

## **The impact of the entrepreneurial leadership attribute of innovation on the level of faculty research output in Saudi Higher Education**

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**الكلمات المفتاحية: قيادة تنظيم المشاريع، ريادة الأعمال، السمات، السلوك المبتكر الموظف، دراسة كمية.**

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### **Abstract:**

The objective of this study is to empirically investigate impact of the entrepreneurial attribute innovation on the level of faculty research output in Higher Education, Saudi Arabia. The study adheres to the quantitative paradigm and follows a typical survey research design. The study in this fashion complements the extant educational leadership literature by documenting empirical evidence extent to which entrepreneurial leadership attributes are present in Saudi higher education system. In particular, the study employs a two-stage model approach where a preliminary model is estimated to document the impact of entrepreneurial leadership on faculty innovative behavior followed by a study model that uncovers the impact of faculty innovative behavior on the level of research output. The study collects data at 1020 faculty respondents at three major Saudi universities based on the validated item pool scale measurement of innovation advanced in Lukes and Stephans (2017). The

results of the study support that the innovation attribute of entrepreneurial leadership is evident of Saudi faculty responses. The results are strongly consistent with the maintained hypothesis that entrepreneurial leadership which has a positive impact on individual innovative behavior owing to the innovation orientation of entrepreneurial leadership style. The study further strongly supports the theoretic prediction underlying the relationship between innovative behavior and performance by showing that faculty members who exhibit innovative behavior tend to perform much better and produce on average greater than three more papers relative to their counterparts who don't exhibit innovative behavior on the individual level. Throughout, the study has a socio-cultural relevance to Saudi Arabia with respect to the 2030 vision of the kingdom that stresses innovation, valuable leadership, and competitive higher education.

أثر ريادة الاعمال في الابتكار على مستوى مخرجات أبحاث أعضاء هيئة التدريس  
في التعليم العالي السعودي  
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#### الملخص:

الهدف من هذه الدراسة هو التحقيق التجريبي في تأثير ابتكار سمة ريادة الأعمال على مستوى مخرجات أبحاث أعضاء هيئة التدريس في التعليم العالي بالمملكة العربية السعودية. تلتزم الدراسة بالنموذج الكمي ويتبع تصميم أبحاث مسح نموذجي. تدرك الدراسة في هذه الطريقة أدب القيادة التعليمية الموجودة من خلال توثيق التجريبية دليل المدى الذي توجد به سمات قيادة الريادة في نظام التعليم العالي السعودي. على وجه الخصوص، توظف الدراسة نهجا نموذجي من مرحلتين حيث يقدر نموذجا أوليا بالوثيقة تأثير القيادة الريادية على السلوك الابتكاري لأعضاء هيئة التدريس متبوعاً بنموذج دراسة يكشف تأثير السلوك الابتكاري لأعضاء هيئة التدريس على مستوى مخرجات البحث. تقوم الدراسة بجمع البيانات في 1020 أعضاء هيئة التدريس في ثلاث جامعات سعودية رئيسية تستند إلى قياس مقياس المستحضر البند المسالك للابتكار المتقدمة في Lukes و Stephans (2017). تدعم نتائج الدراسة أن سمة الابتكار للقيادة الريادية واضحة في استجابات أعضاء هيئة التدريس السعوديين. تتوافق النتائج بقوة مع الفرضية التي تحتفظ بها أن قيادة تنظيم المشاريع لها تأثير إيجابي على السلوك الأفراد المبتكر بسبب توجه الابتكار لأسلوب

قيادة ريادة الأعمال. كما تدعم الدراسة بقوة التنبؤ النظري الكامن وراء العلاقة بين السلوك الابتكاري والأداء من خلال إظهار أن أعضاء هيئة التدريس الذين يظهرون سلوكًا مبتكرًا تميل إلى أداء أفضل بكثير وتنتج في المتوسط أكبر من ثلاثة أوراق أخرى نسبة إلى نظرائهم الذين لا يحملون سلوكًا مبتكرًا على المستوى الفردي. طوال فترة الدراسة، الدراسة لها صلة اجتماعية وثقافية بالمملكة العربية السعودية فيما يتعلق برؤية المملكة 2030 التي تؤكد على الابتكار والقيادة القيمة والتعليم العالي التنافسي.

### **Introduction:**

Entrepreneurial leadership is a modern leadership school of thought that can be distinguished by leaders exhibiting typical entrepreneurial traits (Bagheri et al., 2020). Fontana A. and Musa S. (2017), describes entrepreneurial leadership as a contemporary approach to leadership where typical leadership and entrepreneurship traits are synthesized. Though entrepreneurship is associated with a multitude of personal traits including optimism, openness, proactivity, discipline, risk taking, continuous learning and the success of entrepreneurs depends on transmitting those traits across all levels of the organization (Bagheri, 2017). Perhaps the common theme underlying the array of entrepreneurial traits, however, is the unrelenting focus on innovative ideas and the passion to have such ideas both created and executed for purposes of attaining, harnessing, and exploiting pioneering opportunities (Renko et al., 2015). It thus follows that; entrepreneurial leadership can be viewed as a leadership style that is mainly characterized by driving followers toward passionately creating and achieving innovation (Cardon et al., 2009; X.A. Harrison et al., 2018). Indeed, this characterization of entrepreneurial leadership is fully specificized in terms of the exogenous variable of innovation channeled through by passion. Toward this end, Renko et al. (2015) show that entrepreneurial leaders tend to stimulate the creativity and innovation of followers through passion. Since innovation exhibited by faculty members in higher education is often considered a great indicator of performance and development levels, documenting whether the

innovation attribute of entrepreneurial leadership is evident in Saudi faculty may justify this study. This is particularly so given the concurrent 2030 vision of the kingdom where accentuated emphasis is placed on innovative problem solving, meaningful leadership, and contemporary education. In this respect, the objective of this study is to empirically investigate impact of the entrepreneurial attribute innovation on the level of faculty research output in Saudi Arabia. The study adheres to the quantitative paradigm and follows a typical survey research design. The study in this fashion complements the extant educational leadership literature by documenting empirical evidence as to the extent to which entrepreneurial leadership attributes are present in Saudi Higher Education. In order to satisfy the objective of this study, a two-stage model approach instructs estimating a preliminary model followed by a study model. The preliminary model regresses a measure of faculty innovative behavior on a measure of the extent to which entrepreneurial leadership is present. The purpose of estimating this model is to document the impact of entrepreneurial leadership on employee innovative behavior. In the light of the estimated preliminary model, the study model is estimated whereby a measure of innovative faculty behavior is regressed on a measure of faculty research performance output. The explanatory power of the two models is assessed along with the conceptual and statistical significance associated with the respective impacts of the exogenous variables. The study collects data at 1020 faculty respondents at three major Saudi universities based on the validated item pool scale measurement of innovation advanced in Lukes and Stephans (2017). Toward this end, the rest of the study is presented according to a typical quantitative study in terms of literature review, empirical study, and concluding remarks.

In view of the preceding, this introduction concludes by advancing the following two research questions:

RQ1- What is the impact of the entrepreneurial leadership trait of innovation on the level of faculty innovative behavior in Saudi Arabia?

RQ2- What is the impact of faculty innovative behavior on the level of faculty research performance in Saudi Arabia?

### **Literature Review:**

Most contemporary characterization of the term ‘leadership’ center on the notion of the influential leader and the related extent to which the followers of that leader tend to respond and behave (Tu and Lu, 2016). The leadership-follower characterization of influence and response can be typically observed in modern higher education systems, and so may be useful when understanding the forces governing the performance and development levels of faculty members (E. Allison-Napolitano, 2013). Bundy et. al. (2015) document that, the effectiveness of leadership is a function of efficient analysis of decision-useful data while inculcating a behavioral impact on followers and deploying organizational resources innovatively. Hadley et. al. (2018) contend that effective leaders must be able to deal with the unexpected and the unorthodox in an effective, innovative, and value-added fashion. In fact, the leader-follower and innovation orientations of leadership pave the way for leadership styles that stress innovation. Here, entrepreneurial leadership is indeed a leadership school of thought that is particularly distinguished by its focus on innovation (Bagheri et. al. (2020)). Moreover, the evidence that compiles the impact of entrepreneurial leadership on performance is compelling. For instance, Amabile et al. (2004) hold that leadership support, which is a trait associated with entrepreneurial leadership is expected to augment the creativity levels of followers. Hunter et al. (2007) keep that entrepreneurship, within a human resource management perspective, defines a natural climate for employee creativity. Lau et al. (2012) assess the level of corporate entrepreneurial leadership in terms of the extent to which employees tend to successfully come up with creative solutions that contribute toward the satisfaction of the strategic goals of their organizations. Davidsson (2015) explains that entrepreneurial opportunities and the style of leadership that they entail is a factor behind propelling the creativity and

problem solving of modern societies. Carmeli et al. (2010) establish that entrepreneurial leadership is a pivot for creative problem solving. Breugst et al. (2012) relate the passion of entrepreneurial leaders to the passionate commitment of followers to think out of the box and try to reach for creative solutions that may have seemed otherwise unlikely. Koryak et al. (2015) show that entrepreneurial leadership tends to enable individual capabilities and ultimately firm growth. Engelen et al. (2015) link evident entrepreneurial leadership to bottom-line key performance indicators of organizational performance via the mitigating influences of the transformational leadership attributes of idealized charisma, inspirational motivation, intellectual stimulation, and individualized consideration. Yang et al. (2017) associate entrepreneurial leadership with creativity through the beliefs of self-efficacy. Cai et al. (2019) contend that entrepreneurial leadership fosters employee-level creativity. Mehmood et al. (2020) link creative employees to entrepreneurial leaders. Miao et al. (2019) show that entrepreneurial leadership has a positive impact on management performance. Ribeiro et al. (2020) link both authentic leadership and entrepreneurial leadership to the creativity of followers. In view of the preceding review of the recent literature, one may set the tone for the notion that though the attribute of entrepreneurial creativity is greatly documented empirically, the empirical literature on the entrepreneurial attribute of innovation is rather scant. This is so with perhaps the exception of Huang et al. (2014), Bagheri (2017), and Liu et al. (2019) who show that innovation is prevalent in entrepreneurial climates. In particular, Huang et al. (2014) study the impact of entrepreneurial leadership on micro performance levels of employees via the mediating influences of explorative innovation and exploitive environmental dynamism. Toward this end, accentuating that innovation and innovative behavior are not typically discussed in conjunction with entrepreneurship, Park et al. (2014) distinguish entrepreneurship altogether from a related term referred to as intrapreneurship. They explain that as opposed to entrepreneurship, which is

ultimately concerned with the wealth creation and maximization for entrepreneurs, intrapreneurship is rather concerned with the introduction of innovation and breakthrough ideas via leveraging the relationships among organizational resources (Park et al., 2014). The term intrapreneurship, however, is still not very well structured in the extant literature. Furthermore, given that as opposed to creativity, innovation incorporates the dimension of idea execution and not just idea generation (Dorenbosh et al., 2005; Lukes and Stephans, 2017), this study is defined to fill this gap in the literature by investigating the impact of the entrepreneurial attribute innovation on the level of faculty research output in Saudi Arabia. The study, in this fashion, has a socio-cultural relevance to Saudi Arabia with respect to the 2030 vision of the kingdom in terms of stressing the attribute of innovation, the potential for entrepreneurial leadership, and the quality governing the delivery of higher education solutions.

### **Empirical Study**

The study adheres to the traditional scientific paradigm and applies a strict quantitative analysis with the objective of explaining the endogenous variable of faculty research performance in terms of faculty innovative behavior. Throughout, the exogenous variable of faculty innovative behavior is conceptualized and verified within a theoretical framework of entrepreneurial leadership where the innovation attribute of entrepreneurial leadership is hypothesized to drive faculty innovative behavior in Saudi Arabia.

The empirical analysis in this study thus [1] evaluates a preliminary model of faculty innovative behavior and a study model of faculty research output, and [2] reports respective explanatory powers and parameter estimates.

### **Data Collection and Participants**

The dataset for this study consists of the faculty members at three major universities covering the three main regions of Saudi Arabia: Imam Mohammad Ibn Saud Islamic University, Imam

Abdulrahman Bin Faisal University, and the Islamic University of Medina. Data on the entrepreneurial leadership attribute of innovation and faculty innovative behavior are collected according to the validated Item pool and five-point Likert-type scale measurement of innovation advanced by Lukes and Stephan (2017), which is themed on two broad aspects of innovations: [1] innovative behavior inventory, and [2] innovative support inventory. Whereas innovative behavior inventory represents innovative disposition on the individual level, innovative support inventory represents support for innovative behavior on the institutional and cultural levels. Under this light, this study employs the dimensions of innovative behavior support to capture the level variable of faculty innovative behavior, and the institutional dimensions of innovative support inventory to capture the status of entrepreneurial leadership across the study sample. According to Lukes and Stephan (2017) the institutional dimensions of innovative support are exhausted by the managerial support and organizational support items in the scale measurement. The dimensions of innovative behavior are covered in the scale measurement by the items groupings of idea generation, idea search, idea communication, implementation, involving others, and overcoming obstacles. In addition, this study collects data on the level of faculty research output performance by determining the number of research events participated at by each participant in the year 2019. Faculty members who participated in no or more than eight events were eliminated from the study sample. Researchers set the lower limit of one paper and the upper limit of eight papers to mitigate the presence of outliers and to produce robust estimates of the extent to which faculty innovative behavior is reflected in the respective research output performance. This double filtration method excluded more than three-quarters of the faculty population, yielding a study sample comprising 1020 participants: 316 from the first region university, 234 from the second region university, and 470 from the third region university.



## **Variable Measurement and Coding**

The study measures the innovation-oriented variables of the innovation attribute of entrepreneurial leadership and faculty innovative behavior on a binary “yes” or “no” basis according to participant responses to the respective validated Likert-typed scale measurements of the institutional dimensions of innovative support inventory and the dimensions of innovative behavior inventory advanced in Lukes and Stephan (2017). The measures of the variables were coded “1” for “yes” and “0” for “no,” where “yes” defines an above-average response and “no” defines a below-average response. The study measures the endogenous variable of faculty research output performance continuously, with a number in the closed interval between one and eight.

## **Statistical Analysis and Results**

This study employs a two-stage model where a preliminary model explains faculty innovative behavior in terms of the innovation attribute of entrepreneurial leadership. The objective of estimating this first-stage model is document whether entrepreneurial leadership is evident in Saudi faculty responses, and investigate the maintained hypothesis of entrepreneurial leadership that the innovative attribute of entrepreneurial leadership on the organizational level is positively associated with innovative behavior on the individual level. The preliminary model estimation is carried out according to the following functional form:

FF: the level of faculty innovative behavior = f (innovation attribute of entrepreneurial leadership)

For statical ease of exposition ana analytic tractability, the collective impact of all exogenous variables other than the innovation attribute of entrepreneurial leadership is assumed to cancel out and so reduce to an expected value of zero while maintaining the Gauss-Markov data generating process with well-behaved mathematical properties. The functional form of the model is therefore represented by the following linear specification form:

SF: the level of faculty innovative behavior (i) = b0 (i) + b1 (i)  
innovation attribute of entrepreneurial (i) leadership + e (i)

Where the level of faculty innovative behavior is an endogenous variable measured on a binary basis according to whether exhibits innovative behavior; (i) is an index for faculty members included in the dataset; b0 is an intercept parameter estimate; b1 is a slope or rate for change parameter estimate; and innovation attribute of entrepreneurial leadership is an exogenous variable measured on a binary basis according to whether that attribute is evident in Saudi faculty responses.

Since the model above is essentially a regression of a binary endogenous variable, the model can only be meaningfully interpreted based on a maximum likelihood analysis. In this regard and according to the regression output in appendix 2, the model is estimated with an explanatory power of almost 80% and is strongly significant at all traditional levels of the type I error. The parameter estimate pertaining to the impact of the innovation attribute of entrepreneurial leadership on the level of faculty innovative behavior is also strongly significant at traditional levels. The main output of this model can thus be interpreted as follows. Whereas the maximum likelihood for the sampled faculty member to exhibit innovative behavior absent entrepreneurial innovative support is merely about 8%, that likelihood increases greatly with entrepreneurial innovative support to more than 88%. The results of estimating this model not only suggest that the innovation attribute of entrepreneurial leadership is evident in Saudi faculty responses, but also are consistent with the maintained entrepreneurial leadership hypothesis that entrepreneurial leadership has positive impact on individual innovative behavior owing to the innovation orientation of entrepreneurial leadership style.

The second-stage model is the study model where the objective is to document the impact of faculty innovative behavior on a measure of faculty performance, namely faculty research output. The study model is instructed by the preliminary model above where the innovation attribute of entrepreneurial leadership is established to not only be evident in Saudi data, but also have a

positive impact on Saudi faculty innovative disposition. The study model estimation is carried out according to the following functional form:

FF: the level of faculty research output = f (faculty innovative behavior)

For statical ease of exposition ana analytic tractability, the collective impact of all exogenous variables other than faculty innovative behavior is assumed to cancel out and so reduce to an expected value of zero while maintaining the Gauss-Markov data generating process with well-behaved mathematical properties. The functional form of the model is therefore represented by the following linear specification form:

SF: the level of faculty research output (i) = b0 (i) + b1 (i) faculty innovative behavior (i) + e (i)

Where the level of faculty research output is the number of research events participated at in 2019; (i) is an index for faculty members included in the dataset; b0 is an intercept parameter estimate; b1 is a slope or rate for change parameter estimate; and faculty innovative behavior is an endogenous variable measured on a binary basis according to whether exhibits innovative behavior. Since the model employs binary measurement of the exogenous variable, the model's coefficients can be interpreted according to the following system:

1. S1: b0 is the average number of research events participated at by faculty members who do not exhibit innovative behavior.
2. S2: b0 + b1 is the average number of research events participated at by faculty members who exhibit innovative behavior.

According to the regression output as per Appendix 3, the results show that whereas faculty members who do not exhibit individual innovative behavior produce about two yearly papers on average, faculty members who exhibit innovative behavior tend to perform much better and produce a total of almost six papers on average (i.e., greater than three more papers on average). The analysis reports an explanatory power of 51% that is statistically significant at all traditional levels. With a

parameter estimate that is strongly significant at typical levels of significance, the regression output strongly supports the theoretic prediction underlying the relationship between innovative behavior and performance.

### **Concluding Remarks and Limitations**

This study explains almost 80% of the variation in the level of faculty innovation behavior in terms of the innovation attribute of entrepreneurial leadership. All parameter estimates reported in the study were both conceptually meaningful and statistically significant. The results of the study support that the innovation attribute of entrepreneurial leadership is evident in Saudi faculty responses. The results are strongly consistent with the maintained hypothesis that entrepreneurial leadership has positive impact on individual innovative behavior owing to the innovation orientation of entrepreneurial leadership style. The study further strongly supports the theoretic prediction underlying the relationship between innovative behavior and performance by showing that faculty members who exhibit innovative behavior tend to perform much better and produce on average greater than three more papers relative to their counterparts who don't exhibit innovative behavior on the individual level. Throughout, the study has a socio-cultural relevance to Saudi Arabia with respect to the 2030 vision of the kingdom that stresses innovation, valuable leadership, and competitive higher education. It should be emphasized, however, that Lukes and Stphans (2017) item pool scale measurement, the variable measurement and coding, and the convenient statistical ease of exposition regarding the assumed data generating process of the error term constitute limiting factors of the study. Though this study measures the level of faculty research output performance in terms of the number of research events participated at, there exist many ways to represent the same underlying theoretic construct of research performance with a latitude of other measures. indeed, the research output performance level of faculty members is a compound variable that may be specified parsimoniously by

many right-hand variables other than merely the innovation attribute of tacit entrepreneurial leadership. In spite of the limitations, the results of this study have policy implications for Saudi higher education to encourage innovation and entrepreneurial climates as means of enhancing faculty performance and research output levels. Though this study produced empirical evidence attesting to the positive impact of faculty innovative behavior on research performance, future research studies may include more exogenous, right-hand side variables with the objective of parsimoniously specifying the level of faculty research output performance where the innovation attributes of entrepreneurial leadership may serve as one of the many explanatory variables.

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## **Appendix 1:**

Items of Lukes and Stephan (2017) Likert-type scale measurement of innovation

Innovative Behavior Inventory

Idea generation

I try new ways of doing things at work

I prefer work that requires original thinking

When something does not function well at work, I try to find new solution

Idea search

I try to get new ideas from colleagues or business partners

I am interested in how things are done elsewhere in order to use acquired ideas in my own work

I search for new ideas of other people in order to try to implement the best ones

Idea communication

When I have a new idea, I try to persuade my colleagues of it

When I have a new idea, I try to get support for it from management

I try to show my colleagues positive sides of new ideas

When I have a new idea, I try to involve people who are able to collaborate on it

Implementation starting activities

I develop suitable plans and schedules for the implementation of new ideas

I look for and secure funds needed for the implementation of new ideas

For the implementation of new ideas, I search for new technologies, processes or procedures

Involving others

When problems occur during implementation, I get them into the hands of those who can solve them

I try to involve key decision makers in the implementation of an idea

When I have a new idea, I look for people who are able to push it through

### Overcoming obstacles

I am able to persistently overcome obstacles when implementing an idea

I do not give up even when others say it cannot be done

I usually do not finish until I accomplish the goal

During idea implementation, I am able to persist even when work is not going well at the moment

### Innovation outputs

I was often successful at work in implementing my ideas and putting them in practice

Many things I came up with are used in our organization

Whenever I worked somewhere, I improved something there

### Innovation Support Inventory

#### Managerial support

My manager motivates me to come to him/her with new ideas

My manager always financially rewards good ideas

My manager supports me in implementing good ideas as soon as possible

My manager is tolerant of mistakes and errors during the implementation of something new

My manager is able to obtain support for my proposal also outside our department

#### Organizational support

The way of remuneration in our organization motivates employees to suggest new things and procedures

Our organization has set aside sufficient resources to support the implementation of new ideas

Our organization provides employees time for putting ideas and innovations into practice

#### Cultural support

Most people in (country name) come up with new, original ideas at work

Most people in (country name) are able to really implement new ideas at work

Most people in (country name) look for new challenges at work

Most people in (country name) are able to improvise easily when unexpected changes happen at work

## Appendix 2

REGRESSION OUTPUT - Preliminary								
Regression Statistics								
Multiple R	0.89419251							
R Square	0.79958025							
Adjusted R Square	0.79938221							
Standard Error	0.21333463							
Observations	1020							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	183.7489034	183.7489	4037.4	0			
Residual	1018	46.05780268	0.045512					
Total	1019	229.8067061						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.08033241	0.011228138	7.154562	1.6E-12	0.0582993	0.102366	0.058293	0.10236551
Innovation attribute	0.88903972	0.013991689	63.54056	0	0.8615837	0.916496	0.8615837	0.91649576

### Appendix 3

REGRESSION OUTPUT - STUDY								
<i>Regression Statistics</i>								
Multiple R	0.718456							
R Square	0.516179							
Adjusted R Square	0.515701							
Standard Error	1.593654							
Observations	1020							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	2742.105	2742.105	1079.682	9.8E-162			
Residual	1018	2570.211	2.539735					
Total	1019	5312.317						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	2.375	0.084942	27.96023	6.2E-128	2.208317	2.541683	2.208317	2.541683
Innovatie Behavior	3.454305	0.105127	32.85851	9.8E-162	3.248014	3.660596	3.248014	3.660596