in MS is almost perfect. The calculated Pearson correlation coefficient is 0.96.

Network Analysis

The authors determined a network of mission statements as words (representing actors) appearing in mission statements. Relation is determined as the co-appearance of two adjacent words in the same mission statement (presented as links among adjacent words). The initial network consists of 939 nodes (representing words) and 35,699 links. Therefore, the network of mission statements can be classified as semi-large and undirected network. Moreover, as two words can appear together in many mission statements, the initial network was also weighted. The degree of each node (representing a word) indicates the number of links with other words. Average degree of initial network is 76, meaning on average a word in the initial network is linked with 76 other words in the network. For instance, from Table 1 one can observe that the word *research* appeared with 745 other words in the same mission statement. As can be seen from Table 1, a degree of a word is correlated with frequency in total. The Pearson correlation coefficient is again very high (rho = 0.88).

The initial network can be classified as a dense network, its density is 0.0810 and, therefore, in the initial network there are 8.10% of all possible links among nodes. In the next step, the authors used a degree cut method. They extracted a sub-network of all words in initial network with a degree of at least 100. Then, they identified 90 words with this property and the words are called *keywords*. The network of keywords consists of 90 keywords and 2,583 links among them. Its average degree is 57.4 (number of links per node on average). To make this network more objective, the authors normalised links with cosine dissimilarity. By definition of cosine dissimilarity, all links are on the closed interval between 0 and 1. The PathFinder algorithm was applied to remove less important (not necessarily less weighted!) links from the network. At the end, keywords in remaining network were clustered using Louvain method. Clustering into six clusters turned out to be the best option. The resulting network is displayed in Figure 1.

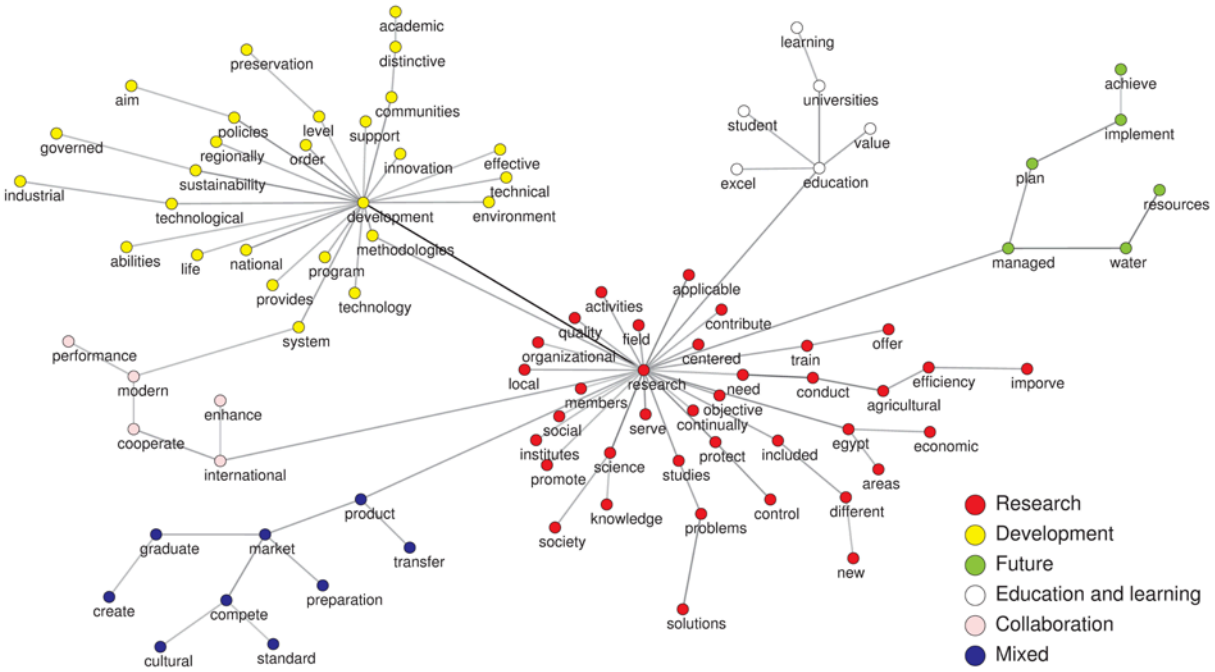

Figure 1: Network of keywords clustered by Louvain method into six clusters.

From Figure 1, one can observe that keywords are divided into six clusters. They are named: *research* (red coloured), *development* (yellow), *future* (green), *education and learning* (white), *collaboration* (purple), *mixed* (blue). The obtained clusters are explained and discussed in the next section.

DISCUSSION AND CONCLUSIONS

The purpose of this article is to give a holistic perspective of the primary mission of the governmental research sector in Egypt through analysing the contents of mission statements of PRCs affiliated to all ministries. Network analytic approaches were utilised to achieve better understanding of underlying mission components. The obtained clusters catch commonalities and trends that clearly depict their distinguishing features.

The analysis of the network revealed six core clusters that give a special flavour to PRCs' mission statements. The first and biggest cluster *research* reflects the orientation towards knowledge creation, training and solving societal problems through applicable solutions. Such orientation can be seen as a commonality between components of PRCs and socially responsible corporations in pursuing their social goals, whereas the words *Egypt* and *local* were among the mostly repeated key words in this cluster. Also, in this cluster, the word agriculture was appeared 305 times with various mission statements to reflect the importance of the agriculture research sector in terms of its size and output.

The following large cluster *development* reflects the orientation towards technical innovation represented in strengthening leadership and technological expertise both in academic and industrial applications within the national and regional fronts. The cluster reflects PRCs importance as a regional hub among developing countries, Middle Eastern countries, MENA region members, third partner countries in the European Mediterranean Research and Innovation Area, and within the African continent. This cluster highlights the fact that the Egyptian governmental research sector is a key sector in terms of overall size, as well as in terms of node centrality in the regional research network, whereas this centrality has considerably increased over time.

Figure 1 shows four smaller clusters representing different orientations: The *future* cluster gives emphasis to the use of available resources to achieve designed plans through effective implementation. The *education and learning* cluster reflects the intensity of higher education institutions in the Egyptian research landscape where state universities communicate a strong mission of well-equipping their graduates. The *collaboration* cluster communicates to external stakeholders the strong commitment of the Egyptian government to global partnership as an unavoidable move to realise knowledge-based society. Finally, the *mixed* cluster communicates the orientation towards an output whether it is in terms of qualified graduates, creative solutions, emerging cultures and standards, novel products or transferred technologies.

Table 1 reveals another important layer of the analysis. On the one hand, the external focus of PRCs missions is way more strongly declared in their communicated public image. This external focus in terms of strategic role in pursuing government's research agenda and output maximisation in terms of goal attainment are strongly communicated in most of the mission statements. On the other hand, the internal focus of PRCs mission is almost negligibly declared in their creeds. This internal focus in terms of building organisational values and identities through support, commitment, motivation and shared vision are poorly communicated in most of the mission statements.

Important future research can be addressed based on the findings of this article. Publicly-owned research centres are mainly run through taxpayer funding, they are always under strict scrutiny and, therefore, they should include distinguishable components different than their private counterparts. Their mission statements should be directly linked and contribute to the core competencies of their umbrella ministries, and should also give emphasis to their responsiveness role in serving public interests through supporting public policies.

The results of this article clarify the direction for public leaders to start PRCs governance shift by revisiting the process and content of PRCs mission statements in order to realise their desired local, regional and international role as catalysts and doers. Furthermore, the missing dimension of internal stakeholders provides an open door for future research to conduct qualitative analysis of the statements articulation process i.e. who used to design the MS and who should craft it. As previous research confirms that the process through which they are crafted and their practical uses are more important than their components or themes.

AUTHORS' CONTRIBUTIONS

Both authors contributed equally to the article, authorship order is only alphabetic.

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