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Editorial

We are pleased to present this issue of JABEM, which features three exciting articles about Asia and Africa: China, the Middle East, and South Africa. These three articles were carefully selected to represent diversity in topic, region, and methodology.

In the lead article, Athmay, Fantasy, and Rahim examine the relationships among Human Resource Information Systems (HRIS)—transactional, relational, and transformational—and user satisfaction and intention to engage. It also investigates the mediating role of user satisfaction in the relationship between HRIS attributes and intention to engage. They collected data through a questionnaire from various public organizations in the United Arab Emirates (UAE). Using confirmatory factor analysis (CFA) and structured equation modeling (SEM) methods, their results indicate that HRIS attributes positively influence user satisfaction and intention to engage. The paper's originality and value come from its theoretical contribution to literature in the context of the Middle East. They discuss the theoretical and practical implications of these findings.

In the second article, Mdaka and Longweni study the interactions between intrinsic and extrinsic motivations in open-source problem-solving. Using a pilot moderation model, they analyze the combined and interactive effects of these motivations on collaborative crowdsourcing within open-source projects. Their quantitative approach, involving respondents from the Mturk platform, employs structural equation modeling to explore the relationships between motivational types and problem-solving success. Their findings show that intrinsic motivation significantly enhances open-source problem-solving. Conversely, extrinsic motivation has a moderating effect, reducing the positive impact of intrinsic motivation when perceived as controlling. This research contributes to the theoretical understanding of motivation in crowdsourcing, highlighting the complex role of extrinsic rewards in collaborative settings.

In the final article, Forman and Sriram explore US and Chinese consumers' attitudes towards dietary supplements. Dietary supplements are generally exempt from strict governmental regulations, leaving consumers to rely on various information sources to judge the safety and efficacy of these products. Given the differences in the US and Chinese marketplaces concerning government regulation and business responsibility, their study addresses the roles of different information sources for US and Chinese consumers. Their findings reveal that while consumers in both countries rank family/friends and health professionals high (and marketer sources low), US consumers are more apt to trust online sources. While neither American nor Chinese consumers trust regulators to ensure supplement safety, Chinese consumers have lower trust than Americans.

In the book review section, Sriram reviews the book by Albrecht, Green & Hoffman entitled Principles of Marketing.

Trust this issue will be worth reading. Please do share your comments.

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The adoption of Human Resource Information System (HRIS) and employees engagement: evidence from United Arab Emirates


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The purpose of this paper is to examine the relationships among Human Resource Information Systems (HRIS)—transactional, relational and transformational—and user satisfaction and intention to engage. It also investigates the mediating role of user satisfaction in the relationship between HRIS attributes and intention to engage. Data were collected through a survey questionnaire of various public organizations in the United Arab Emirates (UAE). Using confirmatory factor analysis (CFA) and structured equation modeling (SEM) methods, the results indicate that HRIS attributes positively influence user satisfaction and intention to engage. The paper's originality and value come from its theoretical contribution to literature in the context of Middle East. The theoretical and practical implications of these findings are also discussed.

keywords: United Arab Emirates, public sector organizations, human resource information system, user satisfaction, intention to engage

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Introduction

Since the late 1990s, information technology (IT) and communications (ITC) have significantly influenced society. This has come about primarily because of the development of the Internet. IT can make public sector organizations more efficient and effective in carrying out various operations (Luo 2009). Public employees, as the contributors to efficiency and effectiveness, should have the required e-readiness. IT provides automatic means for handling the information; public sector employees use this information to shape organizational change and to transform their strategic role through the adoption of IT (Haines & Lafleur 2008). IT is not only the vital element of human resources information systems (HRIS), but also information validity and reliability and, ultimately, its utility for users. The technology is used in the HR departments to provide benefits ranging from the publication of information and automation of transactions as the enabler of the transformation face of HRM within the organization (Al Dmour & Al

Zu'bi 2014, Qadir & Agrawal 2017). The human resource function is an information system that requires adequate access to modern technology and the ability to reconstitute the governance mechanism. Capable and highly qualified human resources employees are needed to coordinate the internal and external services factors to be able to handle the demand for services (Wimmer 2002). Almost all HR processes can be done by using HRIS, which can benefit the organization in several ways. For instance, as an implication of HRIS, the automation of tasks and processes reduces the use of resources (financial, material, and human). Reduction of HR costs, less usage of paper, and assisting managers in the HR process are some examples of reduction of resource usage. Although attention has been given to studying HRIS's impact on HR function in Arab countries (Al Dmour & Zu'bi 2014), only limited studies have been conducted in the UAE. These studies are not comprehensive and examine only some individual-related topics of human resource activities (Al Athmay et al. 2020, Budhwar & Mellahi 2007). Existing literature investigates the impact of HRIS in terms of its effect on the operational, relational, and transformational aspects of the organization (Nayak et al. 2017, Parry 2011). However, there is a lack of research on HRM in the Arab world in general (Forstenlechner 2010, Rees et al. 2007) and in the Gulf countries in particular. In addition, there is minimal research on HRIS, specifically related to the UAE's public sector organizations (Reddick 2009). The difficulty of finding reliable data and conducting research in the region may be contributing factors to this deficit (Al Athmay et al. 2020). The existing studies were conducted either to show the benefits and barriers of HRIS adoption, or to investigate the determinants that influence the adoption of HRIS, or to explore the valuable outcomes in terms of efficiency and effectiveness of adopting HRIS.

To our knowledge, this study is the first attempt in UAE and probably one of few attempts in developing countries to research the impact of HRIS on the operational, relational, and transformational aspects of HR. In this study, user satisfaction is treated as an intermediate variable in terms of its effect on enhancing the employee's engagement through HRIS and how this engagement varied in selected HRIS attributes. This study is significant because it presents an integrated conceptual model that not only focuses on the direct effect of some characteristics of HRIS on user satisfaction but also on the effect of user satisfaction on the engagement of employees in terms of how HRIS contributed to meeting the needs of employees. Additionally, it examines these attributes' direct and indirect effects as the variable *satisfaction* mediates them. This study is also designed to fill the gap in studies undertaken in the Arab region.

This study investigates the impact of HRIS on the practices of human resource departments in the United Arab Emirates public sector organizations. Specifically, it examines the perceptions of public sector employees regarding the types of information provided by HR departments. It explores how different kinds of information, namely transactional, relational, and transformational, affect users' satisfaction and how users' satisfaction enhances employee engagement with HRIS services. It presents the results of a survey of sampled employees in UAE public sector organizations. The research is based primarily on a quantitative approach using a questionnaire survey to collect data across multiple settings pertaining to the research hypotheses. We conducted a field study of human resource management service users in the UAE and tested the proposed model using the structural equation modeling (SEM) technique. The authors of this research investigate three different orientations in which public sector organizations engage their employees through HRIS. The first is the transactional (operational) approach, where activities are undertaken to meet the short-term needs of employees who want to take part in the HR efforts of the organization. The second is a relational approach based on improving HR's external relationship with other parties within the organization. It is during this stage that shared interest and trust in the HRM programs are developed. The third is the transformational approach, which aims to redefine the scope and function of HR in the organization to focus more on strategic issues and to facilitate the positive impacts of HRM on the organization, employees, and society (Athmay et al. 2020, Knies et al. 2018). Research for this paper took place in the UAE, a country that has achieved remarkable social and

economic performance. In all e-government indicators, the UAE fares well above most developing countries in general and other Arab countries in particular (Al Athmay & Rahim 2013). Therefore, this study addresses the gaps in knowledge left by previous research. This study expands the scope of literature by examining the United Arab Emirates as a transitional economy. The study mainly attempts to answer the following questions: (1) What is the direct effect on user satisfaction of HRIS attributes? (2) What is the direct effect of user satisfaction on user intention to engage with the HRIS of the organization? (3) What is the direct effect of HRIS attributes on the intention to support the organization's HRIS? and (4) What is the role of user satisfaction as a mediator on behavioral intention to engage with HRIS of the organization?

In the next section, we develop hypotheses followed by methodology and analysis. Then we present the findings and discussion along with implications for managers and direction for future research.

Theory and Hypotheses Development

Our research model is based upon DeLone and Mclean's (2003) updated the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Al Athmay et al. 2020). Utilizing these models, the present research model adopted three attributes of HRIS's information: transactional, relational, and transformational, and investigated their impact on user satisfaction and employees' intention to engage. We join other researchers in suggesting that transactional, relational and transformational's information are a subset of HRIS's system quality (Al Athmay et al. 2020, Chakraborty & Abu Mansor 2013).

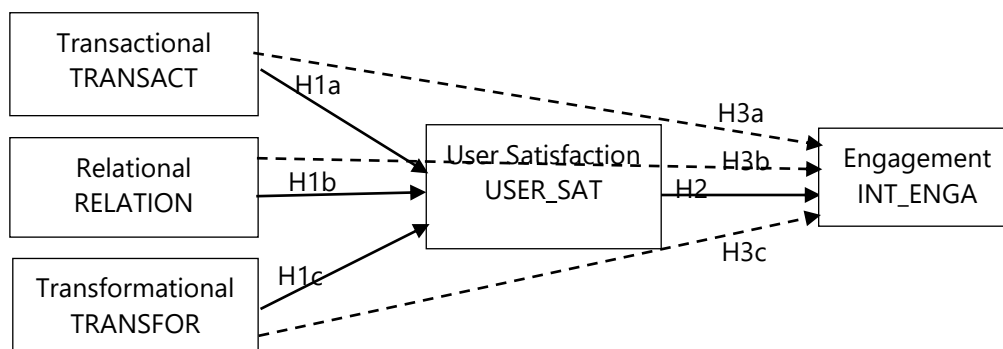


Figure 1. HRIS linking Satisfaction and Engagement

Source: the authors

Based on UTAUT, the research model used variables such as user satisfaction and intention to use, in addition to the three types of HRIS variables: transactional, relational, and transformational. HRIS attributes identified in this research cannot be considered complete. Although other dimensions, such as culture, trust, awareness, organizational, environmental, etc., are of great interest, they are not included due to the length of the survey and concerns regarding the parsimony of this research. The research model shown in Figure 1 was simplified to offer a complete picture of some selected influential factors in the adoption of HRIS services in the UAE's public sector organizations from an employee perspective.

Human Resource Information System (HRIS): Transactional – User Satisfaction

Studies in HRIS have highlighted three main benefits of HRIS adoption; namely, the transactional, transformational, and relational aspects of HRIS (Qadir & Agrawal 2017). The transactional element of IT utilization in HRM is intended to improve the organization's operational efficiency and meet the needs of the employees and managers in terms of the automation of HR records about diverse HRM activities.

Transactional attribute deals with operational and administrative functions such as Payroll, record keeping, and benefits calculations. Transactional is supposed to meet the short-term needs of employees who want to participate in the organization's HR efforts. Many of the functions of the human resources department are routine and repetitive. Some examples are payroll, record keeping, and benefits calculations (Parry 2011, Shrivastava & Shaw 2003). HRM systems easily automate these operations, thus reducing costs and improving efficiency. So, we assume that transaction function positively influences the user's acceptance and satisfaction (AlAlmeri 2017, Al Dmour & Zu'bi 2014). So, we propose the following hypothesis.

H1a. Transactional services have a positive effect on user satisfaction.

HRIS: Relational – User Satisfaction

Studies on the relational aspect of HRIS have highlighted the extent to which HR enhances services provided to managers and employees, improving the relationship and building trust in practices of which organizational members have little knowledge. And the effect of HR practices on relationships is the process within the organization, producing better-informed HR decisions (Ball 2001, Reddick 2009). These studies have neither addressed the link of HRIS to user satisfaction nor investigated the impact of HRIS on employee intention to engage through the mediating factor of user satisfaction. This research addresses this gap. While the operational impact of HRM systems focuses on internally improving the human resources function, the relationship impact crosses over to other departments and connects them. It allows people across the organization to access HR data, resulting in improved and more informed decision-making (Ball 2001, Kovach & Cathcart 1999). Managers and employees can perform HR activities themselves, thereby reducing response times, improving service levels, and bringing more informed decision-making. The impact of relational aspects of the daily HR function can increase commitment and further engagement among employees (Qamari et al. 2022, Shrivastava & Shaw 2003). Our next hypothesis is:

H1b. Relational services have a positive effect on user satisfaction.

HRIS: Transformational – User Satisfaction

The transformational attribute is concerned with HR strategies in areas such as knowledge management and organizational change and taking the organization further steps to produce more value for itself and society. It is agreed that IT within the HR department improves efficiency and the information flow across the organization (relationship impact). The HR department takes center stage when the transformational impact comes into the picture. The transformational effect of HRM systems is an extension of the scope and function of the HR department to include a strong strategic focus. Jobs are much more flexible and are designed around skills, roles, and projects rather than stable tasks. It allows for shared information within and outside of the organization and ensures more accuracy in the core functions of HRM. It activates and develops employees, furthering their engagement to produce more excellent value for the organization and society. It is increasingly involved in fundamental changes within the HR department and across the organization in how they view the business (Nayak et al. 2017, Obeidat 2012). So we propose:

H1c. Transformational services have a positive effect on user satisfaction.

User Satisfaction and Intention to Engage

User satisfaction is used as a mediating variable to either boost or thwart employees' engagement with HRIS within the organization. Even though a great deal of attention has been given to the study of HRIS

success, we do not find any study investigating these variables (transactional, relational, transformational, user satisfaction, and intention to engage) in the region in general and UAE particularly (Sanayei et al. 2008). Although literature exists on HRIS and satisfaction (Coursey & McCreary 2005, Reddick 2009), the impact of user satisfaction on employee engagement is missing. However, users' experience and attitudes with the application of HRIS would add enjoyment and acceptability to the users, increase engagement, and further the trust and commitment of employees. Therefore, this research adds to the limited pool of studies that have been carried out in developing countries. This study was designed because the applicability of a model may vary in different nations. As a preliminary investigation, the current paper focuses only on attributes—transactional, relational, transformational—and investigates their impact on user satisfaction and the employees' intention to engage. So, we propose the following hypothesis:

H2. User satisfaction leads to engagement in the use of HRIS.

Mediating Effects of User Satisfaction on Intention to Engage

The third group of hypotheses deals with the total effects of HRIS attributes on intention to engage. Besides the direct impact, HRIS attributes (transactional, relational, and transformational) also directly affect the intention to engage through user satisfaction. It was predicted that any relationship between these attributes and intention to engage would be mediated by user satisfaction. We expected to find a direct path from HRIS attributes to intention to engage, mediated by user satisfaction. User satisfaction has been widely cited as a measure of the success and effectiveness of HRIS. DeLone and McLean (2003) and Gupta and Saxena (2010) have studied the potential benefits of the adoption of HRIS and found that HRIS can achieve better client, enhance user satisfaction, and achieve efficiency. Lazim et al. (2023) studied the usefulness of information and communication technology in the human resources department of the Malaysian government. They found that timesaving, cost saving, and system quality are the most significant factors affecting user satisfaction using the HRMIS. Thus, the findings of this study should be able to provide awareness of the importance of using HRMIS among public servants. Khashman and Al-Ryalat (2015) studied user satisfaction in a data warehouse. They found that the automation of HR positively affects user satisfaction, including support to end users, information quality, accuracy, and fulfillment of users' needs. From these studies, we can predict that the moderating effect of user satisfaction on HRIS attributes (Transactional, Relational, and Transformational) would be positively related to end users' intention to engage. The research study proposes the following hypotheses for the effects of the mediating variable (user satisfaction) on the intention to engage.

HRIS: Transactional – User Engagement

Transactional services are related to operational and administrative functions such as payroll, record keeping, and benefits calculations. The critical results of the transactional function are to improve operational productivity and provide support automated services for the employees. The implication of this function is to enhance users' acceptance and satisfaction. Some literature on Electronic human resources has studied the impact of transactional function on the efficiency and effectiveness of human resources departments (AlAlmeri 2017, Reddick 2009). These studies have neither addressed the link of HRIS to user satisfaction nor investigated the impact of HRIS on employee intention to engage through the mediating factor of user satisfaction. Thus, we can hypothesize a positive link between users' satisfaction with HRIS services, such as transactional, and users' intention to engage.

H3a. Transactional services have a positive effect on user engagement

HRIS: Relational – User Engagement

As a part of the HRIS quality system, relational function allows employees across the organization to access the HR data, resulting in improved and more informed decision making. The impact of relational aspects of the daily HR function can increase the commitment and further the satisfaction and engagement of the employees (Al Dmour & Zu'bi 2014). These studies have neither addressed the link of HRIS attributes (Transactional, Relational, and Transformational) to user satisfaction nor investigated the impact of HRIS on employee intention to engage through the mediating factor of user satisfaction. Thus, we can predict a positive link between users' satisfaction with HRIS services, such as relational, and users' intention to engage. Our next hypothesis is:

H3b. Relational services have a positive effect on user engagement.

HRIS: Transformational – User Engagement

Transformational attribute of HRIS involves structural changes in the scope and function of the HR department and aligning employee activities with the needs of organizational strategies and customers or clients. According to some studies on the benefits of electronic human resources (EHRM) management, jobs are more flexible and designed based on employees' skills, roles, and projects. EHRM allows for shared information within and outside of the organization, ensuring more accuracy in the core functions of HRM (AlAmeri 2017). These studies have fallen short of the impact of EHRM and the effects of these benefits on the employees' intention to engage. However, they indirectly postulate a positive influence on users' acceptance and satisfaction. In this study, the HRIS transformational attribute is to develop and activate employees, which in turn furthers the employees' engagement to produce greater value for the organization and society. So we finally hypothesize:

H3c. Transformational services have a positive effect on user engagement.

Methodology

Data Collection

The sampling frame for this study is made up of employees working in public sector organizations. The total number of the surveyed public sector organizations is 92. They were chosen from three Emirates: Abu Dhabi, Dubai, and Sharjah. The three emirates were selected because they are the three biggest emirates in the UAE. Three trained people collected the data using a structured questionnaire on a 5-point scale (1=strongly disagree and 5=strongly agree) from an average of 20 random users of HRIS daily, resulting in an overall sample of 1800. The exclusion of 200 questionnaires with incomplete data resulted in a final usable sample of 1600 responses. The sample consisted of male/female (60%/40%), graduate/diploma (70%/30%), employees between 100 and 500 (85%/10%), and IT experts/other (90%/10%).

Operational Measures of the Variables

Transactional (TRANSACT) relates to the degree to which HRIS is undertaken to automate record-keeping and routine clerical activities such as payroll and benefits administration (Chakraborty & Abu Mansorb 2013). It has seven items. *Relational* (RELATION) relates to the degree to which HRIS influences HR's relationship externally with other parties within the organization, thus allowing HR to enhance service by providing managers and employees with remote access to HR databases, supporting their HR-related decisions (Reddick 2009). It has seven items. *Transformational* (TRANSFOR) relates to involving fundamental changes in the scope and function of the HR department and aligning employee activities with the needs of customers or clients (Al Athmay 2020). It has seven items. *User Satisfaction* (USER_SAT) relates to online information and services and the level of satisfaction with these offerings (DeLone & McLean 2003). It has five items. *Intention to engage* (INT_ENGA) relates to the ability of the HRIS system

to positively impact employees' attitudes towards continuous use of HRIS services. It has three items (Al Athmay et al. 2016).

Analyses

Table 1 reports factors and reliability statistics. Values above .70 indicate the reliability of factors (Gefen et al. 2000). We use Harman's one-factor test to test the common method variance. Results show that only one factor emerged and explained less than 50% of the variance (42.40% ie Eigenvalue 2.6). We used SEM to analyze and test the hypotheses. With 29 observed variables, there are $(29 \times 30)/2 = 435$ observations; the number of parameters to be estimated is 65, including the variances of 29 variables (21 exogenous and 8 indigenous variables, ie the disturbance), 29 direct loading on each latent variable, and seven direct effects. Further, three error covariance were set to free. Thus, the model degrees of freedom are $435 - 65 - 3 = 367$. Since the number of observations is greater than the number of parameters to be estimated, we conclude that the HRIS model is over-identified and can be tested statistically. Our analysis indicates the observed Chi-square ($\chi^2 = 1067.82$), degree of freedom ($df = 367$, $p = .00$), $RMSEA = .04$, $GFI = .99$, $AGFI = .93$, $NFI = .98$, $NNFI = .97$, and $CFI = .99$. Our model represents a good fit.

Table 1. Factors and Reliability

Factors	# of items	Cronbach (α)	Eigenvalues
Transactional (TRANSACT)	7	.86	2.76
Relational (RELATION)	7	.82	1.76
Transformational (TRANSFOR)	7	.90	1.49
User Satisfaction (USER_SAT)	5	.85	1.24
Intention to engage (INT_ENGA)	3	.79	1.16

Table 2 reports correlations below .9, indicating no common method bias in the data. The measures have the convergent validity. The average variances extracted were above the recommended .50 level (Hair et al. 1992), meaning their hypothesized factors accounted for more than one-half of the variances observed in these items.

Table 2. Constructs Correlations, AVE Values

	Mean	SD	1	2	3	4	5
1 TRANSACT	4.89	1.34	1				
2 RELATION	5.11	1.02	.73**	1			
3 TRANSFOR	5.11	1.54	.64**	.64**	1		
4 USER_SAT	4.97	1.07	.72**	.57**	.59**	1	
5 INT_ENGA	5.99	1.33	.81**	.68**	.63**	.75**	1
AVE/ \sqrt AVE			.85/.92	.72/.85	.69/.83	.80/.89	.77/.88
Composite Reliability			.86	.86	.87	.90	.80

** $p < .01$ (2-tailed)

Results and Discussion

Table 3 suggests that $H1a$ ($\beta = .19$, $p = .01$), $H1b$ ($\beta = .28$, $p = .01$), and $H1c$ ($\beta = .42$, $p = .05$), are supported. This result is not surprising since a number of researchers highlighted the positive association among RELATION, TRANSACT and, TRANSFOR, and USER_SAT. For example, Yung-Shen (2014) indicates that the effect of structural capital on user satisfaction was fully mediated through relational, suggesting that

frequent communication between IT units and users may not necessarily lead to user satisfaction unless relational is well developed. The study empirically examined the impact of transactional and relational customers on user satisfaction in e-commerce in Taiwan. Based on AlAmeri (2017) study, the Implications of implementing electronic human resource management in Abu Dhabi (UAE) are that EHRM provides a framework to automate key HR services like employee onboarding, training, payroll, benefits, administrative support, and documentation submission, such as time sheets, leave of absence and performance review. In addition, he found that EHRM changed the nature of interactions among HR staff, line managers, and employees from a pure face-to-face relationship to a technology-mediated one.

Table 3. Path Coefficients for Hypotheses

Hypothesis	Path	Path Coefficients	p-value	Results
H1a	transaction → satisfaction	.19	.01	Supported
H1b	relational → satisfaction	.28	.01	Supported
H1c	transformational → satisfaction	.42	.05	Supported
H2	satisfaction → engagement	.60	.00	Supported
H3a	Transaction → engagement	.37	.01	Supported
H3b	Relational → engagement	.25	.00	Supported
H3c	Transformational → engagement	.45	.01	Supported

H2 ($\beta=.60$, $p=.00$) is supported. This is consistent with the majority of empirical studies conducted in human resources literature. For instance, Rehman et al. (2012) reported a positive effect of user satisfaction on the intention of citizens to adopt e-government services. Further, Sambasivan et al. (2010) reported that e-government and the use of procurement electronic systems in e-government have a strong positive relationship between the user's satisfaction and the intention to engage with actual use. Although literature exists on HRIS and satisfaction, the impact of user satisfaction on employee engagement seems to be missing. This literature has touched on the potential benefits of adopting HRIS and found that HRIS can achieve better clients, enhance user satisfaction, and achieve efficiency (Coursey & McCreary 2005). However, we can say that users' experience and attitudes with the application of HRIS would add enjoyment and acceptability to the users, furthering the trust and commitment of employees and increasing engagement.

H3a ($\beta=.37$, $p=.01$), *H1b* ($\beta=.25$, $p=.00$), and *H1c* ($\beta=.45$, $p=.05$) are supported. This result is not surprising since a number of researchers highlighted the positive association among *RELATION*, *TRANSACT* and, *TRANSFOR*, and *INT_ENGA*. Intention to engage refers to the customer's perception that the service was intrinsically enjoyable (Trevino & Webster 1992). The research indicates that the intention to engage can positively impact the use of technology environments for use), other software use, and website use (Novak et al. 2000). Therefore, intention to engage is positively and significantly related to the *RELATION*, *TRANSACT* and *TRANSFOR*. In other words, intention to engage significantly influences HRIS.

Managerial and Theoretical Implications

The study developed a theoretical rationale and empirically tested the relationships among human resource information systems (HRIS) in terms of (transactional, relational, and transformational), user satisfaction, and intention to engage. It also investigates the mediating role of user satisfaction. Our findings suggest that public organizations striving to enhance HRIS should pay attention to the critical role of user satisfaction. In addition, understanding HRIS factors (transactional, relational, and transformational) helps policymakers formulate and develop strategies to increase the intention of the citizens to engage either to acquire information or to conduct transactions on the public website.

Aggarwal and Kapoor (2012) mentioned that HRIS helps the management and HR department and assists the employees in several ways.

Further, managers operating in the public sector can exploit the findings of this study by developing an appropriate HRIS and enhancing technology diffusion in areas under their authority. Many researchers have encouraged using HRIS to increase the overall decision-making efficiency of an organization's management and improve the intention to engage. HRIS helps the HR department to develop a centralized database that provides the public organization with all necessary information and opportunities for different reports. In addition, HRIS eliminates paper forms and errors caused by human factors and is environmentally friendly (Chakraborty & Abu Mansour 2013). The results of this study imply that a user satisfaction will be beneficial for attracting increased users of the public sector information systems such as online services by providing up-to-date information, and this, in turn, will increase user satisfaction and, consequently, the intention to engage through technology. Furthermore, the increased usage of human resources information systems can generate more benefits, such as operational excellence, cost and time savings, increased effectiveness, and better quality of public services (Al Athmay et al. 2016). For the employees, HRIS provides the possibility of independent access to data, which often means working in one software window and keeping automatic tracking and reminders of business obligations and events. In some organizations, employees can also attend online training courses to develop their skills and knowledge. As a result, it encourages employees to make decisions and initiatives on the basis of information obtained in the HRIS system.

According to Oliveira and Martins (2010), technology readiness is dependent on an organization's technology infrastructure and IT human resources. Based on IT expertise, skills, and knowledge that they use to build a web application, technology infrastructure makes a more accessible base on which internet technologies can be created. HRIS can only become integral if the organization has infrastructure and technical skills. These factors allow the technological capacity of an organization to adopt HRIS (Oliveira & Martins 2010). Conversely, since organizations with superior technology readiness are in a better position to adopt HRIS, companies that do not have robust technology infrastructure and comprehensive IT expertise may not take the risk of adopting HRIS. Several researchers have recognized technological readiness as a significant factor that influences IT adoption (Kwon & Zmud 1987). Also, many researchers have pointed out that IT investments per se do not enhance productivity and performance improvements, but they must be complemented with, for instance, other organizational resources, such as the human and relationship assets, to form what is called HRIS. The HRIS leverages the business processes, resulting in superior and efficient product or service delivery infrastructures and cost-effective and operational systems. When strategically aligned with business functions, it yields performance improvements, translating into sustained competitive advantage in the long run.

Conclusion, Limitations, and Future Research

The level of uncertainty has increased exponentially in the present dynamic business environment. HRIS practices in terms of (transactional, relational, and transformational) have tremendously witnessed themselves as a contributor to the user's satisfaction and enriching intention to engage. Understanding the HIRS and their relationship with user satisfaction and intention to engage will help public organizations achieve excellence in services and in serving society and stakeholders. Achieving user satisfaction, which in turn positively impacts the intention to engage, will facilitate many benefits for HRM, such as a more straightforward process, cheaper, faster, more effective, and more efficient, and increasing the organization's performance. All these benefits of HRIS can be achieved perfectly only if HIRS is adopted or adapted in an organization accurately and more effectively.

The measurements of other attributes of HRIS than user satisfaction and intention to engage can be a possible limitation of the study. Further refinement of HIRS, user satisfaction and intention to engage

scales is needed in future research. It also was noticed that most studies were done in Europe and the USA and outside developing countries; thus, this opens a perspective to examine the future HRIS adoption in different geographical areas. The other limitation is that data were collected from only three Emirates in the UAE (Sharjah, Dubai, and Abu Dhabi). Therefore, caution should be considered when generalizing this study's findings to other UAE Emirates. It would be exciting to conduct a future comprehensive work that includes the intention to engage the citizens in all seven Emirates and compare it with the findings of this study.

References

- Al-Dmour RH & Zu'bi MF 2014. Factors motivating and inhibiting the practice of HRIS in business organizations: an empirical analysis - *International Business Research*, 7(7), 1913–9012. <https://www.eacademic.ju.edu.jo> Canadian Center of Science and Education
- Aggarwal N & Kapoor M 2012. Human Resource Information Systems (HRIS)-Its role and importance in Business Competitiveness. *Gian Jyoti E-Journal*, 1(2), 2250–2348.
- AlAmeri B 2017. The implications of implementing electronic human resource management in Abu Dhabi, Department, a thesis submitted in partial fulfillment of the requirements of Liverpool John Moores University for the degree of Doctor of Philosophy. ProQuest Dissertations & Theses, 28327955. <https://www.proquest.com/openview/49c11366fa0bf12ccce6550be37b8e0e/1?pq-origsite=gscholar&cbl=44156>
- Al Athmay AA, Fantasy K & Kumar V 2016. E-government adoption and user's satisfaction: an empirical investigation. *EuroMed Journal of Business*, 11(1), 57–83. <https://doi.org/10.1108/EMJB-05-2014-0016>
- Al Athmay AA, Alhashmi SM, Rahim A & Rafat A 2020. The impact of information technology on practicing human resources management in the public sector in the United Arab Emirates, *University of Sharjah Journal for Humanities & Social Sciences*, 17(1) <https://www.doi.org/10.36394/jhss/17/1B/14>
- Al Athmay AA & Rahim A 2013. E-Governance in Arab Countries: status and Challenges. *Global Journal of Business Research*, 7(5), 79–98. <https://ssrn.com/abstract=2239389>
- Ball KS 2001. The use of human resource information systems: a survey. *Personnel Review*, 30(6), 677–693.
- Budhwar P & Mellahi K 2007. Introduction: human resource management in the Middle East. *The International Journal of Human Resource Management*, 18(1), 2–10. <https://doi.org/10.1080/09585190601068227>
- Chakraborty AR & Abu Mansor NN 2013. Adoption of Human Resource Information System: a Theoretical Analysis. *Social and Behavioral Sciences* 75, 473–478.
- Coursey DH & McCreary SM 2005. Using technology in the workplace, In S. Cordrey (ed), *Handbook of HRM in Government* (89–214). San Fransico. Jossey-Bass. <https://doi.org/10.1016/j.sbspro.2013.04.051>
- DeLone WH & McLean ER 2003. The DeLone and McLean model of information system success: a ten-year update. *Journal of Management Information Systems*, 19(4), 9–30. <https://doi.org/10.1080/07421222.2003.11045748>
- Forstenlechner I 2010. Workforce localization in emerging Gulf economies: the need to fine-tune HRM, *Personnel Review*, 39(1), 135–152.
- Gefen D, Straub DW & Boudreau MC 2000. Structural equation modeling and regression: guidelines for research practice. *Communications of the Association for Information Systems*, 4(41), 1–78.
- Gupta A & Saxena S 2010. Assessing employees perception regarding EHRM in service organisations. *Management Insight*, 7(2), 1–21.
- Haines VY & Lafleur G 2008. Information technology usage and human resource roles and effectiveness. *Human Resource Management*, 47(3), 525–540. <https://doi.org/10.1002/hrm.20230>
- Hair JT, Anderson RE, Tatham RL & Black WC 1992. *Multivariate data analysis with readings*. Macmillan, New York, NY.

- Khashman AM & Al-Ryalat HA 2015. The impact of electronic human resource management (E-HRM) practices on business performance in Jordanian telecommunications sector: the employee's perspective. *Journal of Management Research*, 7(3), 115–129. <https://doi.org/10.5296/jmr.v7i3.7462>
- Knies E, Boselie P, Gould-Williams J & Vandenabeele W 2018. Strategic human resource management and public sector performance: context matters. *The International Journal of Human Resource Management*, 2432–2444. <https://doi.org/10.1080/09585192.2017.1407088>
- Kovach KA & Cathcart Jr CE 1999. Human resource information systems (HRIS): providing business with rapid data access, information exchange and strategic advantage. *Public Personnel Management*, 28(2), 275–282.
- Kwon TH Zmud RW 1987. Unifying the fragmented models of information systems implementation. In Hirschheim BR (ed), *Critical Issues in Information Systems Research*. John Wiley and Sons Ltd., New York. 227–252
- Lazim MTM, Aziz N, Mahmood R & Toshio A 2023. User satisfaction on human resources management information systems: implementation in enforcement organization. *International Journal of Social Science Research*, 11(2), 34–54. <https://doi.org/10.5296/ijssr.v11i2.20827>
- Luo G 2009. E-government, people and social change: a case study in China. *The Electronic Journal of Information Systems in Developing Countries*, 38(1), 1–23. <https://doi.org/10.1002/j.1681-4835.2009.tb00266.x>
- Nayak S, Bhatnagar J & Budhwar P 2017. Leveraging Social Networking for Talent Management: an Exploratory Study of Indian Firms. *Thunderbird International Business Review* 60(1), 21–37. <http://dx.doi.org/10.1002/tie.21911>
- Novak TP, Hoffman DL & Yung YF 2000. Measuring the customer experience in online environments: a structural modeling approach. *Marketing Science*, 19(1), 22–42. <https://doi.org/10.1287/mksc.19.1.22.15184>
- Obeidat B 2012. The relationship between human resource information system (HRIS) functions and human resource management (HRM) functionalities. *Journal of Management Research*, 4(4), 192–211. <http://dx.doi.org/10.5296/jmr.v4i4.2262>
- Oliveira T & Martins MF 2010. Understanding e-business adoption across industries in European countries. *Industrial Management & Data Systems*, 110(9), 1337–1354.
- Parry E 2011. An examination of e-HRM as a means to increase the value of the HR function. *The International Journal of Human Resource Management*, 22(5), 1146–1162. <https://doi.org/10.1080/09585192.2011.556791>
- Qadir A & Agrawal S 2017. Human resource information system (HRIS): re-engineering the traditional human resource management for leveraging strategic human resource management. *MIS Review*, 22(1/2), 41–58.
- Qamari IN, Pierre NL & NuryKIN R (2022) Impact of electronic human resource management toward excellent service – a bibliometric review. *Expert Journal of Business and Management*, 10(1), 25–35.
- Reddick CG 2009. Human Resources Information Systems in Texas City governments: scope and perception of its effectiveness. *Public Personnel Management*, 38(4), 19–34.
- Rees CJ, Mamman A & Bin BA 2007. Emiratization as a strategic HRM change initiative: case study evidence from a UAE petroleum company. *The International Journal of Human Resource Management* 18(1), 33–53.
- Rehman M, Esichaikul V & Kanal M 2012. Factors influencing e-government adoption in Pakistan. *Transforming Government: People, Process and Policy*, 6(3), 258–282. <https://doi.org/10.1108/17506161211251263>
- Sambasivan M, Wemyss GP & Rose RC 2010. User acceptance of a G2B system: a case of electronic procurement system in Malaysia. *Internet Research*, 20(2), 169–187.

- Sanayei A, Sambasivan & Mirzaei A 2008. Designing a model for evaluating the effectiveness of E-HRM (Case study: Iranian organizations). *International Journal of Information Science and Management*, 6(2), 79–98. https://ijism.isc.ac/article_698121.html
- Shrivastava S & Shaw JB 2003. Liberating HR through technology. *Human Resource Management*, 42(3), 201–222. <https://onlinelibrary.wiley.com/doi/abs/10.1002/hrm.10081>
- Trevino LK & Webster J 1992. Flow in computer-mediated communication: electronic mail and voice mail evaluation and impacts. *Communication Research*, 19(5), 539–573.
- Wimmer MA 2002. Integrated service modelling for online one-stop government. *Electronic Markets*, 12(3), 149–156.
- Yung-Shen Y 2014. comparison of quality satisfaction between transactional and relational customers in e-commerce. *The TQM Journal*, 26(6), 577–593.

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A pilot study exploring the interactive effects of intrinsic and extrinsic motivations in Open Source problem-solving

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This study examines the interaction between intrinsic and extrinsic motivations in open-source problem-solving. Using a pilot moderation model, we analyze the combined and interactive effects of these motivations on collaborative crowdsourcing within open-source projects. Our quantitative approach, involving respondents from the Mturk platform, employs structural equation modeling to explore the relationships between motivational types and problem-solving success. The findings show that intrinsic motivation significantly enhances open-source problem-solving. Conversely, extrinsic motivation has a moderating effect, reducing the positive impact of intrinsic motivation when perceived as controlling. This research contributes to the theoretical understanding of motivation in crowdsourcing, highlighting the complex role of extrinsic rewards in collaborative settings.

keywords: open innovation, open source, crowdsourcing

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Introduction

In the rapidly evolving landscape of business and innovation, open innovation has garnered significant attention, marking a pivotal shift in academic research and practical applications across various industries worldwide. This concept illuminates the strategic advantage firms gain by integrating external sources of knowledge into their innovation processes, a paradigm shift underscored by the works of Randhawa, Wilden and Hohberger (2016), Vanhaverbeke and Cloudt (2014), and West and Bogers (2017). Among the diverse mechanisms underpinning open innovation, crowdsourcing has emerged as a transformative approach, propelling the democratization of innovation. Introduced by Howe in 2006, crowdsourcing disrupts traditional models by distributing tasks across an expansive, albeit undefined, network of participants rather than relying on specific employees or contractors. This approach enables firms to extend their problem-solving capabilities beyond their immediate organizational confines, inviting contributions from a global community of potential solvers. Such openness in problem disclosure and solution

solicitation, as elaborated by Afuah and Tucci (2013) and Jeppesen and Lakhani (2010), paves the way for leveraging collective intelligence and expertise to address complex challenges, signifying a paradigm shift towards more inclusive, collaborative innovation practices.

Solving complex problems through crowdsourcing, particularly in open-source projects, underlines a multifaceted interplay of motivational factors that drive participant engagement and sustained contribution. While intrinsic motivations, such as the pursuit of personal satisfaction, intellectual curiosity, and a sense of belonging, are frequently cited as primary drivers in open-source participation, the role of extrinsic motivations, such as financial incentives, reputation gains, and professional development opportunities, also presents a significant influence on contributors' behavior.

Integrating these motivational spectrums poses a complex scenario for understanding how diverse incentives are combined to foster innovation, ensure the quality of contributions, and maintain a robust and active crowdsourcing community. Despite the acknowledged importance of intrinsic rewards in fueling creativity and self-directed engagement, the evolving landscape of open-source projects and crowdsourcing platforms indicates a growing emphasis on extrinsic rewards to attract and retain talent, navigate project complexities, and achieve sustainable development outcomes (Roberts et al. 2006).

The literature has only separately assessed the influences of extrinsic and intrinsic motives for crowdsourcing through open-source projects. This dichotomy raises critical questions regarding the optimal balance between these motivations to maximize participation, innovation, and project success in collaborative problem-solving endeavors. There remains a knowledge gap regarding the collaborative or interactive effect of intrinsic and extrinsic motivation on problem-solving in crowdsourcing.

Thus, this research aims to investigate the interaction between extrinsic and intrinsic motivations in solving complex problems through collaborative crowdsourcing in open-source projects. It seeks to unravel how these motivations influence individual and collective engagement, the quality of contributions, and the long-term viability of open-source initiatives. Through empirical investigation and theoretical analysis, this study endeavors to provide actionable insights for designing crowdsourcing platforms and managing open-source projects in a way that harmoniously integrates diverse motivational drivers to foster innovation, participation, and sustainable development. The following section provides a literature review of the relevant concepts of this paper based on prior publications that lead to the two hypotheses. The study was underpinned by self-determination theory and cognitive evaluation theory. The literature review is followed by a discussion of the methods used to conduct the study and a presentation of the findings. In the penultimate section of this paper, the discussion and managerial implications are presented. Our conclusion section ends the paper with closing remarks.

Literature Review

Open innovation involves expanding knowledge beyond internal market mediums and avoiding limiting internal pathways for bringing a firm's knowledge to market (Mdaka & Longweni 2023, 2024, Mohalajeng & Kroon 2016). Open innovation combines resources and assets within a company with outside sources to gain the greatest value. As an open innovation mechanism, crowdsourcing encompasses several key components essential for successful problem-solving, including open-source problem-solving approaches. Firstly, the composition of the crowd lacks a definitive characterization within the literature, yet contributions are typically based on either qualifications or demographics, with crowd sizes varying from a few hundred to several hundred thousand participants (Bassi et al. 2020). The crowd's purpose bifurcates into completing tasks or solving problems, with some scholars advocating for the divisibility of problems into smaller tasks to facilitate crowdsourcing (Brabham et al. 2014, Karachiwalla & Pinkow 2021). Open-source problem-solving, in particular, leverages the crowd's collective intelligence and diverse expertise to address complex, non-trivial issues, often resulting in innovative solutions that may not emerge from traditional problem-solving methods.

The rewards for crowd participation can be monetary, non-monetary, or voluntary, with motivations encompassing skill development, community contribution, enjoyment, knowledge sharing, and recognition, collectively referred to as the 'four f's of crowdsourcing:' fun, fulfillment, fame, and fortune (Acar 2019, Liang et al. 2018). Open-source initiatives often attract participants driven by intrinsic motivations, such as the desire to contribute to the greater good or the intellectual challenge of solving a complex problem.

Institutions or organizations, whether private or governmental, typically initiate crowdsourcing activities by issuing an open call to the crowd, specifying participation criteria and conditions. Theoretical and application conditions further delineate the appropriate contexts for employing crowdsourcing (Wazny 2017). The utilization of crowd responses involves either the aggregation or selection of contributions. Platforms such as InnoCentive and Threadless exemplify the selection of optimal solutions, whereas Amazon M-Turk aggregates diverse solutions from the crowd (Mourelatos et al. 2022). Open-source problem-solving often benefits from a hybrid approach, where initial ideas are aggregated and refined collaboratively, followed by the selection of the most viable solutions.

Lastly, the accessibility to peer contributions varies significantly across platforms, ranging from no access to full modification capabilities. For instance, Innocentive and Amazon Mturk restrict access to contributions, while platforms like Threadless allow the crowd to view, judge, and modify each other's submissions, facilitating a more collaborative approach (Brabham et al. 2014, Chesbrough et al. 2024). Open-source problem-solving platforms, such as GitHub or Wikipedia, exemplify high levels of accessibility and collaboration, enabling participants to build upon each other's work, thereby accelerating innovation and improving the quality of solutions. This open-access model enhances transparency and fosters a sense of community and shared purpose among contributors, ultimately leading to more robust and widely accepted solutions.

Theory and Hypothesis Development

The motivations driving individuals to participate in crowdsourcing, such as open-source projects, are multifaceted and comprise intrinsic and extrinsic elements. Central to understanding the interplay between intrinsic and extrinsic motivations is the Cognitive Evaluation Theory, which suggests that extrinsic rewards can sometimes undermine intrinsic motivation, especially when the rewards are perceived as controlling rather than supportive of one's autonomy. This theoretical perspective provides a foundation for examining how different types of motivations influence the engagement and performance of contributors in open-source projects.

Cognitive Evaluation Theory: A Focus on the Effects on Intrinsic Motivation

Deci and Ryan (1980) established Cognitive Evaluation Theory (CET), the first sub-theory of SDT, from their prior experiments, in which they observed a dynamic interaction between extrinsic factors (e.g. rewards and choice) and people's intrinsic motivation (e.g. task interest or enjoyment). CET stipulates that external factors in social contexts either undermine or support intrinsic motivation (Deci & Ryan 1980). The support or thwarting of intrinsic motivation is the hallmark of Cognitive Evaluation theory.

Intrinsic motivation is defined by interest and enjoyment. Engaging in an activity for its inherent interest or enjoyment is the hallmark of being intrinsically motivated (Deci & Ryan 2012). With CET, enjoyment is the by-product of total immersion in an activity rather than the active pursuit of enjoyment before engaging in an activity. From the CET perspective, the enjoyment resulting from intrinsic motivation is personally relevant and long lasting, conducive to personal growth and Eudaimonia (Ryan et al. 2008). This contradicts the hedonic approach to well-being proposed by seminal authors Kahneman, Diener and Schwarz (1999). This enjoyment from the pursuit of immediate gratification results in superficial, short-lived feelings of excitement and positivity. Also central to intrinsic motivation is interest.

The denotation of interest, in CET, is the attraction an individual feels toward an activity. In the hedonic approach, activities serve one's self-interest or personal benefit as such interest is outward and thus forms part of extrinsic motivation.

Prevalent research on open-source software (OSS) attests to participants' involvement and task effort to seek fulfillment experienced through the crowdsourcing problem (Hertel et al. 2003, Jeppesen & Lakhani 2010). Emotions of interest and enjoyment remain core concepts of intrinsic motivation. Seminal studies highlight the predominance of intrinsic motivation among open-source contributors, emphasizing that participants in collaboration-based crowdsourcing, i.e. OSS communities, are not driven by monetary incentives (Crump 2011, Michel et al. 2015). In a more recent study, Smirnova, Reitzig and Alexy (2022) found that highly skilled individuals who contribute to a specific open-source software project do so to enjoy contributing and interest in the project. Literature also demonstrates crowdsourcing as an effective mechanism for problem-solving aimed at innovation (Afuah & Tucci 2013, Jeppesen & Lakhani 2010). However, in recent years, little can be attributed to whether intrinsic motivators contribute to effective and successful problem-solving in open-source projects. Hence, we propose our first hypothesis.

H1. Intrinsic motivation is positively associated with collaborative problem-solving through open-source projects.

From the cognitive evaluation perspective, humans have inherent intrinsic motivational propensities that will be expressed under particular conditions. In other words, the maintenance and improvement of these innate propensities necessitate supportive conditions, while unsupportive conditions equally disrupt those, does not concern what causes intrinsic motivation since it is viewed as an innate propensity; instead, it examines the conditions that facilitate or undermine this innate propensity (Ryan et al. 2008, Vansteenkiste et al. 2010, p 106). Various contexts initiate the thwarting or support of intrinsic motivation. Pivotal studies in CET emphasize how interpersonal settings influence intrinsic motivation. Controlling settings, where rewards are administered in a pressuring manner (e.g. performance-based bonuses and imposed goals), undermine intrinsic motivation by making individuals feel pressured to think, feel, or behave in specific ways (Deci & Ryan 2012). Such settings shift the perceived locus of causality from internal to external, diminishing feelings of autonomy and, thus, intrinsic motivation (Decharms 1968). Research has shown that performance-based rewards, verbal rewards perceived as controlling, and a lack of freedom of choice significantly undermine intrinsic motivation (Deci 1971, Moller et al. 2006). Social and environmental contexts like threats, deadlines, directives, and competitiveness also diminish intrinsic motivation (Amabile et al. 1994, Reeve et al. 2004).

Conversely, non-controlling interpersonal settings can enhance intrinsic motivation by being perceived as informational rather than controlling. These settings support autonomy and competence, essential for intrinsic motivation. Positive informational settings, such as providing choices and using rewards as feedback rather than control, have been found to enhance intrinsic motivation by satisfying the needs for competence and autonomy. Unexpected rewards, given after task completion, also support intrinsic motivation by not thwarting autonomy. Additionally, receiving positive feedback in an informative manner enhances intrinsic motivation by fulfilling the need for competence and freedom of choice.

Zheng et al. (2011) found that intrinsic motivation was more critical than extrinsic motivation in driving participation in a Chinese crowdsourcing community, suggesting that the quality of contributions was closely tied to intrinsic factors. On the contrary, Rogstadius et al. (2011) observed that an imbalance favoring extrinsic motivation over intrinsic motivation led to lower levels of accuracy and quality in crowdsourced tasks, supporting the CET's predictions. The interaction between intrinsic and extrinsic motivations in open-source projects remains complex. However, we propose next hypothesis:

H2: Extrinsic motivation negatively moderates the relationship between intrinsic motivation and collaborative problem-solving through open-source projects, such that the relationship is weakened as extrinsic motivation increases.

Figure 1 provides a matrix summarising the effect of extrinsic factors on intrinsic motivation by associating the extent to which a reward is perceived as controlling the thwart or support of intrinsic motivation.

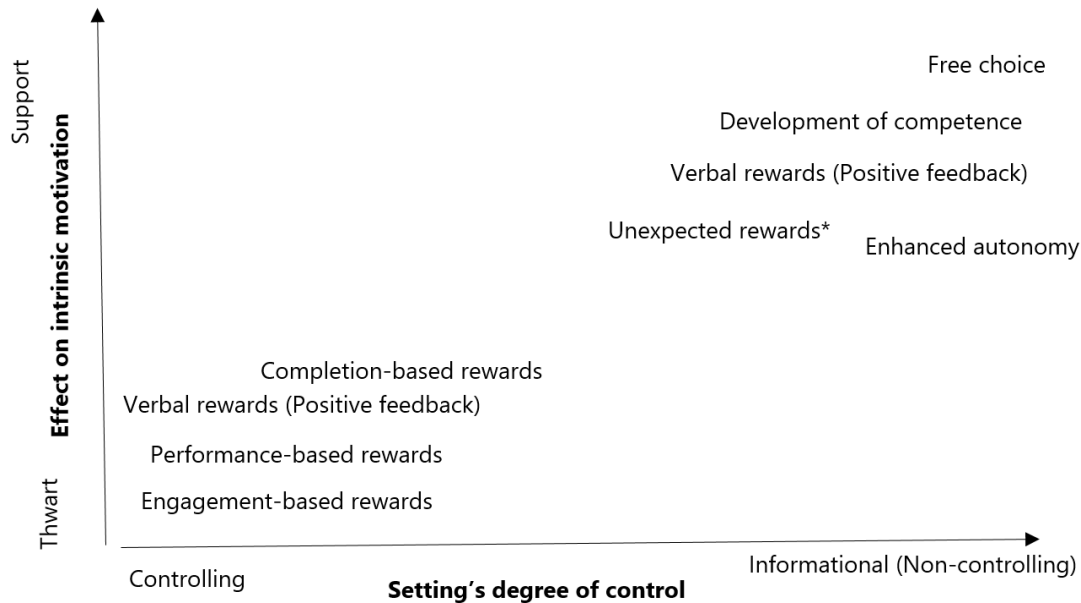


Figure 1. Extrinsic incentives and intrinsic motivation

Source: the authors' illustration based on literature

Figure 2 illustrates the conceptual model.

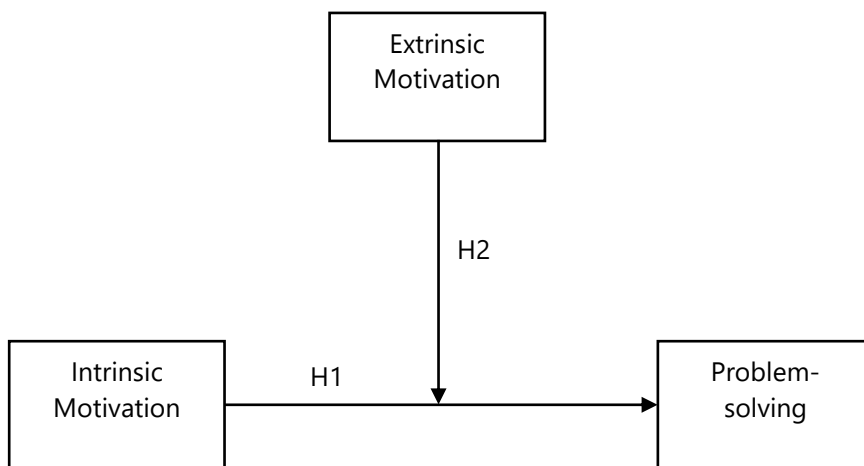


Figure 2. Conceptual Model

Source: the authors

Methodology

Quantitative research methods were employed through a purposive sampling procedure. Purposive sampling allowed for a substantial number of respondents to be surveyed quickly while ensuring that the appropriate participants were chosen to provide the data needed to test the hypotheses. The population from which the empirical sample was drawn includes all Amazon Mechanical Turk (Mturk) platform participants with experience in crowdsourcing. Mturk is a popular crowdsourcing platform that allows firms to hire workers to perform tasks for meager incentives. The Mturk participants are anonymous, complete various crowdsourcing tasks in various locations internationally, and are financially incentivized (Hauser & Schwarz 2016).

Sampling Mturk participants is a precedent of previous studies that have used Amazon's Mturk to collect survey data. About 300 Mturk crowdsourcing participants were targeted to gather data on participants' motivation in open-source projects. A total of 311 responses were gathered, and 288 usable responses were used for analysis. Notably, the sampling on Mturk adapted previous work by Liang et al. (2018) and Pee, Koh and Goh (2018). Pee et al. (2018) aimed to sample individuals participating on different crowdsourcing websites through Mturk. The use of Mturk in seminal academic research has expanded into other areas of social science, including psychology, health, and economics research (Bohannon 2016). Harrison-Walker (2015) sampled 600 Mturk participants to test the differences in psychology between lab participants and Mturk participants. Additionally, Stothart, Boot and Simons (2015) sampled 515 Mturk participants to investigate cognitive aging, while Heen Lieberman, and Miethe (2014) sampled 304 Mturk participants to contrast online survey hosting websites.

Operationalization of the Scales

The research instrument was a self-administered online questionnaire developed on SurveyMonkey and posted as a task on the Mturk platform. The Work Preference Inventory (WPI) was first introduced by Amabile et al. (1994) as a 30-item scale measuring two domains of motivation—extrinsic and intrinsic motivation. The items from the WPI scale were adapted to fit the study's context. The measure of successful problem solving in collaboration-based crowdsourcing was adopted from the perspectives of ISO/IEC 9126 on evaluating new software (Bhatti 2005, Colombo & Guerra 2002). ISO/IEC categories used to measure successful problem-solving in collaboration-based crowdsourcing, particularly open-source software, included functionality, reliability, usability, efficiency, maintainability, and portability. All the constructs were measured with five-point Likert scales, ranging from 1=strongly disagree to 5=strongly agree.

Data Analysis

The data was analyzed utilizing the SPSS and AMOS statistical programs to calculate the descriptive statistics and Cronbach's alpha coefficients and applying Structural Equation Modeling (SEM) to compare the relationships between respondents' intrinsic and extrinsic motivations, problem-solving, and interactive effects of these relationships. The measurement model was analyzed using covariance-based modeling through maximum likelihood estimation and modification indices. The Chi-square statistic, RMSEA (Root Mean Square Error of Approximation), SRMR (Standardised Root Mean Square Residual), CFI (Comparative Fit Index), IFI (Incremental Fit Index), and TLI (Tucker-Lewis Index) were used to assess how well the model fits the data. The $CFI > .90$, $TLI > .90$, $SRMR < .08$, and $RMSEA < .06$ thresholds must be attained to conclude that the measurement model relatively fits the observed data. To create interactive effects for extrinsic and intrinsic motivation, we followed the two critical steps. First, the extrinsic and intrinsic variables were standardized as a caution to eliminate the possibility of multicollinearity. Second, the product indicator approach was utilized to measure interactive effects. This approach multiplies the

indicators of the latent variables (independent variables) to create moderator variable indicators that measure the interaction term in the path model (Kenny & Judd 1984).

Results

Descriptive Analysis

This section details the descriptive statistics for demographic variables such as age, gender, years of experience in crowdsourcing, nationality, highest qualification, employment status, expertise, and hours spent crowdsourcing per week. The demographic analysis reveals predominately male participation (approximately 62% male), with a wide age range from 21 to 74 years, centring around a mean age of approximately 34. This diversity in age highlights the broad appeal and accessibility of crowdsourcing across different life stages. Educational backgrounds vary widely among participants, with the data suggesting a tilt toward higher education. Employment status distribution indicates a significant portion of the participants are likely employed (mean code of 3.42), suggesting crowdsourcing activities are supplemental to their primary employment. The dataset encompasses respondents from three distinct nationalities, with a mean code slightly over 1.5, indicating a majority from the first coded nationality, pointing towards a geographically concentrated pool of respondents, though still incorporating a modest international representation.

Years of experience in crowdsourcing span from newcomers to highly experienced individuals, with an average experience of approximately 3.4 years. This spread indicates a mix of seasoned and newer participants within the crowdsourcing ecosystem, reflecting its dynamic nature and ongoing attraction to a wide range of individuals. The notable maximum of 35 years of experience in crowdsourcing highlights the longevity and evolution of participation over time. However, such outliers may also suggest a need for further data verification or represent pioneering participants in early forms of crowdsourcing.

Reliability and Validity—Measurement Model

The fit statistics of the measurement model revealed that a relatively good model fit was achieved. The fit index values of *CFI* (.94), *IFI* (.94), and *TLI* (.93) were well above the cut-off point of .90, and *RMSEA* (.05) and *SRMR* (.04) were less than the conservative cut-off of .06, with 90 percent confidence lower limit of .03 and upper limit of .06. Further, the *CMIN/df* value was found within the recommended range of 2–5 (1,712), demonstrating that the measurement model fits the data well. Figure 2 shows a graphical representation of the measurement model.

Once the model fit was established, reliability and validity tests were conducted to determine the accuracy of the measurement model. First, Cronbach's alpha coefficients were calculated to determine the internal consistency of all scales measuring extrinsic motivation, intrinsic motivation, and problem-solving. The reliability of all the measurement scales used reported in Table 1 indicates that Cronbach's alpha coefficients for each factor are larger than .7, indicating high reliability and consistency between items measuring each construct under study. This shows that all the items are internally consistent and reliable for measuring the construct variables.

Secondly, two measures of validity were calculated to measure how accurately the instrument measured what it was intended to. Discriminant validity was measured to determine the relationship between constructs. In doing so, the average variance explained should be greater than the squared correlation. The discriminant validity reported in Table 1 indicates that the instrument had discriminant validity.

Lastly, the average factor loading was calculated to determine convergent validity. An average factor loading of .7 indicated convergent validity. The convergent validity is reported in Table 1, which indicates that the average factor loading was below the .7 threshold.

Table 1. Reliability and Validity

Variables	Discriminant validity ($AVE > Correlation^2$)	Reliability Cronbach alpha	Convergent Validity (Av. factor loading)
Extrinsic Motivation	.41 > .04	.88	.56
Intrinsic Motivation	.27 > .06	.90	.49
Open-source problem solving	.46 > .39	.71	.67

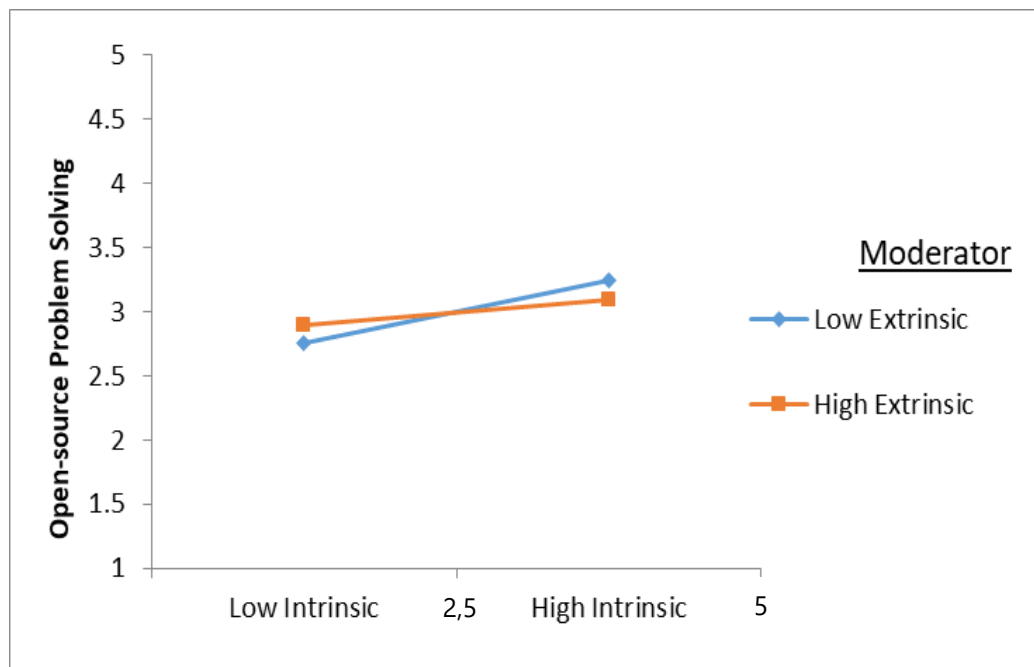
Hypothesis Testing—Structure Model

Structural paths were incorporated into the measurement model following the assessment of correlations, average variance extracted (*AVE*), and reliability. This model is detailed in Table 2 lists the hypotheses (*H*), path coefficients (β) with statistical significance at the .05 level (*p*-values), and the outcomes of each path. Specifically, intrinsic motivation statistically significantly influenced open-source problem solving ($\beta = .17$, $p < .00$; supporting *H1*).

Table 2. Structural Model of the Variables and Interaction Effects

Hypothesis	Relationship	β weights	Std. β weights	P-value
<i>H1</i>	Intrinsic motivation → Problem-solving	.17	.18	.00
<i>H2</i>	Intrinsic motivation x Extrinsic motivation → Problem-solving	-.07	-.15	.01

Further, the interaction between intrinsic and extrinsic motivation was statistically significant (estimate = -.07, $p < .01$). The result identifies extrinsic motivation as a negative moderator of the relationship between intrinsic motivation and open-source problem-solving. Thus, the relationship between intrinsic motivation and open-source problem-solving becomes negative in the presence of extrinsic incentives.

**Figure 2. Two-Way Plot of Interaction Effects of Intrinsic and Extrinsic Motivation**

Hypothesis 2, stating extrinsic motivation negatively moderates the relationship between intrinsic motivation and open-source problem-solving, such that the relationship is weakened as extrinsic motivation increases, is supported. The two-way interaction plot illustrated in Figure 2 supports this finding. Extrinsic motivation weakens the relationship between intrinsic motivation and open-source problem-solving.

Discussion and Conclusion

The purpose of this research was to investigate the interaction between extrinsic and intrinsic motivations in solving complex problems through collaborative crowdsourcing in open-source projects through a pilot study. This interplay is critical for understanding how motivations impact the effectiveness of cooperative efforts in complex, voluntary environments such as open-source communities. First, it was found that open-source problem-solving is significantly associated with intrinsic motivation. Second, the moderating effect of extrinsic motivation on the relationship between intrinsic motivation and successful problem-solving was investigated. It was found that extrinsic motivation significantly moderates the relationship between intrinsic motivation and successful problem-solving. More specifically, extrinsic motivation negatively moderates the relationship between intrinsic motivation and successful problem-solving, such that the relationship is weakened as extrinsic motivation increases. The literature strongly supports this finding (De Jesus et al. 2013, Fischer et al. 2019). We can draw parallels between the Ubuntu philosophy and intrinsic motivation in open-source communities. Ubuntu, an African philosophy emphasizing interconnectedness, compassion, and collective success, aligns with the principles of intrinsic motivation by fostering a sense of community and shared purpose. Just as intrinsic motivation drives open-source contributors through personal satisfaction and community impact, Ubuntu encourages business practices prioritizing collective well-being and ethical behavior (Longweni & Mdaka 2023). Additionally, more recent work on habits of mind during creative problem-solving highlights the importance of diverse thinking skills in managing complex problems and emphasizing persistence, continuous learning, and listening with understanding and empathy as crucial for effective problem-solving in dynamic environments (Longweni & Mdaka, 2024). These habits resonate with the intrinsic motivations found in open-source projects, where contributors often persist through challenges, continuously learn, and value collaborative input.

The cognitive evaluation theory of motivation stipulates that external factors in social contexts either undermine or support intrinsic motivation. The support or thwarting of intrinsic motivation is the hallmark of cognitive evaluation theory. When the interpersonal style of administering external events and rewards is relatively pressuring (e.g. performance-based rewards and imposed goals), the rewards are experienced as more controlling, thus leading to more deterioration of intrinsic motivation. The findings contribute to cognitive evaluation theory by illustrating how external motivators can interfere with or diminish intrinsic motivation, particularly in crowdsourcing contexts. This aligns with Deci and Ryan's (1980) theoretical framework, which posits that intrinsic motivation is undermined when extrinsic rewards are perceived as controlling or coercive. Additionally, the findings of this research paper assist in understanding how motivation works in non-traditional work environments. This is particularly relevant as collaborative and open-sourced projects become more prevalent across various sectors.

Implications for Managers

The findings suggest that project leaders and managers of open-source projects should carefully consider the types of rewards or incentives they offer. Performance-based rewards and imposed goals, experienced as pressuring, could harm the intrinsic motivation that drives many open-source contributors. Managers should consider implementing more autonomy-supportive reward systems that enhance intrinsic motivation and use extrinsic rewards more judiciously to avoid diminishing the inherent motivation often

critical for creative and innovative outcomes. Managers should design reward systems that support autonomy rather than control. Performance-based rewards and imposed goals can feel pressuring and diminish intrinsic motivation, which is critical for open-source projects' voluntary and innovative nature. Instead, rewards should recognize contributions in a way that enhances feelings of autonomy and mastery.

Extrinsic rewards should be used sparingly and thoughtfully. While they can be effective in some contexts, overreliance on extrinsic incentives can weaken the intrinsic motivation that drives many contributors. Managers should balance recognition and rewards to maintain high intrinsic motivation. Ubuntu emphasizes interconnectedness and collective success, which aligns well with the collaborative spirit of open-source projects. Managers should cultivate a community where contributors feel their work is part of a larger, meaningful effort. This can be achieved through team-building activities, open communication, and shared goals.

Limitations and Future Research Directions

While the study outlines the negative impact of extrinsic motivation when it acts as a controlling mechanism, it does not fully explore scenarios where extrinsic rewards might synergize with intrinsic motivation. Different types and delivery methods of extrinsic rewards could have varying impacts, an area that remains underexplored. The data was collected solely from Mturk users, which may not represent the broader demographic of global open-source contributors. Future research should include a more diverse participant pool from various crowdsourcing platforms and geographic regions to enhance generalizability. Also, this study has limitations. Some measures, particularly for convergent validity, did not meet the desired thresholds, suggesting a need for further validation of the measurement instruments. Learning for this pilot study will be adapted for the main research study.

References

- Acar OA 2019. Motivations and solution appropriateness in crowdsourcing challenges for innovation. *Research Policy*, 48(8), 103716.
- Afuah A & Tucci CL 2013. Value capture and crowdsourcing. *Academy of Management Review*, 38(3), 457–460.
- Amabile TM, Hill KG, Hennessey BA & Tighe EM 1994. The work preference inventory: assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology*, 66(5), 950–967. <https://psycnet.apa.org/doi/10.1037/0022-3514.66.5.950>
- Bassi H, Lee CJ, Misener L & Johnson AM 2020. Exploring the characteristics of crowdsourcing: an online observational study. *Journal of Information Science*, 46(3), 291–312. <https://doi.org/10.1177/0165551519828626>
- Bhatti SN 2005. Why quality? ISO 9126 software quality metrics (functionality) support by UML suite. *ACM SIGSOFT Software Engineering Notes*, 30(2), 1–5. <https://doi.org/10.1145/1050849.1050860>
- Bohannon J 2016. Mechanical Turk upends social sciences. *Science*, 352, 1263–1264. <https://doi.org/10.1126/science.352.6291.1263>
- Brabham DC, Ribisl KM, Kirchner TR & Bernhardt JM 2014. Crowdsourcing applications for public health. *American Journal of Preventive Medicine*, 46(2), 179–187.
- Chesbrough HW, Radziwon A, Vanhaverbeke W & West J 2024. *The Oxford Handbook of Open Innovation*. Oxford University Press.
- Colombo R & Guerra A 2002. The evaluation method for software product. In *Proceedings of the 15th International Conference on Software & System Engineering & Applications*, Paris, France, December. 3–4.
- Crump J 2011. What are the police doing on Twitter? Social media, the police and the public. *Policy & internet*, 3(4), 1v27.
- De Jesus SN, Rus CL, Lens W & Imaginário S 2013. Intrinsic motivation and creativity related to product: a meta-analysis of the studies published between 1990–2010. *Creativity Research Journal*, 25(1), 80–84.
- Decharms R & Carpenter V 1968. Measuring motivation in culturally disadvantaged school children. *The Journal of Experimental Education*, 37(1), 31–41.
- Deci EL 1971. Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, 18(1), 105.
- Deci EL & Ryan RM 1980. The empirical exploration of intrinsic motivational processes. In *Advances in Experimental Social Psychology*, 13, 39–80. Academic Press.
- Deci EL & Ryan RM 2012. Self-determination theory. *Handbook of Theories of Social Psychology*, 1(20), 416–436.
- Fischer C, Malycha CP & Schafmann E 2019. The influence of intrinsic motivation and synergistic extrinsic motivators on creativity and innovation. *Frontiers in Psychology*, 10, 137.
- Harrison-Walker LJ 2015. Taking the plunge: online data collection using MTurk.
- Hauser DJ & Schwarz N 2016. Attentive Turkers: MTurk participants perform better on online attention checks than do subject pool participants. *Behavior Research Methods*, 48, 400–407.
- Heen MS, Lieberman JD & Miethe TD 2014. A comparison of different online sampling approaches for generating national samples. *Center for Crime and Justice Policy*, 1(9), 1–8.
- Hertel G, Niedner S & Herrmann S 2003. Motivation of software developers in open source projects: an internet-based survey of contributors to the Linux kernel. *Research Policy*, 32(7), 1159–1177. [https://doi.org/10.1016/S0048-7333\(03\)00047-7](https://doi.org/10.1016/S0048-7333(03)00047-7)
- Howe J 2006. The rise of crowdsourcing. <http://www.wired.com/wired/archive/14.06/crowds.html>
- Jeppesen LB & Lakhani KM 2010. Marginality and problem-solving effectiveness in broadcast search. *Organisation Science*, 21(5), 1016–1033. <https://doi.org/10.1287/orsc.1090.0491>

- Kahneman D, Diener E & Schwarz N 1999. Well-being: foundations of hedonic psychology. Russell Sage Foundation.
- Karachiwalla R & Pinkow F 2021. Understanding crowdsourcing projects: a review on the key design elements of a crowdsourcing initiative. *Creativity and innovation management*, 30(3), 563–584.
- Kenny DA & Judd CM 1984. Estimating the nonlinear and interactive effects of latent variables. *Psychological Bulletin*, 96(1), 201.
- Liang H, Wang MM, Wang JJ & Xue Y 2018. How intrinsic motivation and extrinsic incentives affect task effort in crowdsourcing contests: a mediated moderation model. *Computers in Human Behavior*, 81, 168–176. <https://doi.org/10.1016/j.chb.2017.11.040>
- Longweni M & Mdaka LE 2024. The mindful manager: exploring habits of mind during creative problem-solving in agricultural businesses. *Journal of the Academy of Business and Emerging Markets*, 4(2), 31–42. <https://doi.org/10.5281/zenodo.12692688>
- Longweni M & Mdaka LE 2023. Ubuntu's business edge: a systematic literature review and future directives. *Journal of the Academy of Business and Emerging Markets*, 3(2), 41–54. <https://doi.org/10.5281/zenodo.10183190>
- Mdaka LE & Longweni MJ 2024. Open innovation across the innovation value chain: an African perspective. in *innovation, entrepreneurship and the informal economy in sub-Saharan Africa: a sustainable development agenda* (249–278). Cham: Springer Nature Switzerland.
- Mdaka LE & Longweni M 2023. Open innovation and crowdsourcing research: a bibliometric mapping and cluster analysis using VOSviewer and Biblioshiny. 7th Academy of Business and Emerging Markets (ABEM) Conference Proceedings. https://epe.lac-bac.gc.ca/100/201/300/abem_conference_proceedings/abem-2023-conference-proceedings.pdf
- Michel F, Gil Y, Ratnakar V & Hauder M 2015. A virtual crowdsourcing community for open collaboration in science processes. *AMCIS 2015 Proceedings*. 3. <https://aisel.aisnet.org/amcis2015/VirtualComm/GeneralPresentations/3>
- Mohalajeng LE and Kroon J 2016. Perceptions by users of an Open Innovation platform regarding the innovation value chain. *Journal of Contemporary Management*, 13(1), 892-925.
- Moller AC, Deci EL & Ryan RM 2006. Choice and ego-depletion: the moderating role of autonomy. *Personality and Social Psychology Bulletin*, 32(8), 1024–1036.
- Mourelatos E, Giannakopoulos N & Tzagarakis M 2022. Personality traits and performance in online labour markets. *Behaviour & Information Technology*, 41(3), 468–484.
- Pee LG, Koh E & Goh M 2018. Trait motivations of crowdsourcing and task choice: a distal-proximal perspective. *International Journal of Information Management*, 40, 28–41. <https://doi.org/10.1016/j.ijinfomgt.2018.01.008>
- Randhawa K, Wilden R & Hohberger J 2016. A bibliometric review of open innovation: setting a research agenda. *Journal of Product Innovation Management*, 33(6), 750–772.
- Reeve J, Deci EL & Ryan RM 2004. Self-determination theory: a dialectical framework for understanding sociocultural influences on student. *Big Theories Revisited*, 4, 31.
- Roberts JA, Hann IH & Slaughter SA 2006. Understanding the motivations, participation, and performance of open source software developers: a longitudinal study of the Apache projects. *Management science*, 52(7), 984–999.
- Rogstadius J, Kostakos V, Kittur A, Smus B, Laredo J & Vukovic M 2011. An assessment of intrinsic and extrinsic motivation on task performance in crowdsourcing markets. *Proceedings of the 5th International Conference on Weblogs and Social Media*, 17–21.
- Ryan RM, Huta V & Deci EL 2008. Living well: a self-determination theory perspective on eudaimonia. *Journal of Happiness Studies*, 9, 139–170.
- Smirnova I, Reitzig M & Alexy O 2022. What makes the right OSS contributor tick? Treatments to motivate high-skilled developers. *Research Policy*, 51(1), 104368.

- Stothart CR, Boot WR & Simons DJ 2015. Using Mechanical Turk to assess the effects of age and spatial proximity on inattentive blindness. *Collabra*, 1(1), 2.
- Vanhaverbeke W & Cloudt M 2014. Theories of the firm and open innovation. In Chesbrough H, Vanhaverbeke W & West J (eds). *New frontiers in open innovation*. Oxford: Oxford University Press. 256–280.
- Vansteenkiste M, Niemiec CP & Soenens B 2010. The development of the five mini-theories of self-determination theory: an historical overview, emerging trends, and future directions. *The decade ahead: Theoretical Perspectives on Motivation and Achievement*, 16, 105–165.
- Wazny K 2017. Crowdsourcing ten years in: a review. *Journal of Global Health*, 7(2), 020602. <https://doi.org/10.7189/jogh.07.020602>
- West J & Bogers M 2017. Open innovation: current status and research opportunities. *Innovation, Organization and Management*, 19(1), 43–50.
- Zheng H, Li D & Hou W 2011. Task design, motivation, and participation in crowdsourcing contests. *International Journal of Electronic Commerce*, 15(4), 57–88. <https://doi.org/10.2753/JEC1086-4415150402>

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The use and trust of information sources related to the efficacy and safety of dietary supplements among US vs Chinese consumers: an exploratory study

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Dietary supplements are generally exempt from strict governmental regulations, leaving consumers to rely on various information sources to judge the safety and efficacy of these products. Given the differences in the US and Chinese marketplaces concerning government regulation and business responsibility, this study addresses the roles of different information sources for US and Chinese consumers. Findings reveal that while consumers in both countries rank family/friends and health professionals high (and marketer sources low), US consumers are more apt to trust online sources. While neither American nor Chinese consumers trust regulators to ensure supplement safety, Chinese consumers have lower trust than Americans.

keywords: nutritional supplements, dietary supplements, US consumers, Chinese consumers, government regulation, information source trust

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Introduction

Dietary supplements (also referred to as natural health products, complementary medicines, or food supplements) broadly include vitamins, minerals, herbs or other botanicals, amino acids, and other substances. Consumers often view them as a viable and low-cost approach to health enhancement, illness management, and personal improvement (Nichter & Thompson 2006). Despite the popularity and growing use of supplements, these products are generally neither regulated as conventional foods nor as drugs. As a result, regulations vary significantly across global markets. In the United States, for example, the Food and Drug Administration (FDA) regulates supplements as a separate category whereby “firms are responsible for evaluating the safety and labeling of their products before marketing to ensure that they meet all the requirements of the Dietary Supplement Health Education Act (DSHEA) and FDA regulations” (US Food and Drug Administration 2019). On the other hand, regulations are more stringent in China. The regulation of dietary supplements in China is governed by the Chinese Food and Drug Administration

(CFDA), which requires supplements to be registered and approved by the CFDA before they can be offered for sale. Manufacturers must submit detailed information about the composition of the product, the manufacturing process, and any safety and efficacy studies conducted. Any health claims made about the product must be supported by scientific evidence.

Regardless of government oversight, the burden generally falls on consumers to obtain accurate and comprehensive information regarding the efficacy and safety of dietary supplements. Customers have access to an array of information sources, and it is crucial to understand which sources consumers rely upon in their use of nutritional supplement products. Given the differences in economic and political systems and corresponding differences in the US and China marketplaces concerning consumer attitudes toward government regulation and business responsibility, it is reasonable to question how American and Chinese consumers differ in their trust in product-related information sources.

This study aims to understand various information sources' role for US and Chinese consumers in the risky but unevenly regulated nutritional supplement product category. It also examines consumer perceptions of supplement efficacy and safety. Finally, we examine which entities US and Chinese consumers believe should ultimately be responsible for ensuring dietary supplements' effective and safe use.

Literature Review

Market Size & Characteristics – USA

In American society, dietary supplements are now considered a viable and low-cost approach to health enhancement, illness management, and personal improvement (Nichter & Thompson 2006). Americans report using nutritional supplements to maintain or improve overall health and the health of specific organs, prevent disease, increase energy, improve mental health, achieve weight loss, and resolve miscellaneous health issues such as menopause and hot flashes (Bailey et al. 2013). Even though many dietary supplements are of dubious value and may be dangerous, they are mostly unregulated in the United States. In fact, the onus is placed on the Food and Drug Administration to prove a product is harmful rather than requiring manufacturers to demonstrate their products are safe and effective. (Wilson et al. 2006). American consumer dietary supplement expenditures are proliferating from US\$32 billion in 2016 to a projected about \$57 billion in 2024 (Mikulic 2019). According to the US Government Accountability Office (2013), approximately 150 million people in the United States use nutritional supplements, with 79 percent reporting daily use and 10 percent taking five or more different products per day. An estimated 77 percent of Americans use one or more of the tens of thousands of dietary supplements in place of prescription drugs, and 30 million use them instead of over-the-counter medications (Council for Responsible Nutrition 2019).

Research has explored the relationship between demographic factors (e.g. education, gender, and age) and beliefs about and intent to use supplements (Chandra et al. 2005, Gordon & Schaffer 2005). For example, a study of supplement use by US college athletes (Fralick & Trocchio 2019) revealed gender differences both in motivations (males: to gain strength; females; energy) and in the information sources they used (males: parents/guardians; females: coaches). Another stream of research compares the relative impact of dietary supplements versus prescription drugs on consumers' perceptions of a healthy lifestyle. Compared to nutritional supplements, medications reduce perceptions of health, diminish the importance of healthy lifestyle practices, and lead to lower motivation to engage in health-protective behaviors (Bolton et al. 2008). Subsequently, Royne et al. (2014) examined the impact of health consciousness on consumer attitudes and perceptions of supplement benefits and risks compared to prescription drug counterparts.

Market Size & Characteristics – China

China's dietary supplement market is growing at an estimated CAGR of about 13–14 percent. It is on track to overtake the United States as the largest supplement market, projected to reach US\$40 billion by 2023 and US\$69 billion by 2027. Several market factors fuel this growth, including the rise of China's consumer class, increasing health consciousness, an aging population, growth in e-commerce, and concerns regarding food security (China Business Review 2016). Chinese consumers' more popular supplements include collagen, grape seed extract, whey protein powder, and fish oil. It is common for Chinese consumers to take multiple supplements per day to promote overall well-being. Chinese consumers primarily opt for foreign supplement brands, mainly from the US and Australia, as these are more reliable than domestic brands. In turn, foreign brands have responded to the demand to include specific ingredients, branding, and packaging to better suit the Chinese market.

Supplement use in China spans age groups, with the heaviest usage among those 18–29. Consumers under 40 represent 62 percent of total buyers of food supplements (GMA 2020). While gyms and fitness centers are becoming popular in major cities like Shanghai and Beijing, these facilities are less common in smaller towns and rural areas. Vitamins and other dietary supplements provide an accessible alternative to participate in the wellness movement.

Government Regulation – USA

The Dietary Supplement and Nonprescription Drug Consumer Protection Act of 2006 requires mandatory reporting of serious adverse events associated with supplements and nonprescription drugs. However, the FDA can act against misrepresented claims of dietary supplements or adulterated products only after these supplements have reached the market. Thus, unlike prescription medications, tight regulatory oversight in the nutritional supplement category is lacking, and they need to be tested in controlled scientific studies. This regulatory approach, "innocent until proven guilty," provides consumers with inadequate protection despite reports of harm from contaminated and adulterated products (White 2020).

Even though some supplements contain substances similar to drugs, their regulations differ, particularly regarding product safety and health claims (Mason 1998). The FDA does not require supplements to have premarket approval or safety testing, as is necessary for new drugs and food additives (Vignuolo 1997). Supplement manufacturers were not required to submit evidence of efficacy or safety because the ingredients were found in food or had been used safely before the passage of DSHEA. Manufacturers must submit evidence of safety to the FDA seventy-five days before market release for those supplements that contain unproven ingredients. However, this safety information, which could include any citation to a published article, may be of questionable quality (e.g. a potentially biased study conducted by the manufacturer) (McNamara 1996).

Besides safety standards, DSHEA has fewer strict rules for substantiating health-related claims than the FDA has for drugs or food. DSHEA restricts FDA authority over supplements and gives manufacturers greater freedom to tout their products' health benefits. Although the Act mandates that the "nutrition statements of support cannot be false or misleading," there are no requirements for the manufacturer to substantiate the claims to the FDA, only notification that it is making a claim. Furthermore, the FDA can investigate documentary evidence for new drugs but has no expressed power to examine documentary records for supplements (Gilhooley 1997). White (2020) has been critical of the DSHEA and argues that it "was written to limit the FDA's oversight of dietary products" and cautioned that the supplement industry disregards consumer safety. Thus, self-regulation is unlikely to work.

Critics of the US nutritional supplement industry actively expose what they see as deficiencies in the industry regulations. They believe existing laws do not protect customers well, and there is substantial potential for harm from supplement use, ranging from financial loss to serious adverse health consequences. Dietary supplements continue to be used at a high rate because most consumers are uninformed about these issues. Multiple challenges in regulatory enforcement have significant public

health consequences, including inadequate evaluation of safety, insufficient requirements for efficacy, minimal surveillance for unsubstantiated labeling and marketing claims, inadequate quality assurance and control, and gaps in reporting of adverse events (AEs) in the context of a post-market regulatory framework (Starr 2015). Given what they see as a "Wild West" scenario, these industry critics have argued that regulators amend the DSHEA to require independent laboratory verification of new products and spot-checking products on shelves (White 2020).

Market Regulation – China

Dietary supplements are regulated as *health foods* in China, together with functional foods. Before 2015, when the new Chinese Food Safety Law went into effect, there needed to be more transparency in laws governing the manufacture and sale of supplements. This led to mistrust on the part of consumers and an environment that allowed unscrupulous parties to sell unsafe, shoddy, and in some cases, toxic products (Grebow 2015). The 2015 law establishes a notification-based system for certain supplements (vitamins and minerals) that allows those products to bypass the China Food and Drug Administration's (CFDA) registration process. The law implements function and ingredient catalogs, enabling the CFDA to oversee supplement components and end products. The new guidance also requires more detailed and comprehensive R&D reports from manufacturers, emphasizing product safety and scientific evidence of functionality. Jeff Crowther, executive director of the US-China-Health Products Association, says the new law helps boost transparency and eliminates some gray areas within the China supplement-regulatory framework that had grown murkier over the years. Supplements other than vitamins and minerals continue to be subjected to the long-standing *blue hat* system (named for the logo attached to approved products) that requires companies to engage in costly and extended review processes for each finished product. This system often prompts companies to sidestep the supplement approval process by classifying their products as *foods* (Grebow 2015).

Consumer Trust in Information Sources

US Consumers

With no clear, authoritative source of information, supplement users must determine which sources of information to trust (Thompson & Nichter 2007) and employ one or more sources of product information when choosing to use a particular dietary supplement. These include physicians and other health practitioners, family members and friends, mass media, in-store displays, advertisements, and online sources (Peters et al. 2003). Thompson and Nichter (2007) found that while supplement users receive information from a wide range of sources, 20 percent of respondents expressed skepticism about the value of the information obtained from most of these, including *scientific* knowledge about clinical trials of efficacy. In contrast, 35 percent trusted information and recommendations from lay referral networks or family members and friends. Another 23 percent characterized their supplement use decision as an *experiment* in which they employed knowledge and personal experience over *expert* sources of information.

When consumers reported they were motivated by family or friends to try a supplement, they cited a recommendation based on a positive experience, a family tradition, or culture as the influencing factor. They preferred to trust advice from those within their social support network. Attitudes regarding mass media credibility affected the degree to which consumers relied on news stories and product advertising (Teoh 2019). These findings comport with more general discoveries that one-third of Americans do not trust marketing. More than two-thirds of Americans are more apt to rely on advice from friends and family than in corporate marketing messages, with positive word-of-mouth having a significant impact. Consumers also count on online reviews before purchasing high-involvement products, with 73 percent of American adults indicating they would not consider a product with negative online reviews (Morrison 2014).

Previous consumer research on dietary supplement marketing primarily examined consumer reactions to direct-to-consumer advertising, unsubstantiated nutritional supplement claims, product warnings, and disclaimers (Mason & Scammon 2011, Royne et al. 2014). One such effort finds that government-mandated disclaimers do not impact supplements and that heavy users respond differently to disclaimers than light supplement users (Mason et al. 2007). The FDA has authorized several initiatives to improve product labeling to allow consumers to make more informed decisions about supplements. Homer and Mukherjee (2018) found that consumers made decisions about supplement efficacy despite limited information, unsubstantiated claims of benefits, and downplaying risks. Indeed, despite findings that many dietary supplements fail to deliver on promised benefits, consumers continue to exhibit high confidence in these products (Dodge & Kaufman 2007). White (2020) and others have called for consumers to be educated by health professionals about quality and efficacy issues and the risks of taking non-verified supplements. However, accepting this information is likely met with resistance by some consumers.

Chinese Consumers

Chinese consumers' purchase of vitamins and food supplements is often due to a recommendation made by friends or family members in China (GMA 2020). Chen et al. (2015) report on the usage and credibility of product information sources by Chinese rural customers for several products, including nutritional supplements. Over 1000 respondents from 34 rural counties/villages in 11 Chinese provinces participated in the study. The results show that rural Chinese consumers utilize various information sources depending on product categories. Most rural Chinese consumers (77%) ranked TV commercials as the top source for purchasing nutritional supplements. This study also establishes the link between perceived source credibility and information use. Chinese rural customers seemed to rely mostly on their family's recommendation for nutritional supplements (31%), followed by salesperson recommendations (26%) and TV commercials (23%) (Chen et al. 2015). Tzeng et al. (2022) report that nutritional knowledge influences Chinese consumers' acceptance, intention to purchase, and actual consumption of dietary supplements. Without advice from professionals, dietary supplement consumers typically identify products based on existing knowledge.

Research Propositions Development

We offer the following research propositions based on the literature review presented above and in light of this study's objectives.

Information sources: As consumers have access to an array of information sources regarding dietary supplements, including those from marketers (e.g. advertising, salespersons, and in-store displays) and third parties (e.g., online sites and family/friend recommendations), we propose our first research proposition: do American and Chinese consumers differ in their reliance on different sources of information?

Trust in efficacy by country-of-manufacture: Over 60 percent of nutritional supplements sold in China are imported from the US. Conversely, a limited number of Chinese-made supplements are available in the American market, so our second proposition is: does the trust in the efficacy of nutritional supplements differ for American and Chinese consumers based on the supplements' country of manufacture?

Trust in safety by country-of-manufacture: The research revealed that Chinese consumers value country of origin as a cue and an indicator of safety, with confidence in products manufactured in countries such as the US, Australia, and New Zealand (Miroso et al. 2020). Therefore, our third proposition is: does the trust in the safety of nutritional supplements differ for American and Chinese consumers based on the supplements' country of manufacture?

Perceptions of where responsibility lies for ensuring supplement efficacy and safety: The literature reveals that both US and Chinese consumers use a variety of information sources in assessing supplement safety and efficacy, although there are differences in which sources they trust. For example, Chinese consumers trust media sources more than US consumers, who are skeptical about marketers. In the food industry, Chinese consumers also value safety certifications (Miroso et al. 2020), while one in five Americans is skeptical of scientific studies and trials. Thus, our forth proposition is: do Chinese and American consumers vary on who they believe is responsible for ensuring supplement efficacy and safety?

Methodology

Research Instrument

The survey instrument was developed, which consisted of 26 questions, of which three were used to assess purchase frequency in five product categories – dietary supplements, over-the-counter drugs, skin care products, cars, and major appliances. The researchers developed these items based on the literature review. They tested on a sample of graduate students to ensure that they understood and captured the concepts of interest. Then, participants were asked to rank (1=most, 8=least used) the usefulness of eight information sources (television/radio commercials, online sources, family/friends, personal experience, print advertising, salespeople, in-store displays, health professionals) in making purchases for each of the product categories. Respondents also ranked the five product categories according to how much they trusted product efficacy and safety in each category. Participants were then asked to provide their opinions as to whether manufacturing location (US vs China), reliance on their knowledge and judgment, the manufacturer/retailer brand, and governmental regulations influenced their trust in the efficacy and safety when they purchased dietary supplements and the extent to which they felt various entities bore responsibility for ensuring product efficacy and safety. These were each assessed using 5-point Likert scale items (1=strongly disagree, 5=strongly agree). The respondents were then asked to provide general demographic information, including gender, age, education level, income level, and location, as in the case of the Chinese respondents.

The questionnaire was translated into Chinese, back translated, and modified until there was equivalency between the two versions. The appropriate Institutional Review Board approved the questionnaire, methods, and administration procedures for using human subjects. All subjects were apprised that they had provided their informed consent to participate in the study by completing the questionnaire. US citizens completed the English version, whereas, in the Chinese version, respondents included US-based individuals but were all either Chinese or Taiwanese nationals.

Sample

All questions were pre-tested by students in an undergraduate marketing class at a major university in the Northeastern US to ensure that they were clearly understood and unambiguous. Data was collected online through Qualtrics. We sent the relevant links to participants by email, using the network sampling method, starting with a convenience sample of students in the class of one of the co-authors. The final usable sample comprised 200 respondents (92 American and 108 Chinese). About 36 percent of the respondents were male, and 63 percent female. Within the US sample, 32 percent were male and 67 percent were female; within the Chinese sample, 39 percent were male and 60 percent were female. Across all respondents, 57 percent (US 84%, China 35%) were 18–24 years of age; 38 percent (US 7%, China 63%) were 25–34; one percent (US 2%, China 1%) were 35–44; and two percent (US 6%, China: 0%) were 45–64.

Results and Discussion

We used T-tests to assess differences between the mean responses of US and Chinese respondents on these variables: information sources, trust in supplement efficacy by country-of-manufacture, efficacy of

supplements by country-of-manufacture, perceptions of where responsibility lies for ensuring supplement efficacy and safety, and information sources regarding the efficacy and safety of dietary supplements. In the next section, we discuss the following research propositions in the context of differences between US and Chinese consumers.

Information sources: US and Chinese consumers relied most heavily on family/friends and health professionals and relied least on marketer information sources to make dietary supplement purchase decisions. Both rank the opinions of family/friends and health professionals highly, but the differences are not significant. The major difference between the two was in the use of online sources, with American consumers ranking online sources significantly ($p < .01$) higher (mean=3.53, where 1=most used) than their Chinese counterparts (mean=4.21). Interestingly, the use of information sources also varied across some of the other products studied, such as skincare and major appliances, but these are not reported here as they are not the focus of this study. Table 1 reports the differences between the nationalities.

Table 1. US and Chinese Consumers: Use of Information Sources Regarding Dietary Supplements

Source		Mean	SD	T-Score
Online	US.	3.53	1.55	9.46**
	China	4.21	1.61	
Family/Friends	US.	2.77	1.38	2.48
	China	2.49	1.14	
Health Professionals	US.	3.28	2.63	2.84
	China	2.72	2.07	
Marketer Sources	US.	5.99	.96	.00
	China	5.98	.71	

** $p < .01$, $df = 199$

Trust in Supplement Efficacy by Country-of-Manufacture: US and Chinese consumers indicated higher trust in the effectiveness of dietary supplements produced in the US than in China. While both sets of consumers placed greater confidence in the efficacy of US-manufactured supplements, interestingly, US consumers were significantly ($p < .05$) more likely to trust Chinese-made products (mean=2.62) than the Chinese (2.37). Table 2 reports the differences between the nationalities.

Table 2. US and Chinese Consumers: Efficacy of Supplements by Country-of-Manufacture

Group	Mean	Std. Deviation	T-Score
<i>Chinese-manufactured</i>			
U.S. consumers	2.62	.86	2.09*
Chinese consumers	2.37	.75	
<i>U.S.-manufactured</i>			
U.S. consumers	3.17	.99	-1.06
Chinese consumers	3.30	.65	

* $p < .05$; $df = 182$

Trust in Supplement Safety by Country-of-Manufacture: US and Chinese consumers were more apt to trust the safety of dietary supplements manufactured in the United States than those produced in China. However, there were no significant differences between the two sets of consumers. However, like their greater trust in the efficacy of Chinese-made supplements, US consumers also believed more in the safety

of Chinese-produced supplements (mean=2.74) than their Chinese counterparts (mean=2.45). Table 3 reports the differences between the nationalities.

Table 3. US and Chinese Consumers: Safety of Dietary Supplements by Country-of-Manufacture

Group	Mean	Std. Deviation	T-Score
<i>Chinese-manufactured</i>			
U.S. consumers	2.74	.82	2.58*
Chinese consumers	2.45	.72	
<i>U.S.-manufactured</i>			
U.S. consumers	3.38	.87	-.75
Chinese consumers	3.48	.71	

* $p < .05$; $df = 182$

Perceptions of where responsibility lies for ensuring supplement efficacy and safety: Chinese consumers indicated they were more likely (mean=3.87) than their American counterparts (mean=3.56) to believe they were responsible for ensuring supplement efficacy and safety instead of messaging from supplement manufacturers or government regulators in providing nutritional supplements that are safe and effective. Table 4 reports the mean, SD and associated significance level.

Table 4. US and Chinese Consumers: Judgment/knowledge in the Purchase of Dietary Supplements

Group	Mean	Std. Deviation	T-Score
U.S. consumers	3.56	1.12	-2.26*
Chinese consumers	3.87	.67	

* $p < .05$, $df = 182$

In general, both Chinese and US consumers indicated that the responsibility for ensuring the efficacy and safety of dietary supplements rested more with the manufacturer than with government regulators. However, the differences were not statistically significant. US consumers were significantly ($p < .00$) more apt to believe that the government was responsible for ensuring product safety than their Chinese counterparts. Table 5 reports the differences between the nationalities.

Table 5. US and Chinese consumers: Information Sources re. Efficacy/Safety of Dietary Supplements

Group	Mean	Std. Deviation	T-Score
<i>Efficacy: Responsibility of the manufacturer</i>			
US consumers	3.31	.97	-.40
Chinese consumers	3.36	.68	
<i>Efficacy: Responsibility of government regulators</i>			
US consumers	3.12	1.13	-.39
Chinese consumers	2.98	.94	
<i>Safety: Responsibility of the manufacturer</i>			
US consumers	3.33	1.05	-1.27
Chinese consumers	3.50	.70	
<i>Safety: Responsibility of government regulators</i>			
US consumers	3.12	1.09	-4.35***
Chinese consumers	2.98	.86	

*** $p < .00$, $df = 182$

This study provides insight into how American and Chinese consumers view the purchase of nutritional supplements. Both American and Chinese consumers rank family/friends and health professionals high when considering supplements. The critical difference is in online sources, where US consumers rank these significantly higher than Chinese consumers. Marketer sources (advertising, salespersons, and in-store messages) are not seen as trustworthy by either group (Table 1). As shown in Tables 2 and 3, American consumers trust the effectiveness (mean=2.62 vs 3.17) and safety (mean=2.74 vs 3.38) of nutritional supplements manufactured in China less than those manufactured in the US. Chinese consumers also place greater trust in both the efficacy and safety of US manufactured versus Chinese manufactured supplements. Still, interestingly, the only statistically significant difference is that US consumers have greater belief in both the efficacy and safety of Chinese-manufactured ones than do Chinese consumers. Consistent with the high ranking of personal information sources, reliance on the manufacturer and retailer brand image is relatively similar between American and Chinese consumers when purchasing nutritional supplements. Finally, while neither American nor Chinese consumers trust the government to ensure supplement safety, Chinese consumers have lower trust than Americans as Table 5 shows.

Implications for Policy Makers

One finding that should be troubling for marketers is the low ranking of the use of marketer sources by both US and Chinese consumers. Given the projected growth in nutritional supplement sales, as discussed earlier, marketers must build trust in their information as they invest in marketing expenditures to gain a larger market share. One area for them to explore is influencer marketing since this capitalizes on the use of online media and the influence of friends/family and health professionals, which the data shows is popular among consumers. Chinese manufacturers of nutritional supplements need to improve perceptions of effectiveness and safety in the American market, particularly at home. Using independent labs to test and certify supplements can help raise consumer trust in the safety and efficacy of these products. Nonprofits such as NSF International and the US Pharmacopeial Convention that review and set standards for supplements and verify them by auditing manufacturing facilities and testing for quality also, offer independent certification. Still, only some supplement manufacturers seek this certification (McGinty 2021). Different actors in the supplements sector can address some of the issues raised in this study. Manufacturers and retailers can provide free nutritional supplement samples to American and Chinese consumers to generate positive experiences. Good experiences will motivate consumers to purchase that brand's dietary supplements and generate positive word-of-mouth. While American and Chinese governments are tightening regulations and playing a more active role in ensuring safety and efficacy by setting more specific and strict regulations and working with the industry to improve product safety and quality, consumers still expect supplement manufacturers to ensure this.

Limitations and Directions for Future Research

The limitation of this study is that most survey participants are college students. Most respondents belonged to one of two age groups, 18–24 (56%) and 25–34 (38%). This limitation limits the ability to generalize the findings to the overall population. Future studies should attempt to reach all age groups of nutritional supplement users, especially among populations where low incomes and lack of access to healthcare cause people to self-medicate or rely on untested and unproven remedies. Another limitation is that this study needs to control participants' experiences of using nutritional supplements. Different experiences may lead to a different level of trust that customers place in dietary supplements. Further studies should categorize customers based on their experiences of using nutritional supplements. Since the data was collected for this study, the global pandemic has ravaged many countries since early 2020.

This pandemic has revealed weaknesses in national healthcare systems and the unevenness in citizens' access to them. It has also led to the advocacy of various untested and unproven Covid remedies, often by individuals who are not healthcare specialists. Sometimes, doctors and manufacturers have used social media to promote these remedies (Maxmen 2021). For vulnerable populations in the US, China, and elsewhere, such as low-income immigrant populations with high rates of COVID-19 infection but limited access to healthcare, unregulated drugs are appealing because of cost and accessibility.

Future research might explore changes in the sources of nutritional supplement information used by consumers post-pandemic; whether consumers are more attentive to the country of manufacture, their trust in and expectations of manufacturers, retailers, and healthcare professionals; and whether confidence in government regulators to ensure safety and efficacy have changed. Given the considerable growth in sales of supplements because of the pandemic, the issue of trust in quality, safety, and efficacy may become more important as consumers seek to maintain their health and well-being.

References

- Bailey RL, Gahche JJ, Miller PE, Thomas PR & Dwyer JT 2013. Why US adults use nutritional supplements. *JAMA Internal Medicine*, 173(5), 355–361.
- Bolton LE, Reed A & Volpp KG 2008. How does drug and supplement marketing affect a healthy lifestyle? *Journal of Consumer Research*, 34(5), 713–726.
- Chandra A, Miller K & Willis WK 2005. Perceptions, attitudes, and beliefs of elderly consumers towards vitamin and mineral supplements. *Journal of Medical Marketing*, 5(4), 353–362.
- Chen Q, He Y, Zhao X & Griffith D 2015. Sources of product information for Chinese rural consumers. *International Journal of Advertising*, 27(1), 67–97.
- China Business Review (2016). Getting in to shape: exploring China's health supplements industry. <https://www.chinabusinessreview.com/getting-into-shape-exploring-chinas-health-supplements-industry>
- Council for Responsible Nutrition 2019. Dietary supplement use reaches an all-time high. <https://www.crnusa.org/newsroom/dietary-supplement-use-reaches-all-time-high>
- Dodge T & Kaufman A 2007. What makes consumers think dietary supplements are safe and effective? The role of disclaimers and FDA approval. *Health Psychology*, 26(4), 513–517.
- Fralick AM & Trocchio RB 2019. Division II athletes' dietary supplement use, sources of information, and motivations to use dietary supplements. *Journal of Sport Behavior*, 42(4), 441–460.
- Gilhooley M 1997. Herbal remedies and dietary supplements: the boundaries of drug claims and freedom of choice. *Florida Law Review*, 49, 663.
- GMA 2020. The dietary supplements market in China. <http://marketingtochina.com/the-dietary-supplements-market-in-china>
- Gordon NP & Schaffer DM 2005. Use of dietary supplements by female seniors in a large Northern California health plan. *BMC Geriatrics*, 5(1), 1–10.
- Grebow J 2015. China's new dietary supplement law goes into effect in October. But will it solve the problems? <https://www.nutritionaloutlook.com/view/chinas-new-dietary-supplement-law-goes-effect-October-will-it-solve-problems>
- Homer PM & Mukherjee S 2018. The impact of dietary supplement form and dosage on perceived efficacy. *The Journal of Consumer Marketing*, 35(2), 228–238.
- Mason M J 1998. Drugs or dietary supplements: FDA's enforcement of DSHEA. *Journal of Public Policy & Marketing*, 17(2), 296–302.
- Mason MJ & Scammon D 2011. Unintended consequences of health supplement information regulations: the importance of recognizing consumer motivations. *Journal of Consumer Affairs*, 45(2), 201–223.

- Mason MJ, Scammon D & Fang X 2007. The impact of warnings, disclaimers, and product experience on consumers' perceptions of dietary supplements. *Journal of Consumer Affairs*, 41, 74-99.
- Maxmen A 2021. Desperate to receive Covid care. *The New York Times*, June 22, D1.
- McGinty JC 2021. The fine print of dietary supplements. *The Wall Street Journal*, June 26.
- McNamara SH 1996. FDA regulation of ingredients in dietary supplements after passage of the Dietary Supplement Health and Education Act of 1994: an update. *Food and Drug Law Journal*, 51, 313–18.
- Mikulic M 2019. Total US dietary supplement market size 2016-2024. <https://www.statista.com/statistics/828481/total-dietary-supplements-market-size-in-the-us>
- Mirosa M, Liu Y & Bremer P 2020. Chinese consumers' perceptions of food safety cues and maximising the effectiveness of food safety communications. *British Food Journal*, 123(1), 261–278.
- Morrison K 2014. Survey: Consumers don't trust product information in marketing. <http://www.adweek.com/socialtimes/consumers-trust-word-of-mouth-marketing/206388>
- Nichter M & Thompson JJ 2006. For my wellness, not just my illness: North Americans' use of dietary supplements. *Culture, Medicine and Psychiatry*, 30(2), 175–222.
- Peters CAO, Shelton J & Sharma P 2003. An investigation of factors that influence the consumption of dietary supplements. *Health Marketing Quarterly*, 21(1–2), 113–135.
- Royne M, Fox A, Deitz G & Gibson T 2014. The effects of health consciousness and familiarity with DTCA on perceptions of dietary supplements. *Journal of Consumer Affairs*, 48, 515–534.
- Starr RR 2015. Too little, too late: ineffective regulation of dietary supplements in the United States. *American Journal of Public Health*, 105(3), 478–485.
- Teoh SL, Ngorsuraches S, Lai NM, Bangpan M & Chaiyakunapruk N 2019. Factors affecting consumers' decisions on the use of nutraceuticals: a systematic review. *International Journal of Food Science and Nutrition*, 70(4), 491–512.
- Thompson JJ & Nichter M 2007. The compliance paradox: What we need to know about "real-world" dietary supplement use in the United States. *Alternative Therapies*, 13(2), 48–55.
- Tzeng S-Y & Ho T-Y 2022. Exploring the effects of product knowledge, trust, and distrust in the health belief model to predict attitude toward dietary supplements. *SAGE Open*, 12(1). <https://doi.org/10.1177/21582440211068855>
- US Food and Drug Administration 2019. Dietary supplements. <https://www.fda.gov/food/dietary-supplements>
- US Government Accountability Office 2013. Dietary supplements—FDA may have opportunities to expand its use of reported health problems to oversee products. US Government Accountability Office, 13–244.
- Vignuolo PA 1997. The herbal street drug crisis: an examination of the Dietary Supplement Health and Education Act of 1994. *Seton Hall Legislative Journal*, 21, 200–31.
- White CM 2020. Dietary supplements pose a real danger to patients. *Annals of Pharmacology*, 54(8), 815-819.
- Wilson KM, Klein JD, Sesselberg MA, Yussman SM, Markow DB, Green AE, West JC & Gray NJ 2006. Use of complementary medicine and dietary supplements among US adolescents. *Journal of Adolescent Health*, 38(4), 385–394.

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BOOK REVIEW


Book

Principles of Marketing
Albrecht MG, Green M & Hoffman L
2023 OpenStax, Rice University, ISBN: 978-1-951693-88-6

Reviewer

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There has been increasing concern in the higher educational community about the cost of college textbooks, with some sources, such as the Education Data Initiative, reporting that the average student may spend over \$1000 annually on books, with prices rising at three times the inflation rate. A quarter of the students surveyed worked extra hours and other skipped meals to pay for their books (Hanson 2024). Others have resorted to using cheaper eBooks or renting them to afford them. Some students report not buying textbooks because of their costs, which will harm their performance. One response to this, both at the individual faculty and the institutional level, is to promote textbook cost-saving programs for students. The University of Baltimore, for example, has the No Cost Materials Group, which provides grants to encourage faculty to redesign their courses using low/no cost material. OpenStax, a nonprofit at Rice University, funded by the Gates Foundations, Google, NSF, and others, provides free online and low-cost print textbooks in various subjects under a Creative Commons license. Other publishers offer low-cost options.

The Principles of Marketing text, published by OpenStax, presents the basic material needed to cover an introductory undergraduate marketing course well. The layout is clean, and the topics are readable and understandable, appropriate for the target students. Each chapter begins with an outline and spotlights a company, which is used as an example to highlight key concepts covered in the chapter. Each section starts with learning objectives and ends with a knowledge check quiz (with answers at the end) so students can assess their understanding of the material before moving on to the next section. The content is presented with current and relevant examples, and sections such as *careers in marketing* provide students with insights that can better prepare them for internships and marketing careers. There are links to additional sources for students interested in delving deeper, and each chapter ends with a summary and key terms. Discussion questions, critical thinking exercises, and short cases allow students to apply the concepts in the context of a real company. A nice feature is the marketing plan exercise, which runs through the book, where students build on each chapter's content to have a fully developed marketing plan. A useful template for this plan is also provided in which students complete each section as they finish the relevant material. The instructor's manual accompanying the text is comprehensive and complete, with attractive slides, a test bank, and detailed answers to end-of-chapter and case questions.

These books represent a welcome option for instructors, universities, and students concerned about the rising costs of textbooks, which is part of the larger issue of the increase in college costs. Low/no-cost books (along with course reserves, library resources, public domain work, instructor-developed material, etc.) are a way to bring educational material within the reach of many more students. My review of this book, a no-cost option, suggests that instructors should review the appropriateness of what is available in their disciplines. While Rice University was able to create OpenStax as an edtech nonprofit initiative, with the support and contribution of many generous donors, it will be interesting to see how the business model will evolve, given its dependence on donor funding. Nevertheless, it is an important initiative if education is to be affordable and textbook costs don't price many students out of the market. Many academic journals offer open access as an option, where authors pay a fee, in addition to the traditional subscription-based model. Textbook publishers may consider subsidizing students if funds become tight, given donations' fickleness and unpredictable nature.

My experience shows that these books, supplemented with other open-source work where needed, can provide affordable foundational knowledge without sacrificing quality and depth, and more instructors should consider using them. Students will welcome such initiatives.

Reference

Hanson M 2024. Average cost of college textbooks. <https://educationdata.org/average-cost-of-college-textbooks>

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