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Transformational Leadership, Systems, and Intrinsic Motivation Impacts on Innovation in Higher Education Institutes: Faculty Perspectives in Engineering Colleges

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Abstract: Learning institutes are unique places for innovation, technical transformations, and social changes, which are the main pillars for sustainable development. The purpose of this study was to examine the innovation capacity building through the impact of transformational leadership on followers' satisfaction and output in two engineering colleges: one in a public university in the United States and the other in an International Branch Campus in Qatar. The Multifactor Leadership Questionnaire was used to assess leadership style, and three output indicators were chosen to represent innovative outputs. Innovation-driven systems and Intrinsic motivation were other innovation drivers assessed through the designed survey. The Statistical Package of Social Science was used to identify the correlated constructs of leadership styles and outcomes. The explanatory sequential mixed method helped explain the underlying reasons for the quantitative results through interviews with faculty. The study showed that leaders (deans) exhibited different ranges of transformational leadership styles, yet were lower than the norm. Moreover, transformational leadership traits, in addition to contingent rewards from transactional leadership, were highly correlated with followers' satisfaction with the leader and the system. As this was a cross-cultural study, context affected the participation rate and response results, as hesitation to evaluate the dean was common in a high power–distance context.

Keywords: transformational leadership; innovation; innovation-driven system; intrinsic motivation; mixed method; higher education

1. Introduction

Higher education institutes (HEIs) are learning organizations with great potential to be sources for sustainable visions, skilled leaders, and viable solutions to existing problems and emerging challenges [1,2]. As Tallories Declaration of University Leaders for Sustainable Future, held in 1990 in France, stated: "in creating an equitable and sustainable future for all humankind in harmony with nature, universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals possible" (http://ulsf.org). Universities are major drivers for innovation and growth through their essential roles in transforming societies through human capital development and serving as sources of hope for a better future for their nations [1,3,4]. Research shows that countries investing in human capital development (HCD) achieve higher life-quality and sustained economic growth [5,6]. Hence, education is the foundation of sustainability in helping individuals understand the sources of sustainability, while training them to be catalysts for social change [7,8].

While much of the early well-developed literature on universities focused on the economic aspect of sustainability, recent attention has been given to the importance of transformative sustainability learning

and sustainable management practices. Over the last few decades, transformative learning and the psychology of change have been the focus of a number of studies, specifically in relation to integrating Sustainable Development (SD) into educational institutes [9,10]. Within this scholarship, the value of transformation has been increasingly acknowledged by education researchers [11]. The efforts of transformational leaders (TLs) in creating a culture of change and innovation in the academic sector were addressed by studies such as [12,13], in which Oliveira, Leithwood, and Jantzi stated that the leadership style that correlates with the process of change and innovation is transformational leadership [12,13].

Filho et al. (2018) addressed the added value of transforming leaders in fostering innovation in learning and education for sustainability through a qualitative study conducted in six different countries. They stated that TL is needed to develop innovative skills in students to be agents of change for a sustainable future [11]. This recent study serves as further acknowledgement of the strong relationship between TL and innovation in the academic sector.

Building on this previous scholarship, this paper studies building an innovation capacity for sustainability in universities in novel ways through transformational leadership. This study focuses specifically on the technical achievements of innovative outputs by faculty members through the impact of leadership and governance approaches, which are innovation impactful aspects that have largely been overlooked in previous studies. The explanatory sequential mixed method used in this study fills a gap in previous similar studies, which have identified a relationship between leadership traits and followers' innovative outputs but overlooked explanations for such relationships [14,15]. Capacity building and empowerment are among the prerequisites for achieving true sustainability in universities through participatory processes [16]. The novel perspective offered in this study was assessing sustainability by evaluating universities' innovativeness in order to shed light on factors needed to build a culture of innovation through leadership development within HEIs. Leaders are prominent actors in fostering innovative work behaviors in followers [17–19]. Building a culture of innovation leads and prepares followers to achieve other forms of sustainability on campuses.

This study was designed to examine innovation capacity building through the impact of TL on followers' satisfaction and innovative outputs in two engineering colleges: one in a public university in the United States (US) and the other in an International Branch Campus (IBC) in Qatar. The study results showed traces of TLs in HEI leaders, but these TL levels were lower than the norm. Future training and practices in TL behaviors need to be targeted for HEI leadership development. Context affected the scores given to leaders by their followers, so the effectiveness of TL varied in different systems and cultures. This study showed that even though the faculty of engineering demonstrated very high intrinsic motivation, acknowledgment and rewards for all types of innovation (not limited to technical papers) were an essential motivational requirement by the faculty for producing more innovative outputs. The study suggests that inevitable emerging challenges related to research budgets have profound effects on research. Thus, they reveal the best time for TLs to be effective, as TLs are known for their positive impacts, especially during unstable and challenging situations.

This paper is organized as follows: the next section provides necessary background on HEI, leadership, sustainability, innovation, and system concepts. Section three describes the methodology, samples, and instrumentation developed and used in this study. Sections four and five represent the findings and discussions of the results from various comparative aspects. Finally, section six closes the paper with conclusions and recommendations based on findings and limitations of this study.

2. Theoretical Background

2.1. Innovation

The Organization for Economic and Co-operation Development (OECD) defines innovation as all steps involved in, and necessary for, the development of useful, new and/or improved manufactured

products, processes, or approaches to services, where science and technology are at the base of this process.

Since creativity coexists with innovation, it is worth mentioning that creativity represents the early steps of innovation. Creativity is the generation of ideas but does not necessarily involve the implementation of these ideas [20]. In the context of academia, innovation represents a step beyond creativity and ideas generation to measurable outcomes, such as technical papers, patents, and other representations, which facilitate the future production of innovative products and/or services. These innovative outcomes will provide competitive advancements that are more intellectual than financial, and could lead to other financial and non-financial advancements through partnerships with industry and the government, eventually. In this paper, innovation is used to represent the transformation of creative ideas into applications, such as technical papers, patents, and h-indices.

Innovation capacity building in organizations is described as a proactive strategy in which organizational context is created in the existence and support of managerial feedback for the development of employees' knowledge, skills, and decision-making capacities in order to empower them to decide when to switch between exploration and exploitation activities [21–24]. This capacity building is not merely produced by individuals, but rather by their interactions amongst each other [21].

Understanding the interactions in this relationship, specifically the leaders' and employees' behaviors within their contextual work environments, can help solve the "contextual ambidexterity" dilemma [22,25,26]. The contextual ambidexterity dilemma is defined as the behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit [27,28]. A number of scholars have called for exploring how contextual ambidexterity can be achieved, as well as the specific role of managers and employees in this process [22,27,29–31]. The efforts represented in this paper contribute to this scholarship by exploring the role of leadership and, more specifically, the specific traits that can contribute to achieving the proper ambidexterity to initiate and foster innovation within a work environment.

Brix (2018) offered a framework for how the top management team can build the capacity of the organization to foster the context for ambidexterity, while simultaneously empowering individual employees and building their capacities to process both explorative and exploitative learning activities [28,32]. Direct capacity building can be represented in the managers' role in enabling their employees to access relevant resources. On the other hand, indirect capacity building entails providing feedback and giving decision power to employees. Both direct and indirect capacity building are linked to innovation capacity building for organizations.

2.2. Higher Education and Innovation

The role of universities in innovation includes, but is not limited to, producing qualified graduates, conducting cutting-edge research, and producing products and services of economic and social values [33,34]. Historically, there were two concepts that helped develop the role of HEIs in innovation and fostering R&D activities in the U.S. and other countries—these concepts were the Triple Helix and the Bayh-Dole Act. The Triple Helix model, which was developed by Etzkowitz and Leydesdorff in the 1990s, represents the role of universities in R&D through effective collaboration between universities, industry/business, and government agencies, which resulted in various profit motives for innovation [35]. The successful linkage between academia, industry, and government requires particular governance mechanisms, including the scope and effectiveness of the intellectual property regime and the availability of financial support [33]. The sophisticated innovative systems that emerged after World War II at Massachusetts Institute of Technology (MIT), Cambridge, and Stanford are considered to be examples of the successful application of the Triple Helix model. The Bayh-Dole Act, an intellectual property and patent policy enacted in 1980 in the U.S, enabled small businesses and non-profit organizations (including universities) to retain the titles of their innovation even when created under federally funded research programs. Providing funds through partnerships and

protecting intellectual properties were two strong drivers for HE involvement in building strong innovation system.

Higher education is also linked to innovation through its role in the sustainable development (SD) education and implementation process, economic diversification, and knowledge production and transfer. Building innovative cultures within HEIs is essential for restructuring and transforming HE towards embracing sustainability and SD concepts and practices [36,37]. As creative work and leaders of creative workers are affected by broader organizational strategies [38], if the strategy of HEIs as creative work factories cultivates innovation, this strategy will ensure the successful adaptation and sustainability of an innovative culture within HEI [38,39].

2.3. Transformational Leaders

Leaders can significantly influence employees' perception of their jobs and job performances [40]. In the private sector, TLs have proven their capability to influence their followers by strengthening the perception, the meaning, and the significance of their jobs through their words and actions [41,42]. Studies show that when a task's significance is highlighted, by a TLs influence, it leads to stronger job engagement, which enhances innovative job behavior [43,44]. Bass and Avolio (1994) described TLs as: "Leaders who have increasing awareness of what is right, good, important, and beautiful; when they help to elevate followers' needs for achievement and self-actualization; when they foster in followers' high moral maturity; and when they move followers to go beyond their self-interests for the good of their group, organization, or society" [45]. For a leader to be considered transformational, there are four core traits that he or she must have. The first trait of a TL is Idealized Influence (II), which describes leaders who are exemplary role models for their followers through their charisma, values, and high moral standards [46]. Leaders' charisma represents their symbolic behaviors, visions, and inspirational abilities (both verbal and non-verbal), which appeal to ideological values and performance beyond the followers' expectations [46]. The second trait is Inspirational Motivation (IM). IM is the leader's ability to inspire, motivate, and communicate high expectations from followers and give them a sense of confidence that they can meet these expectations. The third trait of TLs is Intellectual Stimulation (IS), where the leader encourages followers to think out of the box, challenges them in problem solving, and motivates their creative thinking to come up with novel and unconventional solutions. The fourth trait of TLs is individualized consideration (IC). Leaders with a transformational leadership style pay attention to their followers' performance, take care of their development, and possess high emotional intelligence [47].

TLs are a good match for the core of business in creative ventures, as TLs are known for their ability to generate a safe and non-threatening environment in which employees can conduct complex, creative, and uncertain tasks [48,49]. Conducting complex and uncertain tasks, such as high-tech and knowledge-based SMEs, requires psychological safety for employees [48,50]. In these contexts, supervisors with high transformational leadership skills can contribute to generating a non-threatening environment where employees feel that their worth and competencies are being valued and put all their energies in to creating innovative work [50]. TLs influence their followers' sense of significance, job engagement, and meaning, which makes them feel supported by the organization, and eventually improves their competence [51].

2.4. Leadership in Higher Education (HE)

As with any other sector affected by globalization, HE faces external challenges due to increasing international competition and volatile economic conditions. The economic support that comes from the government and private sectors are linked to structural changes in socio-economic conditions, the political impact of globalization, and advancement in information and communication technologies [18]. From recruiting talented staff and students to providing new programs and research funding, HE is facing increasingly high competition keeping high standards and positions among other universities, fulfilling market needs and meeting societies' expectations. As these conditions appear

challenging, they create an opportunity for long-awaited transformation in the education system [19]. The value of transformation in HE has been acknowledged by education researchers in the last few years [11]. In HE, transformation is not limited to economic structures and modes of operation, but also its role in society [3]. In addition to their classic and apparent role of producing educated and skilled individuals, universities are increasingly situating themselves as the drivers for innovation and growth in society [3].

Sustaining a high-quality HE that is recognized as world class requires the continuous development of people and organizational culture. Building on individual strengths of leadership, governance, and management systems is key to developing HEIs that are innovative [52]. Inadequate HE leadership and governance will not only affect human capital (students and faculty) and financial resources (funding and endowments), but also will impact society's confidence in the HE sector [52].

In the UK, for instance, the leadership and governance system has evolved with time, and some changes were witnessed in the different roles within HE. Large universities, which were strong financially, maintained considerable academic autonomy, which was supported by the heads of colleges, divisions, or executive deans [53,54]. On the other hand, the universities that emerged during the post-1990s period, came with a cross institutional perspective, where the roles of executive dean and chancellor were merged together into a more of a corporate institutional structure, where the dean is classified within the senior management team, indicating different types of responsibilities.

Whether this change is anticipated or sudden, agility in leadership is needed to embrace and manage the transformational process. As leadership is a dominant human factor in the process of transformation, HE leaders have the mission and responsibility to envision the transformation process, lay out its roadmap, and implement it with the help of motivated teams and supporters from staff, faculty, students, and a broader range of stakeholders whom the leadership is responsible to gather and motivate [55–57].

2.5. The Nexus of Leadership, Follower, and System

Leadership means influencing and facilitating individuals and requires collective efforts to accomplish shared objectives and common goals [47,58]. If innovation is the common goal that leaders and followers aspire to, it can be attained by integrating individual efforts and organizational systems designed to facilitate it [59]. As this relationship is interactive and dynamic, the outcomes will differ according to the contribution each player offers within this dynamic system, as represented by Figure 1 from [60]. When the contribution is balanced, the system is expected to be sustained with no wasted resources. However, if the contribution is not balanced, a number of sources and efforts will be wasted, which, as a result, will threaten the sustainability, functionality, and efficiency of the system.

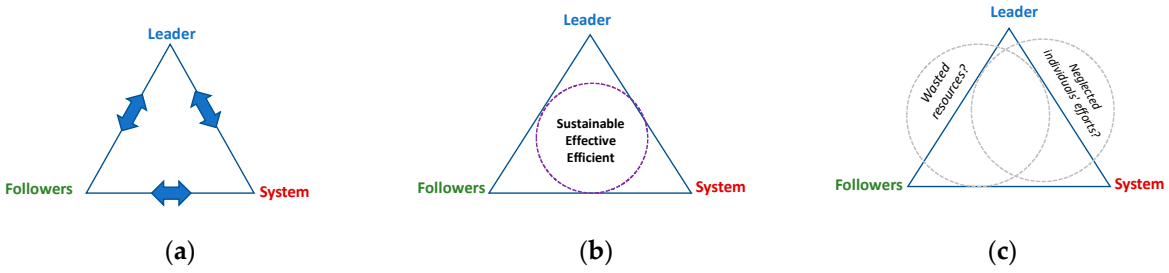


Figure 1. Sustainable and unsustainable systems. (**a**) Interactive system and its players in organizations; (**b**) balanced and interactive governance, leadership, and followership lead to effective, efficient, and sustainable organization; (**c**) possible undesired outcomes if and when the governance, leadership, and follower system is unbalanced [60].

3. Methodology

This study followed the explanatory sequential mixed method approach, which involves collecting quantitative data at the initial stage using a web-based survey, followed by collecting qualitative data using semi-structured interviews in order to explain the results obtained in the first stage.

There were two main sets of quantitative data for this study: the leadership style and the innovative output for the faculty, which represented the independent and dependent variables, respectively. We examined the degree of innovation support the current system offered and the level of intrinsic motivation in followers as essential moderating factors for the innovativeness relationship between leadership style and followers [61–63].

3.1. Procedure and Instrumentation

3.1.1. Survey

The overall survey contained 55 items in which 45 items represented the Multifactor Leadership Questionnaire (MLQ) (Form 5X) to examine the leadership style. Five items represented the innovation-driven system, and five items represented intrinsic motivation, covering all three pillars of sustainable innovation system in Figure 1. MLQ raters were asked to assess to what degree they have observed their leaders being engaged in specific behaviors that formed the nine components of the three leadership styles of transformational, transactional, and/or passive/avoidant leadership [64,65]. Sample items of this scale included "my leader talks optimistically about the future," "My leader spends time teaching and coaching," and "my leader avoids making decisions.".

The innovation-driven system was assessed using five items inspired by the Higher Education Innovate self-assessment tool (HEinnovate) [66]. Sample items of this scale included "my college has a culture that induces more innovation," "my college invests in staff development by providing diverse learning opportunities to support its innovation agenda," and "incentives and rewards given to faculty/staff/students for their innovative initiatives are satisfying.".

Followers' intrinsic motivations were assessed using items developed in [67]. For the purpose of this study, four out of the initial five statements were utilized. Sample items of this scale included: "I enjoy finding solutions to complex problems," "I enjoy coming up with new ideas for research, papers, and/or classes," and "I enjoy engaging in analytical thinking.".

All the survey constructs were measured using a five-point Likert scale ranging from 0 = not at all to 4 = frequently if not always, except items reflecting the type of system and the main motivation driver for innovation. The type of system item provided four multiple choices: a—leadership shapes the system, b—system guides the leader, c—system constrains the leader, and d—participatory process. For the motivation driver of innovation, three options were provided, a—internal drive, b—system mechanism, and c—leadership influence.

The selection of innovation indicators to measure innovative outputs was based on their importance in the R&D and HEI sectors, their appearance in the Global Innovation Indicator framework (GII) ranking calculations, and their availability in accessible resources. The work of [68–70] was used to guide the researcher to classify the indicators into the categories of input, process, and output, as shown in Table 1. This study is limited to three output indicators directly connected to faculty, as shown in the next paragraph.

3.1.2. Innovation Indicators

The list of innovative indicators used in this study was inspired by [60]. The table divided innovation indicators into, input, process, and output. This study was limited to the output indicators directly linked to faculty, which were technical publications, patents, and h-index. The data were collected from online resources that included the institute's website, Google Scholar personal profiles, and research engines, such as Scopus and Justia (for patents). Table 2 shows the type and resource of each indicator used. For the scientific and technical publications, Scopus and Google Scholars were the

main resources, as they were a more comprehensive database than university websites. The technical publications included journals, conference papers, books, book chapters, and manuals (such as lab manuals), where each was counted as one. Abstracts without full papers were excluded.

Table 1. The proposed table of indicators for empirical analysis [60].

Type	Indicator	Unit
Input	Pupil/teacher ratio	%
	Total R&D headcount	Number
Process	Continuous skills development	Number of courses, conferences (per) faculty (per) year
	Reward system	Yes/No
	Uni/Gov/Industry collaboration	Number of workshops, seminarsgrants/funds ($)
Output	Number of graduates in science and engineering	Number of students (per) year
	Number of patents	Number of patents (per) year
	Number of scientific and technical published articles	Number of publications (per) year
	H-index	|Number|
	Number of start-ups	Number of start-ups (per) year (or every 3–5 years)

Table 2. Innovation indicators directly linked to faculty and sources of data.

Output Indicators	Data Resources
Technical publications: journals, conference papers, books, book chapters	Google scholar profile Scopus Personal pages
H-index	Scopus and Google scholar
Patents	Justia, personal page, google scholar profile

Two considerations were taken into account when collecting the indicator: the date of publication, which was 2003 onward (2003 was the year when BC started operating) and the dates of appointment for faculty members in their current institutes.

Patents were collected using JUSTIA, an American legal website specialized in legal information, and Google Scholar personal page, and were included according to their publication date. In cases where a patent was filed twice, one time as an application and a second time as a grant, the patent was counted only once (according to the file date).

3.1.3. Qualitative Data

The last instrument used in this study was face-to-face interviews. Semi-structured questions were formed based on the results found in the first part of the quantitative analysis, the survey. Sample questions in this part included: "What do you think of the current process toward more innovative work at your college?," "How is it done and who are the main players?," "How did the leadership and governance facilitate, and/or hinder your capacity of creativity and innovation?," and "What do you suggest to make faculty contribute toward more innovative outputs?".

3.2. Sample

The data were collected from two engineering colleges. One college was from a public university in the U.S. and referred to as the main campus (MC), and the other college was its antecedent IBC, hosted by Qatar Foundation (QF) and referred to as (BC). Unlike MC, BC had only four departments and a total of 45 faculty members. Although BC had one graduate program, the university undertook a great amount of research by a researcher body of 50 graduate students. Conducting research at BC followed a relatively similar approach to conducting research in MC. The same corresponding departments in MC were chosen to be included within the sample, and 184 full time faculty members involved in both teaching and research were included. Despite the relatively small size of BC compared

to MC, both campuses were heavily involved in research, and the processes of research and teaching at both campuses were identical, as both operated under the same system of policies and governance.

The survey was sent to all faculty in engineering at both campuses, excluding lab staff and technical coordinators and lecturers, because one of the main selection criteria was for the respondents to have research activities. Email invitations were sent to the faculty directly from the survey application websites. Two weeks after sending the survey, only 3% of the sample responded. As the response rate was very low, a visit to the local institute was made by the researchers to encourage the faculty to participate in the study and give them some information about the research and its objectives in person. Simultaneously, and right after this visit, the researcher sent electronic reminders to all faculty as a follow-up to this visit, which resulted an immediate 10% increase in the response rate for this institute.

In total, 45 invitations were sent to the BC faculty and 31 responses were received, in which 23 were complete and 8 were incomplete and were discarded from the empirical analysis. For MC, 184 invitations were sent and 28 responses were received, in which 19 were complete, and 11 were incomplete and discarded from the analysis. In total, 42 samples were valid for analysis. The response rates were 70% in BC and 15.2% in MC, which showed the importance and necessity of face-to-face communication in collecting surveys. Knowing the faculty in person and campus accessibility were major contributing factors to the higher response rate in BC, while the lack of previous personal acquaintance and limited access to the MC building (as it was not in the researchers' home country) were major limitations for MC and caused the low response rate.

4. Results

4.1. Demographics

The sample had a total number of 5 female and 37 male participants, representing 12% and 88% for each gender, respectively. Male and female percentages in each institute are shown in Figure 2a. From these percentages, it was clear that both engineering colleges were dominated by male faculty. The largest age group for BC was (46 to 55 years), which had 12 participants. Next came the age group above 55 years, with 5 participants (representing 52% and 22%, respectively). Above 55 years was the largest group in MC, with 9 participants, followed by 46–55 years with 6 participants (Figure 2b). The sample age groups in percentage forms for BC and MC separately are shown in Figure 2b.

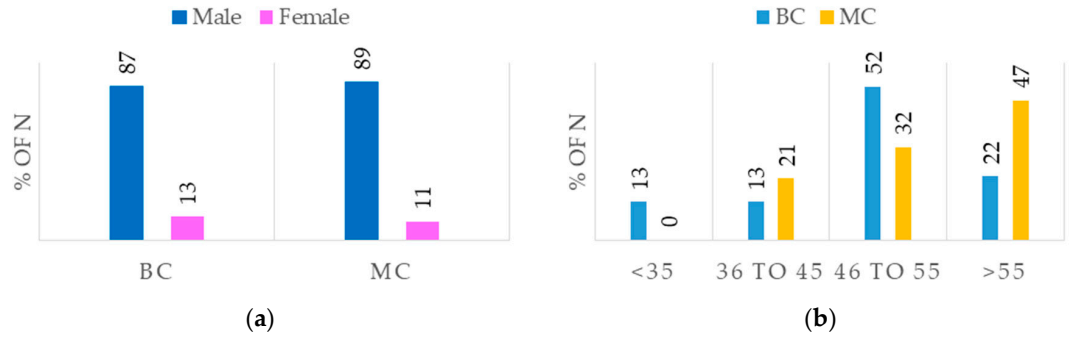


Figure 2. (**a**) Male and female faculty member percentages in the branch campus (BC) and the main campus (MC), (**b**) faculty age group percentages in BC and MC.

More than 60% of BC and 80% of MC have a minimum of 16 years of experience in total (Figure 3a). The majority of faculty in both institutes have worked for their respective institutes between 6 to 15 years (Figure 3b). This guaranteed that faculty in both campuses have, and still are, working under the supervision of the deans currently in office. It was normal not to have more than 16 years of experience at the BC institute, since BC was established 16 years ago. 40% to 50% of the faculty in both campuses have held managerial positions in academia in the past, including program chairs and associate deans, which indicated as good understanding and close relationship with the dean. In MC,

90% of the faculty had industrial experience, while only half of the faculty in BC worked in industry. Faculty members with industrial experience establish stronger ties with industrial partners, which leads to better "free flow" communication and input from industry and more shared projects that involve solving real world problems [71] (Figure 4a,b).

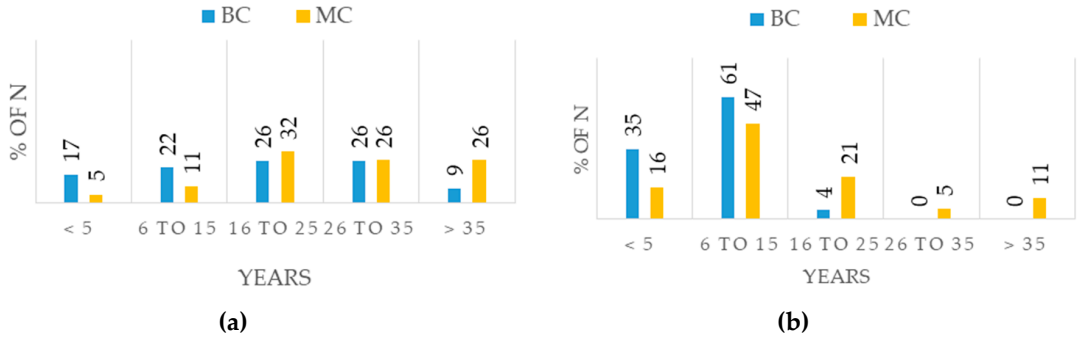


Figure 3. (**a**) Total experience for faculty members in percentages; (**b**) faculty years of experience in BC and MC institutes in percentages.

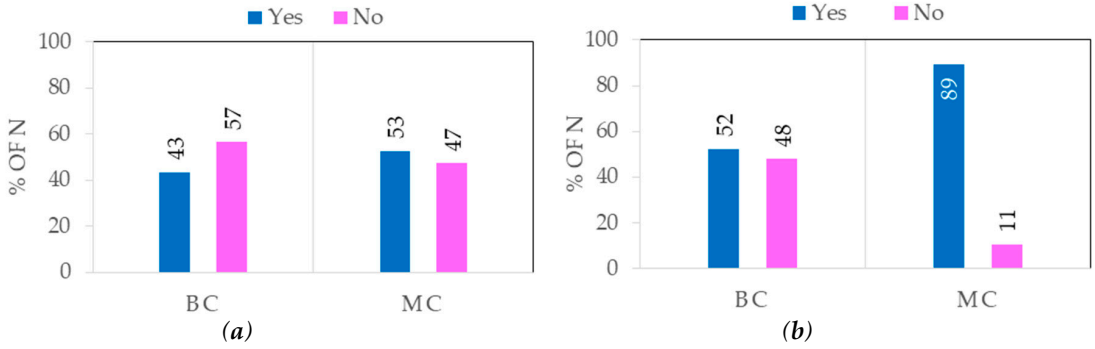


Figure 4. (**a**) Managerial experience in academia in percentages for BC and MC faculty; (**b**) industrial experience for BC and MC faculty in percentages.

4.2. MLQ Descriptive Statistic

Descriptive statistics are important, especially in cross-cultural research [72]. The Cronbach alpha for all twelve items in the combined sample was 0.87 and for BC and MC were 0.871 and 0.878, respectively (Tables 3 and 4). This result indicated high reliability for the sample to be analyzed. The Cronbach alpha was calculated for each construct, since MLQ is multidimensional [73,74], and the values ranged from 0.37 (lowest) to 0.94 (highest). Constructs with a Cronbach alpha between 0.7 to 0.95 showed high reliability, so they were used in the analysis, while constructs with Cronbach alpha lower than 0.7, such as IM, MBE (A), MBE (P), and LF were discarded from the analysis for their low reliability.

Table 3. Descriptive data for the combined sample.

N = 42	***M***	***SD***	***α***
Transformational leadership:			
II (A)	2.137	1	0.844
II (B)	2.446	0.708	0.782
IM	2.792	0.751	0.632
IS	1.500	1.010	0.810
IC	1.256	0.868	0.839
Transactional Leadership:			
CR	1.821	1.056	0.867
MBE (A)	1.542	0.508	0.378

Table 3. *Cont.*

N = 42	*M*	*SD*	*α*
Passive Leadership:			
MBE (P)	1.274	0.884	0.369
LF	1.196	0.716	0.655
Leadership outcomes			
EE	1.492	1.194	0.857
EF	1.833	1.168	0.859
SAT	1.679	1.188	0.877

Note: α, Cronbach alpha representing reliability; underlined numbers indicate low reliability ($\alpha < 0.7$).

Table 4. Descriptive data for BC and MC represented separately.

	N = 23 Branch Campus Non-Public University Outside US			**N = 19 Main Campus Public University in US**		
	M	**SD**	**α**	**M**	**SD**	**α**
Transformational leadership:						
II (A)	2.283	1.156	0.851	1.961	0.774	0.858
II (B)	2.630	0.698	0.756	2.224	0.671	0.786
IM	2.837	0.782	0.555	2.737	0.729	0.757
IS	1.707	1.022	0.845	1.250	0.965	0.73
IC	1.543	0.835	0.821	0.908	0.796	0.858
Transactional Leadership:						
CR	2.120	1.079	0.863	1.461	0.933	0.860
MBE (A)	1.576	0.535	0.234	1.500	0.486	0.578
Passive Leadership:						
MBE (P)	1.065	0.755	0.416	1.526	0.982	0.237
LF	1.044	0.745	0.684	1.382	0.653	0.556
Leadership outcomes						
EE	1.739	1.142	0.893	1.193	1.218	0.799
EF	1.98	1.259	0.881	1.658	1.055	0.832
SAT	2.022	1.239	0.891	1.263	1.005	0.850

Note: Underlined numbers indicate low reliability ($\alpha < 0.7$), II (A), Idealized influence attribute; II (B), idealized influence behavior; IM, inspirational motivation; IS, intellectual stimulation; IC, individualized consideration; CR, contingent reward; MBE (A), management by exception active; MBE (P), management by exception passive; LF, lassiez-faire; EE, extra effort; EF, effectiveness; SAT, satisfaction.

We calculated the percentiles for individuals' scores in BC and MC (Table 5), and then compared our sample to the norm sample provided by [64,65] at the 60th percentile (Table 6). It is worth mentioning that the norm sample in [64,65] was taken from the U.S. and had a sample size of 12,118 raters at a lower level, which means that leaders were rated by their employees, not by peer leaders nor higher level leaders in the institutes' hierarchies, which all showed similar conditions to our study. Leadership traits and outcomes for the norm sample were higher than the BC and MC scores (exception: II (B), both norm and BC were equal to 3.0).

Table 5. Percentile scores for leader's individual traits based on the faculty's rating.

BC												
N = 23	**Transformational**					**Transactional**		**Passive**		**Leadership Outcomes**		
%tile	**II (A)**	**II (B)**	**IM**	**IS**	**IC**	**CR**	**MBE (A)**	**MBE (P)**	**LF**	**EE**	**EF**	**SAT**
5	0.10	1.10		0.00	0.05	0.10				0.00	0.05	0.00
10	0.60	1.60		0.10	0.35	0.60				0.00	0.25	0.00
20	1.00	1.95		0.70	0.70	1.25				0.33	0.50	0.90
30	1.40	2.10		1.00	1.00	1.25				1.00	0.75	1.00
40	2.25	2.65		1.50	1.25	1.65				1.20	1.60	1.80
50	2.25	3.00		1.75	1.50	2.00				2.00	2.75	2.00
60	2.85	3.00		2.10	2.00	2.60				2.33	2.75	3.00
70	3.00	3.00		2.45	2.20	3.00				2.60	3.00	3.00
80	3.30	3.25		2.75	2.30	3.30				3.00	3.05	3.10
90	3.75	3.25		2.90	2.65	3.50				3.00	3.50	3.50

MC												
N = 19	**Transformational**					**Transactional**		**Passive**		**Leadership Outcomes**		
%tile	**II (A)**	**II (B)**	**IM**	**IS**	**IC**	**CR**	**MBE (A)**	**MBE (P)**	**LF**	**EE**	**EF**	**SAT**
5	0.75	1.25	1.25	0.00	0.00	0.00				0.00	0.00	0.00
10	1.00	1.50	1.75	0.25	0.00	0.25				0.00	0.25	0.00
20	1.25	1.75	2.25	0.25	0.00	0.50				0.00	0.75	0.00
30	1.50	1.75	2.50	0.50	0.50	1.25				0.33	0.75	0.50
40	1.75	1.75	2.50	1.00	0.50	1.25				0.33	1.00	1.00
50	1.75	2.00	2.50	1.00	0.75	1.25				0.67	1.75	1.50
60	2.00	2.25	2.75	1.00	0.75	1.50				1.00	2.25	1.50
70	2.25	2.25	3.25	2.00	1.50	1.75				2.00	2.50	1.50
80	3.00	3.00	3.50	2.25	1.50	2.50				3.00	2.50	2.50
90	3.25	3.25	4.00	2.75	2.25	3.00				3.00	3.00	3.00

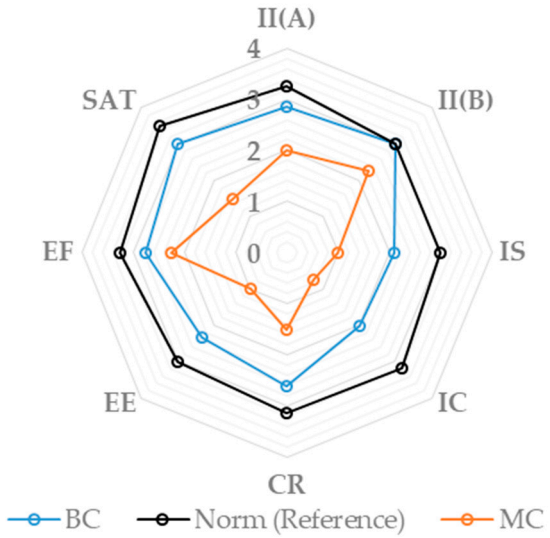
Note: The shaded area represents the omitted values due to failing the reliability test (Table 4); II (A), Idealized influence attribute; II (B), idealized influence behavior; IM, inspirational motivation; IS, intellectual stimulation; IC, individualized consideration; CR, contingent reward; MBE (A), management by exception active; MBE (P), management by exception passive; LF, lassiez-faire; EE, extra effort; EF, effectiveness; SAT, satisfaction, (0 = not at all, 1 = once in a while, 2 = sometimes, 3 = fairly often, 4 = frequently if not always).

Table 6. Leadership style traits and leadership outcomes for BC, MC, and the norm sample in the 60th percentile.

60th %tile	**Transformational**					**Transactional**		**Passive**		**Leadership Outcomes**		
	II (A)	**II (B)**	**IM**	**IS**	**IC**	**CR**	**MBE (A)**	**MBE (P)**	**LF**	**EE**	**EF**	**SAT**
Norm N = 12,118	3.25	3.00	3.25	3.00	3.17	3.13				3.00	3.25	3.50
BC N = 23	2.85	3.00		2.10	2.00	2.60				2.33	2.75	3.00
MC N = 19	2.00	2.25	2.75	1.00	0.75	1.50				1.00	2.25	1.50

This indicated that leaders in our sample exhibited a transformational style in their leadership, but this style lower than the norm (close to 4). Distances from the norm were calculated to show how far our sample was from the reference sample (Table 7). MC showed a greater distance from the norm than BC. This result indicated that MC had the lowest TL behavior. Leadership outcomes were also lower than the norm sample, which was expected since TL is strongly associated with follower satisfaction and empowerment by leaders with TL behavior [55,56].

Table 7. Distances of leadership traits and leadership outcomes for BC and MC from the norm sample at the 60th percentile.



Trait/Outcome	BC Distance from Norm	MC Distance from Norm
II (A)	−0.4	−1.25
II (B)	0	−0.75
IS	−0.9	−2
IC	−1.17	−2.42
CR	−0.53	−1.63
EE	−0.67	−2
EF	−0.5	−1
SAT	−0.5	−2

4.3. System

The faculty's perspective on the governance mechanism of the system was assessed by a four multiple choice item. The item stated that "the following statement describes my engineering college the best" and provided four answers. Option one was "The leadership shapes the system," indicating a hierarchal system with greater power granted to the leadership. Option two was "the system guides the leader," indicating the existence of a rigid and supportive system to the leader. Option three was "the system constrains the leader," indicating a rigid system but with limiting power that could hinder the leader's initiatives and positive changes. The last option was "it is a participatory process," indicating a flatter system with less hierarchal powers as an ideal case of a university. Among the BC faculty, 44% believed that the system guided the leader, followed by 22% choosing the "participatory process" (Figure 5). These two choices indicated less power possessed by the BC leader and more power given to the system and followers, as it is a participatory process. The BC being an IBC that follows the rules and policies of its main campus could be one explanation for these answers.

On the other hand, 47% of the MC faculty believed that leadership shaped the system, followed by 37% believing that the system constrained the leader. The first choice gave high power to the leader, while the second choice limited this power, which was unexpected. Only 5% of the MC participants chose the participatory process, which could indicate a system ruled by a centralized power, since it was a public university governed by the state's rules and regulations.

Culture of innovation: Item two in this scale asked about whether the college embraces a culture of innovation 48% of BC faculty said "often" and 22% said "rarely." On the other hand, 42% of MC faculty said "rarely" while only 26% answered "often," indicating that more efforts in building innovative culture were witnessed by BC's faculty than their counterparts in MC. About one third of BC and MC thought that such a culture exists occasionally.

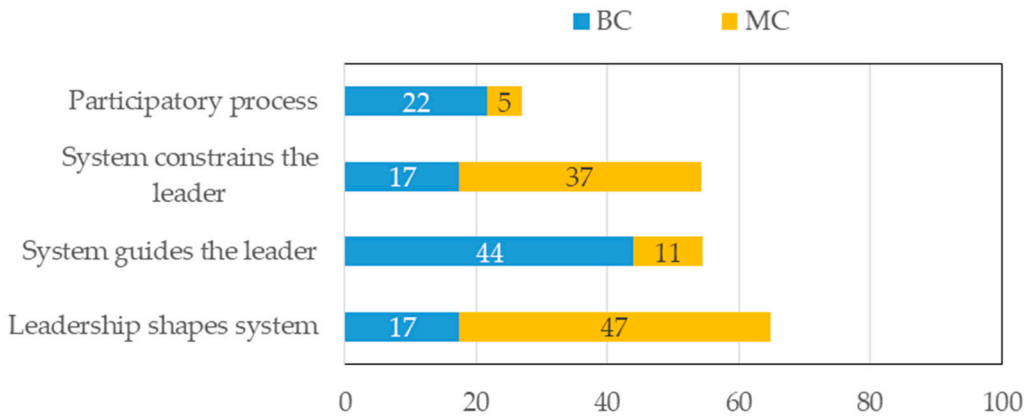


Figure 5. Item 1 at a system scale for statements to describe the systems in the two institutes, as per the faculty members' perspectives.

Learning opportunities: Item three, 48% of BC faculty stated that the college provides diverse learning opportunities for innovation, while 22% stated that they were rarely provided (if any) and the remaining 30% said "sometimes," thereby matching the percentage division in Item 2. Again, the MC faculty scored lower results at the higher end with 26%, indicating low availability of the diverse learning opportunities to support the innovation agenda in MC compared to BC's results.

Incentives: Item 4 asked the faculty about their satisfaction of the provided incentives for their innovative work. The results clearly showed that BC faculty were more satisfied than the MC's, with 44% versus only 10% for each, respectively. As the BC results showed the same trend as the previous two items, MC recorded an increase in "sometimes," possibly indicating a higher satisfaction with incentives, based on specific conditions or outcomes.

Overall, more faculty were satisfied by the current system in BC than in MC, which could be inferred from the previous questions. Figure 6 shows result summaries for Items 2–5 at a system scale.

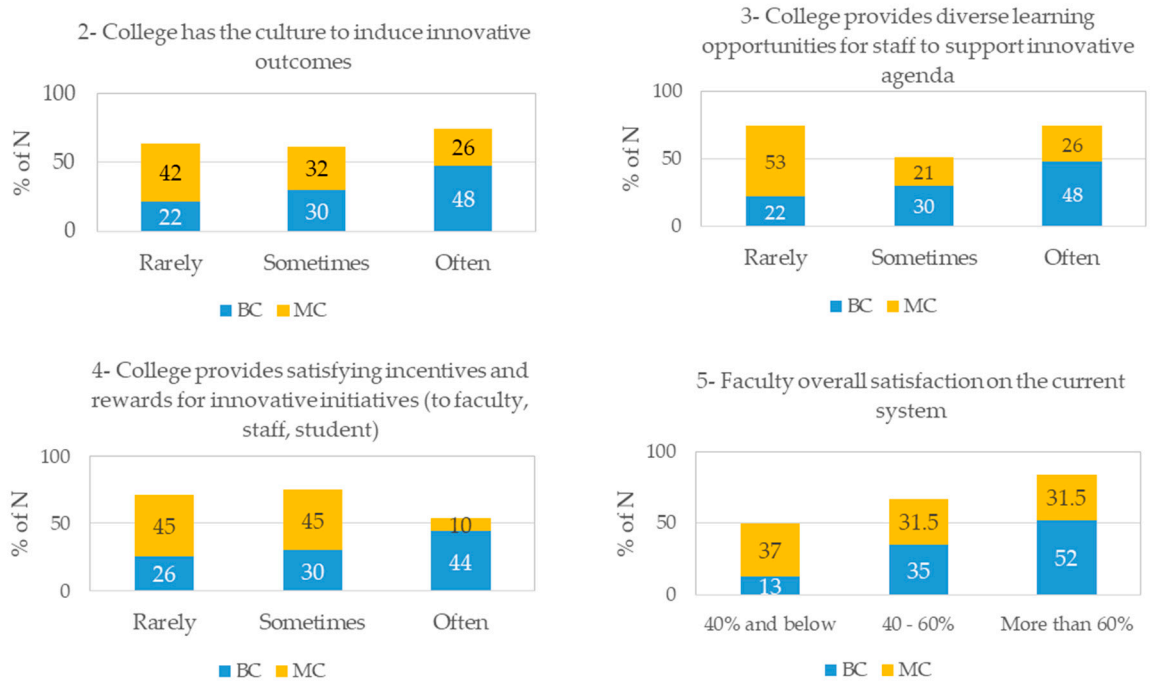


Figure 6. Statements 2 to 5 at a system scale assessed the faculty's satisfaction with the culture, learning opportunities, incentives, and rewards, in addition to the overall satisfaction level, of the current system. Note: Rarely = "not at all" and "once in a while", Often = "fairly often" and "frequently if not always" merged together.

4.4. Followership

Item one in the followership scale measured the main innovation driver for faculty members; 78% of BC faculty and 83% of MC faculty selected internal motivation as their main driver for innovation, showing a strong self-drive, as expected from individuals in domains demanding deep cognitive engagement [75]. More faculty in MC believed more in leadership's impact on innovation than those in BC. On the contrary, more of the BC faculty believed in the impact of the system's mechanisms, such as the required goals, meeting targets, and promotions in driving more innovation, while none of MC's faculty chose system as a driver for innovation. These results support the findings of Item 1 in the system (Figure 7), which show that more power is given to the leadership in MC, while the system power dominates in BC (an IBC that follows the rules and policies of its main campus).

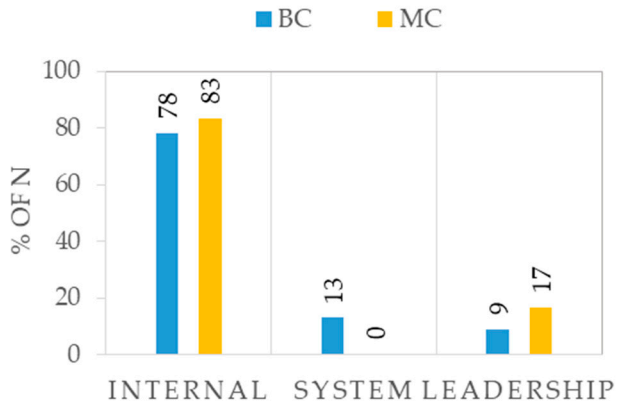


Figure 7. The main drivers of innovation for faculty. Note: Internal = achievements, self-satisfaction, and personal goals; System = required goals and minimum achievements per year, promotion; Leadership: supportive and encouraging leadership providing an open-door/dialogue environment.

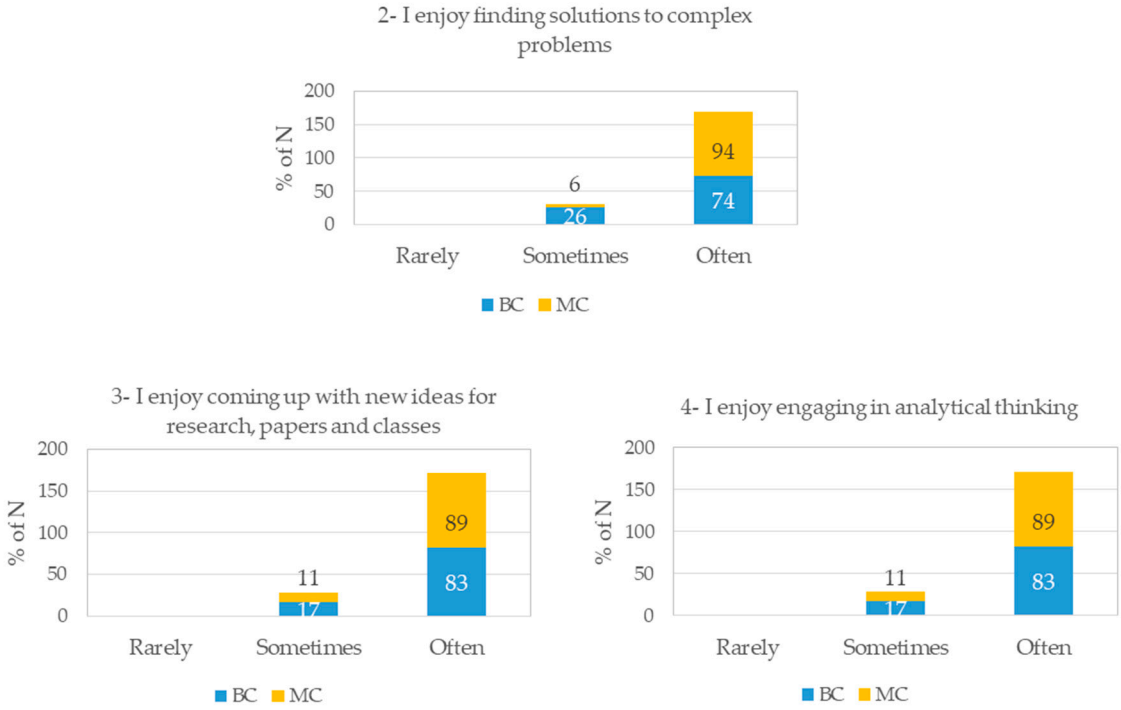


Figure 8. Items 2 to 4 in the followership scale as adopted from [64] to assess intrinsic motivation, Note: Rarely = "not at all" and "once in a while", Often = "fairly often," and "frequently if not always" merged together.

Items 2–5 show clearly that faculty in both colleges have high intrinsic motivation levels, as no scores were recorded in the lower end of the scale, such as "not at all" and/or "once in a while". Figure 8 shows the results of the three statements developed by [67] with the percentages for each college. 74% of BC faculty said they often enjoy finding solutions to complex problems, and 83% said they enjoy creating ideas and analytical thinking. A higher number of faculty enjoyed finding solutions to complex problems, creating new ideas, and engaging in analytical thinking, as shown in Figure 8. Item number 5 asked about the overall intrinsic motivation level for faculty, to which 94% of MC faculty and 87% of BC faculty answered "Strong," emphasizing the results obtained from Item 1 as the innovation driver for the faculty (Figure 9).

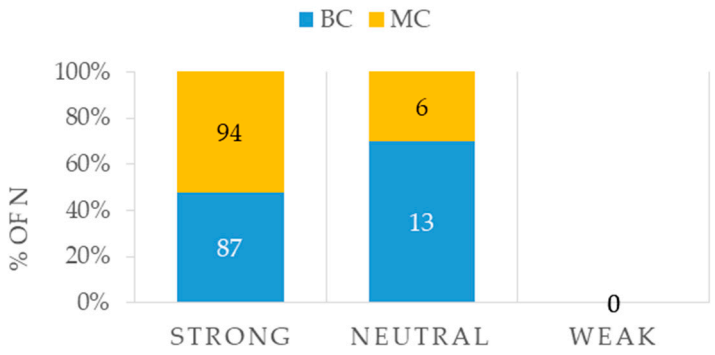


Figure 9. The level of intrinsic motivation for the faculty.

4.5. Correlation between Main Pillars of Leadership, System and Followership Nexus

A Pearson (two-tailed) correlation in Statistical Package of Social Science (SPSS) (IBM Corporation, Armonk, NY, USA) was used to identify the significant relationships between TL and aspects of the system and followership. All four aspects of TLs (II (A), II (B), IS, IC), in addition to the CR from transactional leadership, correlated positively with the leadership outcomes of EE, EF, and SAT in both BC and MC (Table 8). The Pearson coefficient showed significant levels (at $p < 0.01$), with correlation values ranging from 0.606 to 0.896. II (A) and IS showed the highest correlation values for BC (0.752–0.896), indicating that the leader's idealized influence and intellectual stimulation affected a follower's satisfaction of their leader and identification of the leader's effectiveness and extra efforts. The same leadership outcomes were highly correlated with the IC and CR (0.785–0.848) for MC faculty (Table 8).

Table 8. The Pearson Correlation between leadership aspects and leadership outcomes.

		BC			MC		
		EE	**EF**	**SAT**	**EE**	**EF**	**SAT**
Transformational	**II (A)**	0.752 **	0.795 **	0.896 **	0.622 **	0.782 **	0.773 **
	II (B)	0.752 **	0.788 **	0.772 **	0.606 **	0.805 **	0.742 **
	IS	0.818 **	0.799 **	0.800 **	0.693 **	0.682 **	0.637 **
	IC	0.724 **	0.661 **	0.692 **	0.802 **	0.800 **	0.848 **
Transactional	**CR**	0.752 **	0.759 **	0.827 **	0.785 **	0.801 **	0.804 **

BC, branch campus; MC, main campus; II (A), Idealized influence attribute; II (B), idealized influence behavior; IS, intellectual stimulation; IC, individualized consideration; CR, contingent reward; ** Correlation is significant at the 0.01 level (two-tailed).

Items 2–5 in the innovation driven system correlated positively with all four aspects of TL and CR at $p < 0.01$ level. II (A), and IS showed the highest correlation for BC (0.592–0.777), while IC and CR were the highest for MC (0.585–0.835), confirming the results obtained in the previous correlation with leadership outcomes that these two traits (II (A) and IS for BC, and IC and CR for MC) are of the faculty's interest and affect their satisfaction (Table 9).

Table 9. The Pearson Correlation between leadership aspects and system.

		BC				MC			
		Culture	Diverse Learning	Incentives and Rewards	System Satisfaction	Culture	Diverse Learning	Incentives and Rewards	System Satisfaction
Transformational	II (A)	0.734 **	0.695 **	0.631 **	0.759 **	0.801 **	0.504 *	0.692 **	0.665 **
	II (B)	0.530 **	0.644 **	0.670 **	0.553 **	0.784 ***	0.553 *	0.624 **	0.618 **
	IS	0.592 **	0.777 **	0.766 **	0.691 **	0.778 **	0.602 **	0.642 **	0.612 **
	IC	0.487 *	0.638 **	0.590 **	0.477 *	0.672 **	0.585 **	0.762 **	0.805 **
Transactional	CR	0.744 **	0.730 **	0.634 **	0.784 **	0.769 **	0.604 **	0.814 **	0.835 **

BC, branch campus; MC, main campus; II (A), Idealized influence attribute; II (B), idealized influence behavior; IS, intellectual stimulation; IC, individualized consideration; CR, contingent reward; ** Correlation is significant at the 0.01 level (two-tailed); * Correlation is significant at the 0.05 level (two-tailed).

No significant correlation was found between leadership style and intrinsic motivation for MC faculty, showcasing the independency of this scale. An exception was recorded for BC, where internal motivation level was correlated with II (A) at the $p = 0.01$ level and with II (B) and IS at the $p = 0.05$ level (Table 10).

Table 10. The Pearson Correlation between leadership aspects and intrinsic motivation.

		BC					MC				
		Innovation Driver	Solving Complex Problems	Producing New Ideas	Analytical Thinking	Internal Motivation Level	Innovation Driver	Solving Complex Problems	Producing New Ideas	Analytical Thinking	Internal Motivation Level
Transformational	II (A)	−0.215	0.100	0.181	0.114	0.588 **	−0.258	0.217	0.310	0.367	0.126
	II (B)	−0.145	0.037	0.156	0.143	0.422 *	−0.299	0.172	0.290	0.235	0.062
	IS	0.074	0.129	0.192	0.278	0.437 *	−0.373	0.180	0.191	0.173	0.077
	IC	−0.005	−0.028	0.121	0.116	0.394	−0.357	−0.148	−0.078	0.065	−0.238
Transactional	CR	−0.089	0.089	0.202	0.125	0.522 *	−0.427	0.053	0.150	0.217	−0.068

BC, branch campus; MC, main campus; II (A), Idealized influence attribute; II (B), idealized influence behavior; IS, intellectual stimulation; IC, individualized consideration; CR, contingent reward; ** Correlation is significant at the 0.01 level (two-tailed); * Correlation is significant at the 0.05 level (two-tailed).

4.6. Innovative Output Indicators

BC and MC technical publications and filed patents for the last 15 years were plotted to examine changes in production before and during the current leaders' appointment dates as possible results of the effect of leaders' traits on followers' outputs (Figure 10a,b). The researchers took into account the joining date of each faculty member in their perspective institutes, and both indicators were divided by the number of faculty considering the differences in the sizes of the two colleges (Figure 10c,d). MC showed a gradual increase in the technical publication, which reached a production of 2000 in 2018 (Figure 10a). The production of patents was oscillating, recording a high increase in 2010 followed by an unstable period between 2011–2013, and then another gradual increase started in 2013 and reached a production peak in 2016 (Figure 10b).

BC technical paper production had four distinctive periods. Before 2007, BC had a total production of less than 100 papers. From 2007–2010, the average annual production was about 120 papers, and from 2011 to 2015, the average production reached 400 papers per year. In 2016, the production was about 550, recording the highest peak in the history of this campus. However, it started declining after 2016, settling at an average of 350 papers per year (Figure 10a). Patent production started increasing in 2015, which recorded 6 patents in the same year and reached its highest, 16 patents, in 2017, and then decreased again (Figure 10b).

The average H-index was categorized and colour coded per department, as shown in Figure 11. MC had higher h-indices than BC in all four departments.

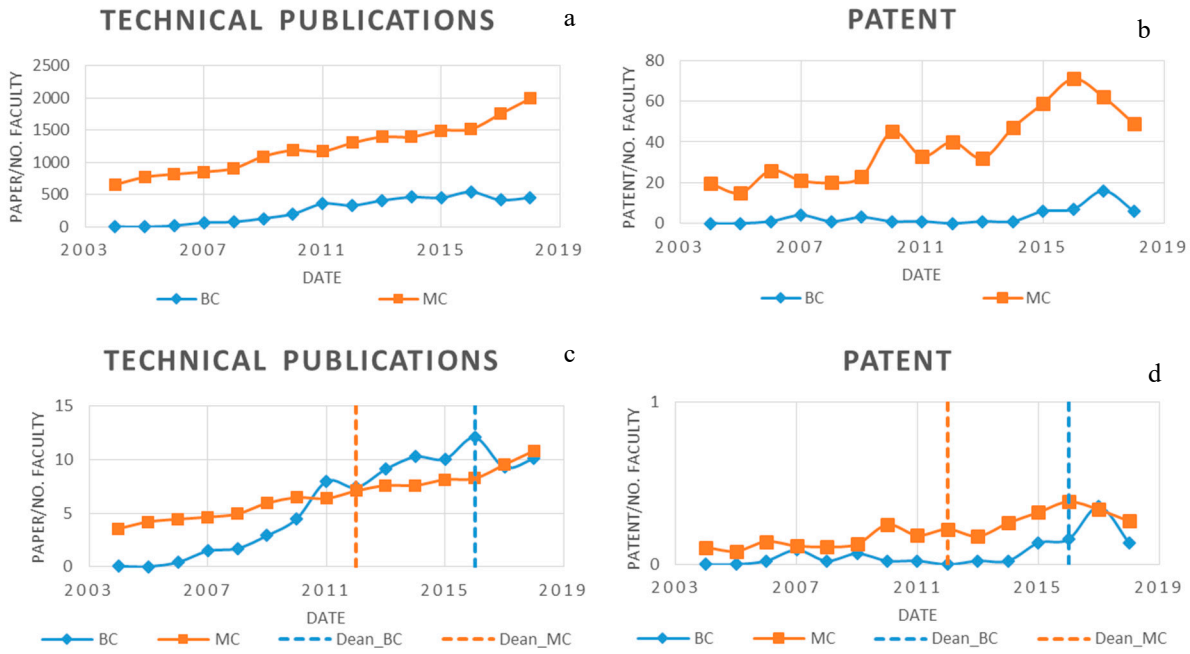


Figure 10. (**a**) Number of technical papers in MC and BC since 2003. (**b**) Number of patents in MC and BC since 2003. (**c**) Number of technical papers published divided by number of faculty. (**d**) Number of produced patents divided by number of faculty.

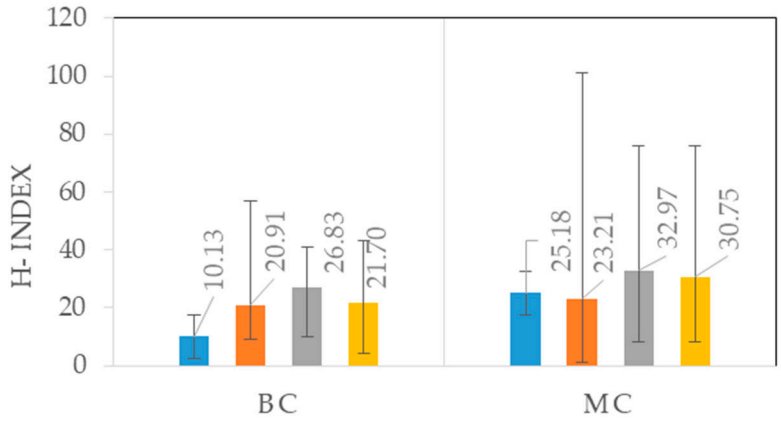


Figure 11. H-index for faculty in BC and MC in which matching colours represent the same departments in different institutes.

5. Discussion

Overall, both leaders exhibited some TL styles, where the BC leaders had higher scores than the MC leaders. However, both schools recorded lower values than the norm for positive traits and leadership outcomes. All TL aspects in addition to CR were positively related to leadership outcomes and an innovation driven system. Among all the aspects, II (A) and IS had the highest correlation values for BC, while IC and CR were the highest for MC.

Connecting the innovation indicator results to MLQ, the calculated values showed that the relationship between the two sets of data contradicted the findings from previous studies. Literature indicates that leaders with higher TL values contribute to having followers with higher satisfaction, productivity, and innovative skills. Moreover, literature claims that female leaders exhibit higher transformational skills and lower transactional skills compared to their male counterparts [76]. Our results indicate that the MC leader was given lower results for her transformational leadership style. Despite this, the followers' innovative outputs in patents and h-index for MC exceeded those

for BC. In addition, MC technical paper production kept increasing, gradually, while BC witnessed a decrease after 2016.

Prior to conducting the interviews, a possible explanation for the MC leader being given lower values for her TL skills could be due to the effect of role congruity theory of prejudice towards female leadership. This theory argues that prejudice towards female leadership can take two forms: Women can be perceived less favorably than men for leadership roles and/or certain leadership behaviors that are perceived as positive when enacted by male leaders can be perceived as negative when enacted by female leaders [77]. Webster and Foschi's [78] expectation theory and Foschi's double standard theory indicate that striker standards are applied to women to indicate high competency, compared to their male's counterparts. At the same time, stronger evidence is required to prove men's incompetency and poor performance [79,80]. As this study was conducted in a male dominated field (nearly 90% of raters were male), potential bias in the raters' evaluation was expected as a result of one (or more) of the above mentioned theories.

BC in Qatar, being an extension of MC, represented an interesting cross-cultural case study. The functioning of the institute in another country, in which the power distance (PD) and uncertainty avoidance (UA) scales were different, affected the behaviour of its employees [81]. In high PD countries, such as Russia, China, and the Arab countries, power is more centralized, and leaders are looked at as individuals with superiority who are to be respected. As more than 60% of BC employees come from nations with high power-distance, the high MLQ assessment scores given to the leader of BC could represent a form of respect from subordinates to their leader.

The innovative output production peak recorded from 2011 to 2016 could be credited to the increasing and continuous levels of financial support from Qatar National Research Funds (QNRF), which is a national agency by QF that was established in 2006 to build a national research infrastructure that facilitates the move toward a knowledge-based economy and creates a regional research hub (http://www.qnrf.org). The National Priority Research Program (NPRP), which is a flagship program under QNRF, awarded around $1 billion between 2006 to 2016. The amount awarded to each institute was not published. However, the literature shows that until 2011, BC was categorized among the top producers in Qatar, accounting for 14% of the overall scientific articles produced [82]. As the journal article production increased by 1.5-fold, we estimated the BC share from QNRF awards to be 20%, which is equivalent to $20 million per year (from 2006 to 2016). This amount is equivalent to half the average awards received by MC Engineering from the National Science Foundation (NSF). As the size of the MC faculty is thirteen times bigger than that of BC, this indicates higher grants per faculty received in BC. Technical paper production witnessed a decline in 2016, which was the same year that a new BC dean took the position. In 2015, QNRF announced a major shift in their funding strategy that affected NPRP and redirected funds from projects selected based on an international peer reviewed process to projects on specific research topics of national interest [82]. This could explain the decline in BC production. In addition, the oil price depression that occurred in 2014 had a negative impact on research funding. While the exact amount was not recorded, the decline in research funds was estimated to be between 20–45% [82]. The patent production and h-index were lower for BC than MC despite the BC leader receiving higher TL scores than the MC leader.

5.1. Qualitative Data (Stage Two)

Fifteen faculty members were interviewed after the quantitative analysis phase, in which nine had experience working at both campuses.

The effect of PD in different contexts emerged once again in the interviews. As a general observation, MC faculty were more comfortable expressing their opinions and talking about their experiences in their institute and in relation to their leader (dean). During the interviews, the Dean of MC was mentioned seven times in different forms, such as by the first and last name, or as "our dean." On the other hand, the dean's name at BC was never mentioned during the interview, and only

two faculty members referred to him as "the dean." This indicated higher levels of comfort, trust, and probably less hierarchical organization in MC and less of the same indications in BC.

5.2. Idealized Influence Behavior and Attribute (II B&A)

Leaders with a high II score have great influence on their associates through trust and confidence. These leaders connect their followers to a vision and aspire them to work beyond their expectations and reach their highest potentials. This attribute represents charismatic leaders who develop high levels of autonomy, achievements, and development among their associates [64,65]. The literature shows that leaders with a high II lead their followers toward greater product and process innovation [83].

Faculty in MC expressed their satisfaction in the high level of autonomy given to them, as in the following statements:

> "A supporting factor here for being creative and innovative is the fact that it is flat structure. We have autonomy level that helps us be more creative, but again, too much freedom means we do everything by ourselves which can occupy a lot of our time."

> "They give the right autonomy level to faculty."

While in BC, even though the quantitative data showed higher (II) results for the BC leader, some indications of less autonomy and more hierarchal power influence were identified from the interviews, as in the following statements:

> "To enhance creativity and innovation, leadership should not direct or judge the process at early stages and ensure faculty and students' autonomy. Give room for experimental trial and error."

5.3. Intellectual Stimulation (IS)

Intellectual stimulation was one of the most evident differences between MC and BC and the lowest among the other traits (2 for BC and 1 for MC out of 4). Intellectual stimulation in TL enhances the generation of non-traditional ideas, stimulates higher level exploratory thinking, and shows appreciation for creative ideas and value these initiatives. As the quantitative data showed that both leaders exhibited low to medium values for IS, interviews identified some of the areas for improvement by finding possible sources for such indications.

Faculty in BC expressed their dissatisfaction in not exceeding the research phase of development, as expressed in the following statements:

> "It is about research and stops at research. No real development beyond that."

> "Innovation should not be a directed process so it can grow. Nor it should be judged at early stages. In addition, faculty and students need a good autonomy level for experimental errors."

5.4. Individualized Consideration (IC)

Leaders with high IC pay attention to their followers' performance, take care of their development, and possess high emotional intelligence [53]. Some of the faculty in BC expressed their concerns that developing innovative skills was not a priority to the college, as in the following statements:

> "Developing innovation for individuals is not the job for this institution. Especially that it can't be accurately measured nor have a direct fame or gain like in other sectors."

> "Leader's role is to empower faculty members and recognize their accomplishments."

> "Innovative thinking should be encouraged more at the undergraduate level."

"Leadership should consider attracting the big names in the field for collaboration to enhance the system and for capacity building."

"Leadership should consider having the right mechanisms for evaluation starting by having competent people when evaluating projects' proposals and allocating the right resources. Weak people should be laid off"

Having the proper culture to cultivate creativity and a high workload for faculty with minimum supportive resources for teaching was addressed by a number of BC faculty, which was another consideration required from the leader:

"Time is not enough for faculty to do innovative work."

"Culture needs to be developed to train students how to commercialize their ideas with better collaboration among faculty and students."

MC is a public university whose social purpose is more evident. IC should be emphasized and practiced more by the leader, especially since correlation results verified that IC has the strongest connection to followers' satisfaction (compared to other traits). In public HEIs, leaders' IC efforts, such as building relationships with staff and spending time coaching and counselling them, appeared to be of higher importance and influence in producing innovative outcomes than in private sectors. Our study's results align with the finding in [83].

MC faculty acknowledged their leader's efforts in cultivating a culture of innovation to enhance the students' learning process. However, they requested more efforts for innovation in research. The literature refers to this behavior as individualistic leadership, which shows clearly in faculty (in the field of science and technology, especially in American colleges) [84]. This type of leadership places a higher value on research compared to teaching and sees competition (through a high accumulation of academic research production) as more rewarding than collaboration [84]. This explains the low satisfaction levels recorded in MC.

MC faculty members were satisfied by their interactions with each other but not with the leader. More time with the leadership was aspired, and more initiatives by the leader were sought to create a direct connection:

"Better and more direct connection from leadership is needed."

"Mentorship for new faculty is needed. They tend not to ask not to appear weak; hence, a lot of time is wasted trying to navigate their ways through. This can be initiated by leadership."

"Leaders need to set clear objectives and facilitate large scale projects, forming teams and put together mechanisms for funding (which are currently very good already)."

Similarly, and in relation to IC, the faculty emphasized the importance of the acknowledgement of projects, which is currently not as vigorous as it should be. The fact that 90% of MC faculty had industrial experience showed a strong connection with the industry that justified this request. It also explained the low satisfaction of faculty with incentives and rewards (Figure 6, Item 4). Faculty dissatisfaction statements included:

"Projects are not valued as publications."

"Projects and community services consume more time and effort, but poorly perceived."

"Special award for projects is needed."

"We need better acknowledgment for faculty who do applied research "development," which is different than the traditional focus of faculty (basic research and published papers) which is the current criteria faculty is being assessed on."

Emphasizing published journals as assessment criteria for faculty could justify the increase of MC's technical paper production in 2016, which was accompanied by a decline in patent production during the same period (Figure 10), even though no reduction was recorded in the NSF awards within the same period (Figure 12).

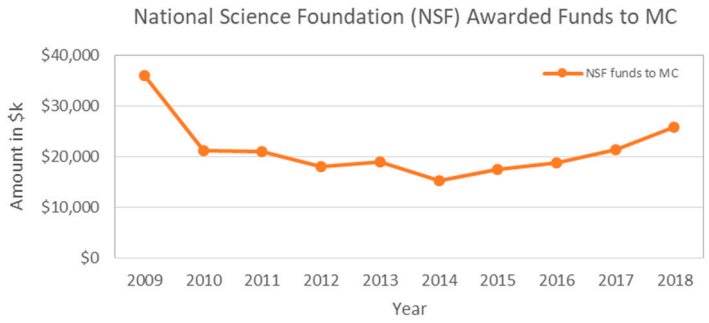


Figure 12. National Science Foundation (NSF) awarded funds to MC Engineering College. (NSF is one of the major federal supporting bodies for science in the U.S.).

6. Conclusions

As most of the studies discussing the relationship between transformational leadership and innovation with empirical data were conducted in firms' R&D departments [85–88], this study was designed to close this gap by focusing specifically on HEIs. Higher education has been criticized for being self-absorbed and conservative, which is why TLs are needed to provide the necessary changes and innovation to respond to external needs and challenges [89]. Especially, the effect of the human dimension in the HE transformation process has been always overlooked [90–93]. This study confirmed that transformational leadership exists in engineering colleges, but to a lower extent that varies in different contexts. As this study focused on engineering colleges, more studies are needed in different HEI departments to gain a better understanding of the existence of TLs in the educational sector, and their impact on different forms of innovation.

Further studies on the influence of PD on TL reporting and effectiveness is suggested for future research. A Low response rate was a major challenge in conducting this study, as some faculty stated they had not received the survey or that it might have been accidentally deleted (or classified as junk-mail), which limited the number of participants. Another major challenge was the sensitivity of the topic. The researchers received a number of comments from the faculty regarding their hesitation to take the survey. Others refused to take the survey, as it required assessing their dean, which could be another reason for the low response rate. As the leadership style assessment in this study was limited to faculty (lower-level-raters), other types of raters, like higher level raters (i.e., the provost or director), and/or self-rating (deans rating themselves) could be considered for future studies to compare different perspectives and to increase response rates.

Even though all positive leadership traits correlated positively with followers' satisfaction of leaders and systems, II (A) and IS showed a stronger correlation in the IBC context, while IC and CR showed a stronger correlation in the context of a public university in the US. The explanatory sequential mixed method analysis for similar studies was important to explain relationships between variables, which has been a limitation of previous studies investigating TL impact on followers' behaviors [14]. Interviews with MC faculty, for instance, explained one of the major dissatisfaction resources which was the importance of considering different types of innovation (not limited to published articles) for rewards and acknowledgment. This input confirmed the results obtained for IC's strong correlation with MC's faculty member satisfaction. As this study focused on what traits promote innovation and was limited to output innovation, future studies should focus on what hinders innovation and forms obstacles toward achieving higher innovative outcomes for different types of innovation (e.g., Table 1).

The case of BC as an IBC in Qatar was an interesting situation in which the college achieved commendable research production by taking advantage of the plentiful resources and limited competition for national research funds. This situational factor could override the effect of leadership style when access to resources was available. TL helped organizations improve effectiveness, especially when meeting new challenges such as reorganization, strategic redirection, or downsizing [51]. Experiencing economic changes, such as budget cuts, that affected research expenditures were the best opportunities for TLs to show their effectiveness [94,95]. TLs are individuals capable of bringing real change that is measurable, quantifiable, purposeful, and has moral value [96]. Situations, such as reduced budgets, require risk taking, bold moves, and the encouragement of innovative work behaviors, to maintain stable academic production. The period of budget reallocation (beyond 2015) represented the right time for the transformational leadership style to shine. As four years have passed, BC is expected to overcome funding challenges, or the hierarchal system will override the effectiveness of their TLs.

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