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Developing a Mathematical Model of Entrepreneurship Based on Transformational Leadership Behavior

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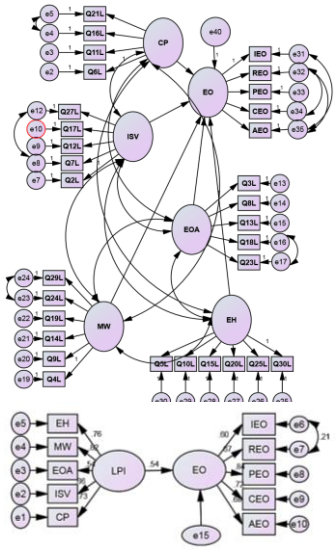

Abstract

This study aimed to reduce the university-industry gap from the perspective of leadership and entrepreneurship. The focus of this research is to assess the influence of transformational leadership of manager on academic staff's entrepreneurial orientation and to pave the way for identifying potential opportunities, generating new ideas in industrial relation, and to subsequently narrow the university-industry problem. In order to understand the contribution of leadership within the university–industry context, this research reviewed the effect of transformational leadership style on entrepreneurial orientation and then examined the existing relationship. The population of this study is the academic staff of a public university in Iran. A research sample of 295 academic staff was chosen by using stratified sampling technique. Technical analysis of data applied Structural Equation Modeling in two step: measurement model for testing the construct validity of questionnaires and structural model for hypothesizes testing with mathematical program. The results showed that transformational leadership was the best predictor for entrepreneurial orientation. The research findings in this study revealed that the quality of transformational leadership within an organization had an effect on the entrepreneurial orientation. One of the managerial implications of this study is to reinforce the recognition and basis of enhancing entrepreneurial orientation by transformational leadership.

Keywords: University-industry gap; transformational leadership; Entrepreneurial University

1.0 INTRODUCTION

The viewpoint of the university as a quintessential contributor to wealth creation and economic growth has expanded in recent decades [1]. Debackere [2] asserted that academic research has become "integrated into the economic cycle of innovation and development". In the knowledge based economy thinking, the university performs as both "a human capital (HC) provider and a seeding bed for new firms" and innovation [3]. Accordingly, "entrepreneurial university" subject is on the agenda of the governments through policies planned to foster and sustain university-industry communication [4]. Simply viewed, the country that can realize most effective inter-linkage among the three players of university-industry-government can accomplish faster shift of discoveries from the laboratory to the market. Therefore, the rapidity of knowledge creation and its transferring for utilization offer competitive advantage for industry [5].

From another perspective, higher education, based on UNESCO, has three roles: knowledge creation (research); knowledge transfer (education); and knowledge distribution (service). The educational system of Iran is almost conveying (transferring) knowledge while the two other roles have not been paid enough attention. Therefore, this system does not have the benefit of improving the lacks of demands from industry. Through buying technical information from developed countries, the requirements of the state-run sector are met. In such a situation, R&D is not needed because the knowledge resources overseas are able to fulfil all necessities [6].

In developing countries a gap exists between university and industry. While, in developed countries university is in the process of deserting their ivory towers and establishing strong connections with industry, through sponsored and supported research and continuing education. Indeed, in developing countries from the other point of view, the foreign education systems joined with the very big inertia inherent in any education system, has reduced these

systems to a state of quasi-static lethargy [7]. Despite the growth of industry, the universities have remained limited in their ivory towers with little or no attempt made to bridge the continuously increasing university-industry gap. Iran is not an exception. Viewed simply, Iran is suffering from the existing wide gap and looking for treating this gap syndrome [8].

This paper introduces the university-industry gap syndrome and advises means by which the gap can be reduced. Since research plays a key role in eliminating university-industry ties, the role of leadership as a tie between universities and industry is also discussed. Further, literature shows that a limited number of researches focus more in-depth on lack of university-industry collaboration and effect of leadership on entrepreneurship in R&D and research centers. There is a call for developing a model to bridge the gap that leading to managing academic staff to carry out cooperating with industry by university.

■2.0 BACKGROUND AND LITERATURE OF THE STUDY

Today, with the increased speed of information and telecommunication technology, many changes have occurred in society but, higher education system does not have the capacity to meet current needs. Academic system faces financial, educational, managerial problem [9-10]. It encounters many challenges, crises and decreasing of quality, and needs modify and transformation [11].

There are strong relationship among economic development and the spread of higher education and the societal returns on higher education, comprising the spread of knowledge and culture but, ineffectual management and strategies in higher education can also hinder development [12]. Therefore, much of these problems can be traced back to ineffective management, increased enrolments, a shortage of technology, antiquated instructional methods largely [13-14]. There is call for investigation of leadership in academic organization.

2.1 Transformational Leadership

Leadership refers to the process of how to influence people and guide them to achieve organizational goals [15-16]. Effective leaders are important because they are one of the factors determining the success or failure of a group, organization or even a whole country [17]. Indeed, relationships between leaders and followers can make them motivated to work well to achieve outcome or objective [18].

The position of the academic leaders in higher education is one that requires leadership, administrative skills, and scholarship [10,19] Transformational leadership behaviors represent the most effective leadership style and principal contributors for the realization of outcomes in colleges and universities because transformational leadership is characterized as the formal collegial model of leadership to higher educational institutions [20-21]. The management literature offers Kouzes and Posner's transformational leadership model for coping with challenges encountering to academic leaders. Kouzes and Posner [22] developed a transformational leadership model for effective leader. They believed that transformational leaders inspire subordinates to perform better by encouraging their employees through recognition and celebration.

Iranian universities values in leadership are thus similar to the characteristics of transformational leadership in other countries. The Iranian view of a visionary managers (or leaders) is a person who has a mental plan, shares a new model, has a global attitude, is excited about and devoted to his/her vision, and is a trustworthy communicator [23]. In this regard, universities need to be accoutered by transformational leadership characteristics instead of bureaucratic management [24].

2.2 Entrepreneurial Orientation (EO)

As universities and academic center become an increasingly important element of the national innovation system, there is call for universities to transfer from their traditional model to the 'entrepreneurial' model due to the following reasons: 1) in most of traditional ones administrators are regularly government appointees, tasked to carry out government policies. 2) These universities tend to have been tasked by their governments to concentrate strongly on their human resource development role by the integration of foreign technologies and knowledge. 3) Local industries often have less experience, and lower ability to commercialize knowledge generated from local universities [25-26].

Entrepreneurial university, as the new generation of universities, plays important role in the knowledge economy. The entrepreneurial thinking provides universities with a roadmap for tackling increasing difficulty and complexity, persuading them to embrace change and innovativeness, take risks and assumes responsibility for planning and implementing development strategies vital for success in the ever changing competitive environment [27].

The results of some researches revealed that the EO of the academic staff affects the process of change and also they have a key role to reach the entrepreneurial university [28-33].

2.3 Relationship between Transformational Leadership and Entrepreneurship

There are several arguments for proposing a relationship between transformational leadership and entrepreneurial orientation. Understanding leadership styles and entrepreneurship linkage is important to creating added value and leading to entrepreneurial orientation [34-37]. Literature showed evidence of research involving transformational leadership and entrepreneurship [38-39]. Alsalami [40] confirmed a positive and directly relationship between transformational leadership and innovation as one of the primary characteristics of entrepreneurs. Previous studies have concluded that there are many similarities between the characters of transformational leadership style and characters of successful entrepreneurs [39-41].

Based on the preceding literature, the following can be hypothesized:

H_1: Transformational leadership behavior (challenging the process, inspiring a shared vision, enabling others to act, modelling the way, and encouraging the heart) of academic leaders significantly influences academic staff entrepreneurial orientation.

- H_{1a}: Challenging the process behavior of academic leaders significantly influences academic staff entrepreneurial orientation.
- H_{1b}: Inspiring a share vision behavior of academic leaders significantly influences academic staff entrepreneurial orientation.
- H_{1c}: Enabling others to act behaviour of academic leaders significantly influences academic staff entrepreneurial orientation.
- H_{1d}: Modelling the way behaviour of academic leaders significantly influences academic staff entrepreneurial orientation.
- H_{1e}: Encouraging the heart behaviour of academic leaders significantly influences academic staff entrepreneurial orientation.

3.0 METHOD AND MATERIAL

The aims will be addressed, in this study, is to present a model based on the relationship between transformational leadership behaviours (Kouzes and Posner model) and academic staff entrepreneurial orientation, in Iranian public universities by proposing a model using SEM. This quantitative study tried to test a theory through measurement. It also aimed to predict effects, outcomes and any significant relationships as well as present a model. The population of this study is the academic staff of public university in Iran. Research sample is 295 academic staff chosen by using stratified sampling technique. The applied instrument for this study was comprised of two parts: transformational leadership questionnaire (LPI) and entrepreneurial orientation questionnaire. To be more illustrative transformational leadership questionnaire (LPI) is included five construct (challenging the process (CP), inspiring a shared vision (ISV), enabling others to act (EOA), modelling the way (MW) and encouraging the heart (EH)) based on Kouzes and Posner theory [22] to evaluate transformational leadership behaviour of academic leaders from the viewpoint of academic staff that explain as follow:

'Challenging the processes' means that transformational leaders would search new opportunities in order to transform the current status. 'Inspiring a shared vision' refers to transformational leaders that they have an extensive thinking paradigm and the ability to imagine the future. 'Enabling the others to act' implies that transformational leaders support others in their planning and help to improve their skills and abilities. 'Modelling the way' represents that transformational leaders act clearly about the values and beliefs, and 'Encouraging the hearts' indicates that transformational leaders would encourage the human workforce to have efforts.

Entrepreneurial orientation questionnaire (EO) is involve five construct (innovativeness (IEO), risk-taking (REO), proactiveness (PEO), competitive aggressiveness(CEO), and autonomy(AEO)) based on Dess and Lumpkin theory [43] to assess level of entrepreneurial orientation of academic staff.

3.1 Method of Analysis

Technical analysis of data applied SEM (Structural Equation Modeling) in two step: measurement model for testing the construct validity of questionnaires and structural model for hypothesizes testing with mathematical program AMOS (Analysis of Moment Structure) Version 21. After collecting data the validity and reliability of each questionnaire was tested by explanatory factor analysis (EFA) and confirmatory factor analysis (CFA). Moreover, the measurement model of the study was tested and structural model run to test hypothesizes in two models. In the first model (integrated model), relationship between constructs of LPI and EO was investigated to answer the H_{1a}, H_{1b}, H_{1c}, H_{1d} and H_{1e} and in the second model relationship between LPI and EO was examined to answer the H1 as overall model. Findings of this analysis are explained in the following section.

3.1.1 Integrated Model

Figure 1 shows the measurement model of integrated model which includes six latent constructs such as CP, ISV, EOA, MW, EH, and EO. The first five constructs (CP, ISV, EOA, MW, EH) are shown through their respective items. However, EO is identified through the IEO, REO, PEO, CEO, and AEO which computed through the average of the corresponding items. For example, Q1E, Q4E, Q6E, Q9E, and Q12E are indicators of IEO. Therefore, parcelled items are shown to measure constructs variables such EO into SEM. Parcelling is referred to as a procedure for computing sums or average scores across multiple items [44-45]. In this research, items parceling used for increasing reliability, decreasing complexity and obtaining better model fit [46].

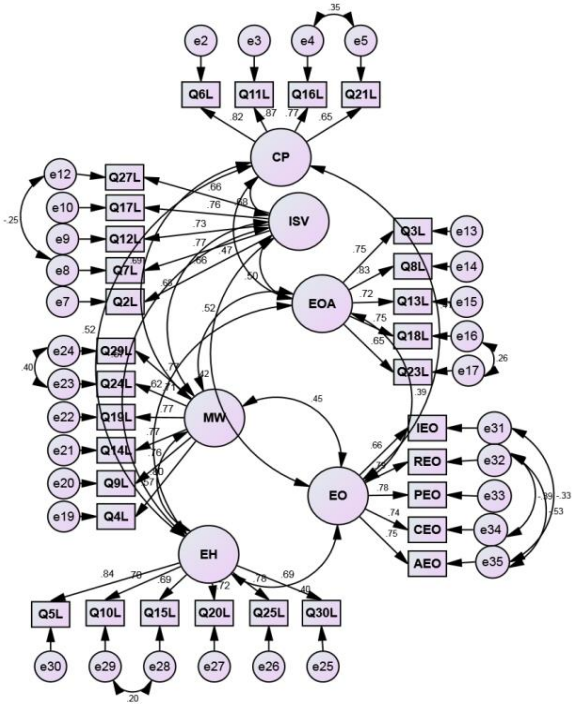

Figure 1 Measurement model (integrated model)

a) Measurement Model

For evaluate the measurement model of Integrated model, construct validity determined by Average Variance Extracted (AVE) and factor loading greater than .5, construct reliability (CR) is estimated greater than .6 and results for model fit is presented in Table 1 to propose a good model fit .They indicated that comparative fit index (CFI) and Tucker -Lewis index (TL) are 0.970, 0.966 respectively values greater than .90 indicate a good model fit. Root mean square error (RMSEA=.035) values less than .08 indicate good fit (Byrne, 2010). The model, as initially proposed fitted the data well. The goodness-of-fit index (GFI=.920), adjusted goodness-of-fit index (AGFI=.904), were all acceptable. The root mean square residual (RMR) was also acceptable at .036. RMSEA was adequate since it was between .030 and .040. Nevertheless all the indicator variables loaded highly and significantly onto their respective factors. In addition, all the constructs were positively and significantly correlated with each other.

Table 1 CFA of integrated model

Criteria	Chi-square	Degrees of freedom	GFI	RMSEA	RMR	Normed Chi-Square	NFI	NNFI (TLI)	CFI	AGFI
Final Results	655.857	411	0.920	0.035	0.035	1.59	.924	0.966	0.970	0.904
Cutoff			0.9	Less than 0.08	Close to zero	<5	0.9	0.9	0.9	0.9

b) Testing of Proposed Structural Model

Structural model depictives the relationships (paths) among the constructs themselves [47].The hypothesized model evaluated using the expected direction and magnitude of standardized direct effect [48].

The component of the structural model represents the hypothesis of the research in Table 2. A structural model was developed and tested in which the 5 direct path from the exogenous constructs such as CP, ISV, EOA, MW, EH, and EO as endogenous construct. Once the measurement model yields acceptable fit, a structural model is built to specify the relationships between latent variables based on the research hypotheses, has showed in the Figure 2. In the structural model (Figure 2) where the relationships between transformational leadership constructs and entrepreneurial orientation were specified, Figure 2 displays the result of testing of proposed structural model.

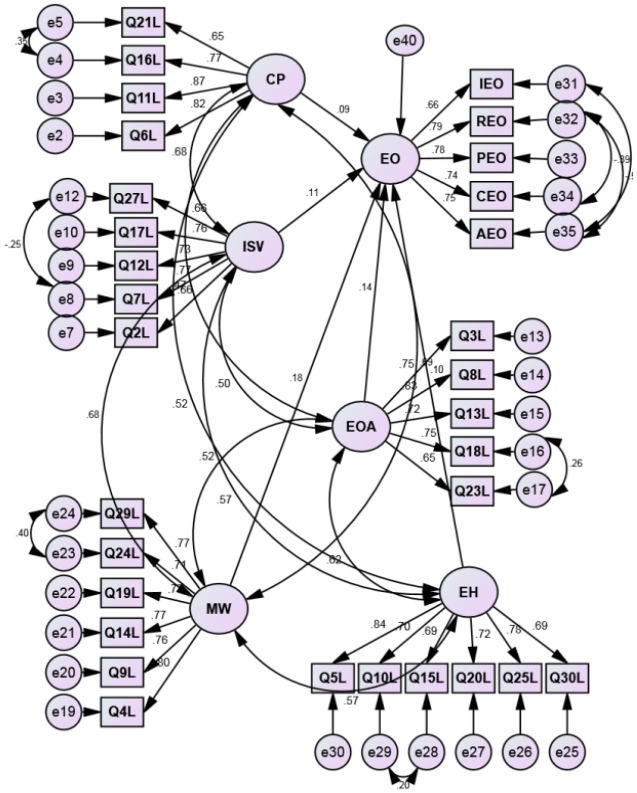

Figure 2 Structural model (integrated model)

Table 2 shows the ML (maximum likelihood) estimates of hypothesized paths. H_{1a} that is mentioned relationship between CP and EO (Beta = 0.058, p = .205) and H_{1b} that is explained relationship between ISV and EO (Beta = 0.089, p = 0.143) were not supported. These two path coefficient were positive and not statistically significant. H_{1c} (Beta = 0.099, p = .033) and H_{1d} (Beta = 0.116, p = .021) were supported. These two path coefficient that are included relationship of EOA and MW with EO (H_{1c} and H_{1d} respectively) were positive and they were statistically significant. The last relationship is about connected EH with EO (H_{1e}) that was not supported (Beta = 0.074, p = .137). The path coefficient was positive and it was not statistically significant.

Table 2 The coefficients of regression analysis

H	Relationships	Beta	P	Results
H1a	CP-EO	0.058	0.205	Not Supported
H1b	ISV-EO	0.089	0.143	Not Supported
H1c	EOA-EO	0.099	0.033	Supported
H1d	MW-EO	0.116	0.021	Supported
H1e	EH-EO	0.074	0.137	Not Supported

The results of structural model were employed to show which of the two constructs of transformational leadership (EOA and MW) can be regarded as the significant predictors of entrepreneurial orientation of academic staff.

3.1.2 Overall Model

Figure 3 shows the measurement model of overall model which includes two latent constructs such as LPI, and EO. As can be seen in the Figure 3, LPI is recognize by CP, ISV, EOA, MW, and EH that computed within the mean of comparable items, such as Q5L, Q10L, Q15L, Q20L, Q25L, and Q30L are items of EH. Similar to LPI, indicators of EO were parcelled in five observed variables including IEO, REO, PEO, CEO, and AEO which computed through the average of the corresponding items. Therefore, parceled items are shown to measure constructs variables LPI and EO.

For evaluate the measurement model of overall model, construct validity determined by Average Variance Extracted (AVE) and factor loading greater than .5, construct reliability (CR) is estimated greater than .6. CFA results for overall model are presented in Table 3 to propose a good model fit .They indicated that all the criteria were acceptable.

Table 3 CFA of overall model

Criteria	Chi-square	Degrees of freedom	GFI	RMR	Normed Chi-Square	NFI	NNFI (TLI)	CFI	AGFI
Final Results	162.113	33	0.937	0.033	4.93	0.920	0.912	0.935	0.940
Cut off				Close to zero	<5	0.9	0.9	0.9	0.9

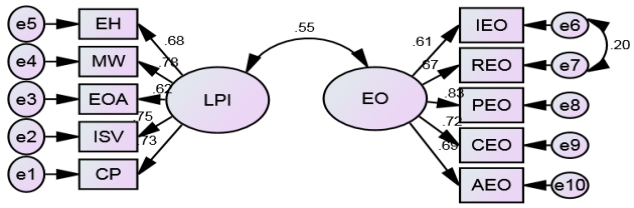

Figure 3 Measurement model (overall model)

A structural model was developed and tested in which the direct path from the exogenous constructs such as LPI to EO as endogenous constructs. Figure 4 displays the result of testing of proposed structural model.

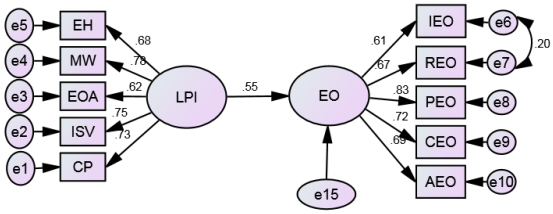

Figure 4 Structural model (overall model)

The component of the structural model represents the hypothesis of the research as mentioned in Table 4. Table 4 shows the maximum likelihood estimates of hypothesized paths. H1 was supported (Beta = 0.413, p = Sig). The path coefficient was positive and was statistically significant.

Table 4 Testing hypotheses of overall model

Hypothesis	Relationship	Beta	P	Results
H1	LPI- EO	0.413	Sig.	Supported

■3.0 RESULTS AND DISCUSSION

This study examined the effects of transformational leadership dimensions in academic leader such as challenging the processes, inspiring a shared vision, enabling others to act, modelling the way and encouraging the hearts.

Empirical results via SEM revealed that the standardized beta coefficient for H_{1a}, challenging the process does not significantly influence entrepreneurial orientation. Therefore, finding does not conform to the empirical data. Entrepreneurial orientation is insignificantly determined by challenging the process features such as seek for new opportunities in order to transform the current status.

A closer examination discovered that academic leaders put less emphasis on aspect such as inspiring a share vision, as these were found to insignificantly impact on entrepreneurial orientation, thus invalidating H_{1b}. This finding implies that EO is insignificantly indicated by inspiring a share vision characteristic like an extensive thinking paradigm and the ability to imagine the future.

Furthermore, the results indicated that entrepreneurial orientation is influenced by enabling other to act, hence supporting H_{1c}. This result is comparable to previous study. Entrepreneurial orientation with enabling other to act is developed because the academic leaders support others in their planning and help to improve their skills and abilities.

Modelling the way according to the standardized beta coefficient for H_{1d} significantly impacts entrepreneurial orientation and was found as predictor for EO like enabling other to act. It connotes that EO with modelling the way has increased. In other words, they act clearly about the values and beliefs. Similar significant results were obtained in preceding study.

Additionally, this quantitative research finding demonstrates that encourage the hearts does not significantly affect entrepreneurial orientation similar to challenging the process and inspiring a share vision. Therefore, H1e does not conform to the empirical data. Entrepreneurial orientation is insignificantly influenced by encourage the hearts features such as encourage the human workforce to have efforts. This result contradicts the research findings of previous studies.

The last finding of this research hypothesized the overall relationship between transformational leadership of academic leaders and entrepreneurial orientation of academic staff (H1). The result showed that transformational leadership is significant predictor for EO. This finding is an agreement with Matzler *et al*. [39], Rothaermel *et al*. [49], Eyal and Kark [37] and Yadollahi *et al*. [50] that asserted the transformational leadership potentially improves the level of EO.

■4.0 CONCLUSION AND RECOMMENDATION

This research exposes intriguing and prominent implications for research and practice as transformational leadership characteristics continue to be important research issues. With regard to academic application, the findings of this study bring significant importance to academic transformation to improve its transformational leadership and entrepreneurial orientation efficiently by considering different knowledge-industry strategies, depending on the demand of target industry.

Importantly, this study approved that the two constructs of transformational leadership, 'enabling other to act' and 'modelling the way', are critical factors that influences entrepreneurship orientation (or spirit) regarding the demand of society and industry.

Regarding the first significant predictor of EO, enabling other to act, academic leaders should seek and grab opportunities to detect weak point of industry and consequently performance consulting. The leaders also should enable academic staff to involve their new ideas. Leaders should adopt an approach that makes staff consider failures and errors blessings in disguise and significant learning opportunities. Viewed simply, welcoming

mistake and failure by expanding the culture of experimentation should be generalized in university and industry. It is noticeable to be advised to academic leaders that they should develop cooperative relationships among the subordinates since close corporation leads to knowledge sharing and consequently new idea-creation. One more significant managerial implication of this study is empowering staff to make decisions in operational process and administration method and supporting the decisions that academic staff make on their own in university by transformational leaders.

According to findings of the study transformational leaders should spend time and energy on making certain that the employer works with adhere to the planned strategy (like entrepreneurship). Transformational leaders must act clearly about the values and beliefs. Moreover, they should provide the behavioural expectations by modelling themselves and also pave for appropriate opportunities to obtain continuous accomplishments by dividing the plans into smaller components. These features indicate 'modelling the way' as another construct of LPI which was as a second predictor of EO. For this study, 'modelling the Way', or showing team workers how to do their tasks to the leader's expected norms and standards, is key to effective subordinates performance. Since the key performance indices (KPIs) in entrepreneurial universities are functions of entrepreneurship, modelling the way is established on entrepreneurship characteristics, undoubtedly.

Theoretically speaking, the findings of the study has showed the direction to indicate the characteristics of academic leaders that lead to create the new opportunity for academic staff and encourage them to progress forward entrepreneurial orientation. Practically speaking, transformational thinking in leadership provides a mutual liaison within universities and industries that leads to provide an excellent opportunity for them to acquire some mutual first-hand industrial experience and consequently, encourage cooperation among universities and industries via joint projects or consulting opportunities.

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