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Linking Human Capital Analytics to Total Quality Management Practices in Higher Education Institutions

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Abstract

Precise measurement of quality and performance indicators is paramount for undertaking organizational monitoring and controlling functions. Higher education institutions are no exception, when it comes to the need of measuring and calibrating performance in view of set goals and standards. In this regard, the notion of total quality management encapsulates all the key aspects of quality that are worth measuring in higher education institutions. From customer/student satisfaction to employee involvement, from leadership commitment to infrastructure, total quality management targets all these and miscellaneous areas for quality check and balance. While most dimensions of total quality management are well aligned with organizational tangible outcomes, certain aspects related to human resource management lack clarity in terms of outcomes. Evidence-based management calls for employment of human capital analytics or people metrics to facilitate accurate and outcome-based assessment of human resource investments. Drawing from literature, this study highlights key dimensions of total quality management in higher education institutions and provides a framework for their measurement with the aid of human capital analytics.

Keywords: TQM, HCAs, HR Metrics, HEIs, Quality.

Introduction

Gauging different quality indicators in higher education is paramount for institutional growth. Here, total quality management (TQM) offers a holistic approach in evaluating and calibrating vital areas of operations. Implementing TQM practices in higher education institutions (HEIs) is especially daunting because their structure is usually more bureaucratic than conventional business organizational designs. This hampers the autonomy with which necessary changes can be approved and enforced for quality improvement (Ali & Shastri, 2010).

TQM typically covers almost all functional and operational areas of the organization. However, sometimes it may fixate on financial performance indicators, while at other times, it may explore certain non-financial elements like job satisfaction, customer satisfaction and miscellaneous processes (Qasrawi, Almahamid & Qasrawi, 2017). When it comes to HEIs, TQM encapsulates pretty much both financial as well non-financial elements of TQM. From return on investment to knowledge development, there is a wide array of areas where TQM elements reside (Jamoliddinovich, 2022).

Given the vastness of research conducted in TQM field, this study aims to identify and narrow down the most critical TQM factors in HEIs. Rationale behind determining critical TQM indicators is to highlight and distinguish both hard and soft quality variables. Investment utility of latter is often debated due to its lack of alignment with organizational tangible and measurable outcomes (Hamilton & Sodeman, 2020). Here, human capital analytics (HCAs) come into play. Aiming for measurement of HR-related quality standards and their subsequent alignment with measurable outcomes is the motto of HCAs (Pease, 2015).

Hence, TQM factors that are interlinked with human resource (HR) function, whether directly or indirectly, are proposed to be measured using HCAs. The discussion on quantifying HR indicators is not old. It is inevitable now in the digital age of big data, where all kinds of data can be collected, mined, analyzed, and made decisions upon. Transformation of conventional HR practices to digitalization of HR through people metrics is a must for talent and people management (Fernandez & Gallardo-Gallardo, 2021; Saputra et al, 2022). Investment in people is a compelling idea but may remain mythical and subjective if not reflected in the financial bottom line. Thus, all HR investments must be tied to tangible outcomes (Pease, Byerly & Fitz-enz, 2013).

Purpose and Rationale of Study

The purpose of this paper is to discuss in detail quality function of HEIs and connect them with HR analytics or HCAs. The study dives into the science behind HCAs and their potential employment for informed, data-driven, and outcome-based decision making. Such decisions if implemented, may not only improve quality across the board, but also assist in future data mining, analysis, and interpretation for taking even better decisions. To achieve this, a framework is built to facilitate measurement of TQM critical areas using specific HCAs.

Significance of Study

This study discusses a vital concern of quality, i.e., measurement and calibration of quality parameters for reliable and actionable results. Changes striving towards betterment of organizational quality function is contingent upon precise measurement of quality variables. Here, variables related to human resource management (HRM) require attention since their relationship with tangible outcomes remains questionable. This study contributes to quality and HRM literature by drawing attention towards the need for accurate assessment and measurement of quality standards through HR metrics. The paper would benefit quality assurance units and HR departments of higher education institutions in facilitating evidence- and outcome-based decision making, especially when it comes to human factors.

Research Questions

This paper strives to answer the following research questions.

- What are the primary TQM indicators in HEIs?
- What is the relevance of HCAs in organizations' quality function?
- How do TQM indicators align with HR metrics?
- How can HEIs measure TQM dimensions through the aid of HCAs?

Research Objectives

Following are the research objectives of this paper.

- To establish major TQM parameters in HEIs based on literature.
- To determine the role of HCAs in measuring organizational quality indicators.
- To develop a framework for measuring quality parameters prevalent in HEIs through HCAs.

Literature Review

Total Quality Management in Higher Education

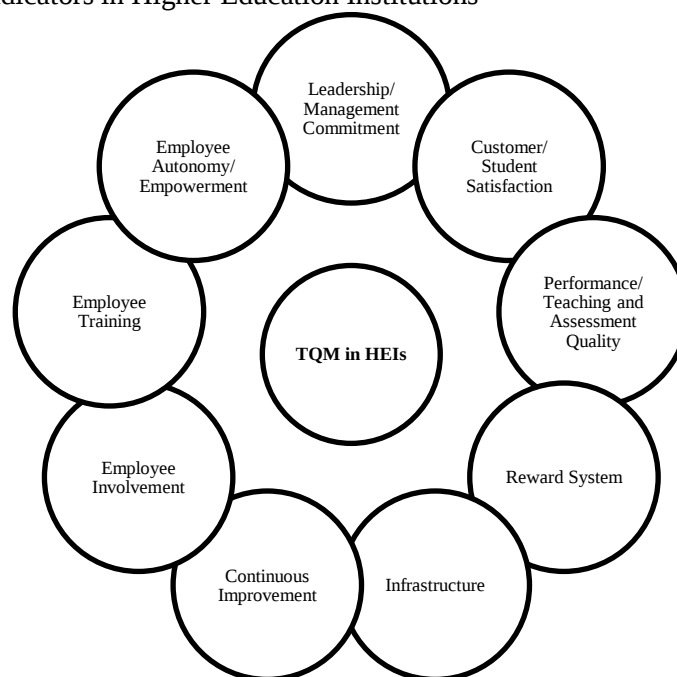
Pertaining to quality in today's age, education institutions need to be as evolving and competitive as any conventional business firm (Ali & Johl, 2022). While quality standards like six sigma and ISO 9000 have been widely used and calibrated to ensure high quality service provision (Khan, 2010), there is no shortage of quality indicators and critical success factors for establishing what constitutes quality in any given institution (Ali & Johl, 2022). Combinedly referred to as total quality management, TQM entails both human and non-human resources and how they are managed and capitalized for organizational gains (Kiran, 2017). This holistic outlook on quality also prevails in the higher education sector. Several papers have discussed the most critical quality indicators in higher education. Primary TQM indicators include leadership and strategic management, customer focus, employee training, human resource management, product and process design, corporate social responsibility, job satisfaction, employee empowerment, planning, stakeholder and supplier management, and information (Sila and Ebrahimpour, 2003; Nair, 2006; Molina-Azorín et al, 2009). Furthermore, strategic planning, top management commitment, teamwork, employee involvement, system approach, supplier relations and continuous improvement are also among the most widely discussed TQM indicators (Manatos et al, 2014).

Looking at studies across different countries, there is an overlap of a multitude of TQM indicators in higher education. In India, Ali and Shastri (2010) point out that quality in HEIs depend on customer satisfaction and identification, teaching quality, research, service price, teaching mode, stakeholder management, leadership, and the ability to embrace cultural/organizational transformation and change. Leadership and management commitment are most important quality parameters in Malaysian HEIs. These are followed by customer satisfaction, employee involvement, employee training, continuous improvement, communication, and teamwork (Salleh et al, 2018). A study conducted in Turkish universities state that process improvement, recognition, and meeting international quality standards are the dominant quality indicators, based on which accreditation or quality certification is awarded (Eryılmaz et al, 2016). Research from Greece signify TQM practices

of customer focus, leadership, vision, evaluation methods, process design, resource allocation process, employee involvement, reward systems, and employee training (Taraza & Anastasiadou, 2019). A study carried out in United Kingdom argues that students are not like conventional customers rather their purchase of education is contingent upon their own performance and learning. Thus, value for money in HEIs is directly tied to customer orientation. This includes students' trust in academic professionalism and their motivation towards education and learning. For faculty and staff, major TQM indicators are academic professionalism, subject knowledge, expertise, and autonomy (Cheng, 2017). In Vietnam, quality is demonstrated through leadership, admission criteria, student motivation, teaching quality, curriculum, internationalization, and campus life (Nguyen et al, 2020).

Studies from Pakistan also reinforce similar findings. Khan, Malik and Janjua (2019) affirm that HEIs should seek to improve quality assurance cell functions through training and development (T&D), better working conditions, leadership, employee focus and fair reward systems. Once again, customer focus and satisfaction are deemed the most important indicators of TQM implementation in Pakistani HEIs. For attaining customer or student satisfaction, top management commitment, communication, teaching and assessment methods, infrastructure and working environment are the driving factors (Khan, 2010). These and miscellaneous tangible factors play a pivotal role in effective service delivery by Pakistani HEIs (Shafqat et al, 2021; Suleman & Gul, 2015). In addition to customer or student satisfaction, employee involvement, employee motivation and leadership are some of the most prominent intangible parameters that are critical to TQM (Suleman & Gul, 2015). Knowledge creation and knowledge sharing are also associated with implementing TQM practices in Pakistani HEIs (Nasim, 2021). The above discussion highlights a plethora of factors that constitute TQM in higher education. The following figure depicts the most critical TQM factors based on their reinforcement by HEIs around the world.

Figure 1 – TQM Indicators in Higher Education Institutions



Source: Author

Human Capital Analytics

Big data and human capital analytics have transformed HR and talent management practices (Saputra et al, 2022). Also known as HR metrics/analytics, talent metrics or people metrics, human capital analytics and metrics refer to careful collection of data from a variety of sources, followed by analysis, and interpretation, aimed towards HR decisions that are justified in terms of measurable strategic, financial and performance related outcomes (Barbar, Choughri & Soubjaki, 2019). Represented by surveys, ratios, or products, HCAs are based on both qualitative and quantitative methods to assess the quality and utility of HR decisions. Quantifiable, measurable, and evidence-based in nature, they assist in analyzing complex HR functions to take data-driven HR decisions (Wirges & Neyer, 2022; Zafar et al, 2022).

HR should be viewed as an investment rather than a cost function. While traditional HR reporting systems have been in place to determine the worth of HR investments, they lack the ability to dissect and analyze big data (Pease, Byerly & Fitz-enz, 2013). For instance, descriptive analytics allow for mere observation and reporting of information, something that most organizations are already doing. Diagnostic metrics go further and assist in uncovering potential problems or antecedents of various phenomenon an organization seeks to understand. Predictive analytics allow for statistical modelling like correlational or causal designs to predict outcomes of different variables. Prescriptive metrics inquire what measures can be taken to improve the problems and fill the gaps identified through the previous three stages (Kale, Aher & Anute, 2022). Thus, HR analytics should not be confined to descriptive and diagnostic analysis. Unfortunately, predictive, causal, and prescriptive models that are evidence-based in nature, and better connect the HR decisions to tangible outcomes are still not widely used. Statistical modelling, artificial intelligence and simulation are some of the techniques to determine most viable and strategic HR decisions, transforming them from looming cost to rewarding investment (Fernandez & Gallardo-Gallardo, 2021).

Today, the vast and virtually unlimited availability and free flow of data provides an invaluable opportunity to make data-driven decisions (Gurusinghe, Arachchige & Dayarathna, 2021). Operational HR areas like hiring, training and development, compensation mechanism, motivation tools, performance management, and employee retention can be assessed in such a way so as to gauge their tangible and measurable returns (Fernandez & Gallardo-Gallardo, 2021; Gurusinghe, Arachchige & Dayarathna, 2021; Polyakova, Kolmakov & Pokamestov 2020). Reliance on data ensures decisions are realistically catered to HR needs. This may very well improve factors like motivation, retention, and performance (Qureshi et al, 2020). Here, the notion of appreciative inquiry is paramount to inquire what is working and where should the funds be allocated. The answer must also link back to tangible financial or productivity returns (Fernandez & Gallardo-Gallardo, 2021; Pease, Byerly & Fitz-enz, 2013).

Organizations that employ predictive HR analytics are more likely to make faster decisions than their competitors, are more likely to improve financial performance relative to industry and are more data-driven (Pease, 2015). Moreover, Organizations that use sophisticated HR metrics to handle big data tend to gain competitive advantage over others. However, adopting HR analytics requires proficiency in data handling, technological prowess for data analysis and interpretation, willingness to transform HR reporting and decision-making standards and culture that embraces HR decision making based on predictive HR modelling (Ejaz, Akbar & Shaikh, 2020).

Research Methodology

The paper follows a descriptive approach by taking a closer look at historical literature within the context of study variables. Based on literary discussion, the paper puts forward a basic framework for measuring TQM in HEIs through HR metrics.

Facilitating Total Quality Management through Human Capital Analytics

Data analytics can assist with effective TQM implementation by ensuring data is collected from the right place and interpreted to make the right decision (Shafqat et al, 2021). This applies to HR operations as well. While quality cells rely on data when it comes to product design, logistics, marketing, and finance, role of HR variables is usually considered to be indirect in meeting organizational goals. Therefore, investment in causes like motivation, leadership, or employee involvement seem like unwanted expenses (Pease, 2015). Application of HCAs counter this stance and places critical significance to these and other soft HR parameters in employing TQM practices (Ali & Johl, 2022).

Literature points out that TQM and HCAs are highly intertwined. For instance, organizations that implement TQM practices experience more job satisfaction and affective commitment. Both the HR metrics are tied to better performance (Khan, Malik & Janjua, 2019). Similarly, certain TQM practices are largely aided by HCAs (Asif et al, 2013).

Currently, HEIs use parameters like number of enrolled students, and research output as quality indicators (Tari & Dick, 2016), however they barely cover areas like leadership, employee involvement, teaching quality, and autonomy. Conversely, HCAs not only measure these but also model them against tangible returns. Highlighted in figure 1, nine critical TQM indicators in higher education institutions are identified. Out of these, seven can be gauged through HR metrics. Considering the scepticism towards HCAs, lack of training in employing and implementing different

HR metrics and bureaucratic resistance (Tari & Dick, 2016), this study presents a comprehensive framework for catering to each individual TQM area where HCAs apply. Specific HR metrics are prescribed for seven TQM indicators in HEIs that are directly part of HRM. No specific metric is prescribed for measuring customer/student satisfaction, however, factors like employee involvement, and employee empowerment in HEIs are subsequently linked back to student satisfaction (Shafqat et al, 2021). Most of the HR metrics discussed in this study are taken from the dictionary of people metrics published by Victorian Public Sector Commission in Australia (VPSC). There are hundreds of HR metrics used and recommended by numerous sources, thus, it is up to organizations' discretion to choose the most suitable metrics for decision making.

Coming towards the seven TQM indicators, *leadership and management commitment* has remained vital quality driver (Chen, Lee & Wang, 2020; Tari & Dick, 2016). Lack of effective leadership, strategic management, and commitment to long-term vision in HEIs is responsible for low teachers' morale and raise quality concerns (Asif et al, 2013; Suleman & Gul, 2015). Only sound leadership and top management commitment can help HEIs attain sustainable competitive edge (Chen, Lee & Wang, 2020). Leadership can be measured using two metrics namely *employee satisfaction with leadership* and *leadership development plan prevalence rate*. The former refers to employees' confidence in a leader's conceptual and communication skills and are inspired and motivated by them. This metric also translates into employee commitment and positive brand repute. The latter measure identifies managers who seek to develop leadership skills for taking on the reigns of the organization in future. The results can indicate potential candidates for managerial and leadership positions, followed by grooming programs to take on the respective roles (VPSC).

Employee autonomy and empowerment is another TQM indicator signifying independence in academic activities (Cheng, 2017; Tari & Dick, 2016). It can be measured using *employee empowerment surveys* that assess the degree of autonomy with which employees take decisions. *Cross function mobility rate* measures the autonomy in HR cross functional mobility for learning and development opportunities in the organization. This metric may promote employee engagement and retention. Lastly, the *flexible work hours rate* allows employees to acquire paid leave, telecommute or enjoy flexible working arrangements. Flexibility in scheduling improves employee retention (VPSC).

Employee training and professional development are the most widely discussed factors when it comes to implementing TQM in HEIs (Tari & Dick, 2016). Training metrics determine whether it is smart to invest money in a training program and whether it is aligned with organizational objectives. Firms that use predictive HR models to determine training effectiveness are better at evaluating the usefulness and benefits of training programs (Zafar et al, 2022). Two metrics associated with measuring training feasibility and effectiveness include *HR initiative completion rate* that shows employees' commitment to completing a training program (Debara, 2022). This may determine desirable T&D areas that the workforce seems to seek. *Training experience satisfaction rate* is another metric that denotes learner's satisfaction with the learning they received from the training program. Lastly, *training ROI* metric directly relates training to financial returns. Programs with high training ROI rates are promoted and reinforced given the tangible benefit they bring in (Vulpen, 2021).

Gauging *employee involvement* for TQM employment is difficult but necessary (Asif et al, 2013). Employees play the most vital role in services. Quality of service delivery in HEIs is contingent upon employees' conduct, mannerism, care, empathy, and courtesy. Albeit intangible, these factors translate into better performance, customer satisfaction and financial returns (Shafqat et al, 2021; Tari & Dick, 2016). Employee involvement and engagement at work are found to be strongly associated with net income and earnings per share (Pease, Byerly & Fitz-enz, 2013). For measurement, *employee engagement index* can be employed to determine employee effort, enthusiasm, and overall involvement in their daily tasks. High involvement and engagement ensure employee retention. Employee involvement can also be assessed using *absence and turnover rates*. High absenteeism and turnover are usually considered antithesis of work engagement and involvement, thus signalling low work involvement, and calling for interventions (VPSC).

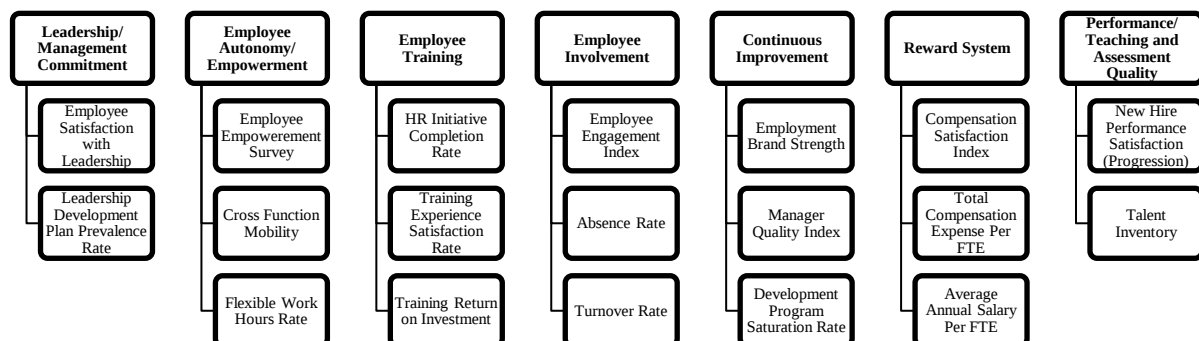
Continuous improvement entails benchmarking and stakeholder focus. In HEIs, continuous improvement is ensured by relying on data like student ratings, student results, grievances and complaints, student learning, program design and resources (Asif et al, 2013; Tari & Dick, 2016). Keeping in mind the goal to imitate industry's best practices, a metric of *employment brand strength*

can be used. It measures the desirability of an organization's remuneration, working conditions, and culture relative to competitors. A strong brand ensures employee commitment, and low turnover. Employees' perception about the quality of manager's work can be examined through *Manager quality index*. This metric can promote bottom-up feedback, resulting in continuous improvement in managerial practices of HEIs. Lastly, the *development program saturation rate* shows the percentage of employees participating in development programs. These programs include acquisition of new skills for enhancing individual as well as organizational performance (VPSC).

An efficient *reward system* is an invaluable TQM component. It must inculcate compensation plans that are tuned with employee performance. Here, application of HCAs allows for alignment of expected performance with the right pay structure, thereby improving productivity (Qureshi et al, 2020). The quality of reward systems can be measured using a metric of *compensation satisfaction index* that determines how equitable the pay structures are perceived by the workforce. Equitable and competitive wages and salaries improve job satisfaction. From an operational standpoint, metrics like *total compensation expense per full-time employee* and *average annual salary per full-time employee* may help determine compensation expenses and cost control mechanism may be devised accordingly (VPSC).

The final TQM indicator is *performance* which is judged by teaching and assessment quality in HEIs. However, monitoring of teaching staff is not easy given the multitude of programs, pedagogical paradigms, teaching methodologies, program design and delivery modes (Asif et al, 2013). The HR metrics that may help measure employee performance include *new hire performance satisfaction (progression)*, which involves checking employees' periodic performance (VPSC). This metric facilitates better recruitment and devising ways to handle performance related issues. In addition to monitoring performance, it also controls high turnover. *Talent inventory* metric can also measure performance by defining different skills that employees possess (Bag, 2016). Examining skill variety can assist with identifying employees' strong suits as well as learning gaps. Figure 2 depicts the conceptual framework connecting TQM indicators with their respective HR metrics.

Figure 2 – Conceptual Framework



Source: Author

Discussion

Managing quality in higher education institutions is generally considered a matter of academic performance, program performance, faculty training, student intake, student satisfaction, teaching methodology, research output and infrastructure. (Gamboa-Suárez, Avendaño-Castro & Núñez, 2022; Khan, 2010). Performance across these parameters is judged based on organizational quality standards. Here, total quality management provides a holistic picture of individual as well as organizational performance (Lim et al, 2022).

Resource deployment for enhancement of the quality parameters mentioned above is up to institutional management (Gamboa-Suárez, Avendaño-Castro & Núñez, 2022). But while the outcomes of hard factors including infrastructure or higher student intake can be observed in the financial bottom line, benefits of spending in areas like faculty training and development, pedagogical innovations, or leadership skills are somewhat blurred. Lack of evidence-based management approach in HR quality management has led to the disconnection between HR expenses and outcomes (McCartney & Fu, 2022). Thus, the alignment between HEIs' soft investment and its financial or

productivity-based outcomes becomes indispensable. Nevertheless, there remains a wide gap in precise and outcome-based measurement of HR variables (Wirges & Neyer, 2022). Particularly, the use of predictive and prescriptive HR analytics and metrics has not been adopted by most organizations. One of the reasons is lack of sufficient awareness and information about HR metrics and how they are employed to calibrate quality across multiple HR and miscellaneous organizational functions. Furthermore, lack of selection of right data also inhibits organizational ability to align its quality parameters with various metrics (Fernandez & Gallardo-Gallardo, 2021).

In the context of quality, this paper draws attention towards half-hearted utilization of HR data, with descriptive and diagnostic analysis being the most common. Often, data for predictive and prescriptive analysis is not even collected let alone used for effective decision making. Against TQM standards, use of HR analytics or HCAs in their full form can not only highlight the gaps for improvement, but also suggest remedies for numerous problems. Particularly for HR departments, an understanding of HCAs would make many HR expenses seem like worthwhile quality investments rather than futile verbiage and paperwork shuffle with no real outcomes.

Conclusion

This study explored TQM dimensions and their application in HEIs through the aid of human capital metrics and analytics. Based on literature, nine principal TQM indicators that contribute to quality function of HEIs were identified out of which seven are measurable using different HR metrics. The paper draws from TQM and HCAs literature to provide a precise framework for measurement of TQM facets through objective and quantitative HR analytics. The framework would pave the way for understanding and applying people metrics to various quality parameters in HEIs.

Future Research Prospects

This study is confined to the discussion of evaluating TQM indicators through HR metrics. Future studies may delve deeply into the classification of HR analytics, focusing especially on predictive and prescriptive metrics. Longitudinal studies testing the effects of adopting HCAs may highlight temporal utility of HR analytics for organizations.

References

- Ali, K. & Johl, S.K. (2022). Soft and hard TQM practices: Future research agenda for industry 4.0. *Total Quality Management & Business Excellence*, 33(13-14), 1625-1655. doi:10.1080/14783363.2021.1985448.
- Ali, M. & Shastri, R.K. (2010). Implementation of total quality management in higher education. *Asian Journal of Business Management*, 2(1), 9-16.
- Asif, M., Awan, M.U., Khan, M.K., & Ahmad, N. (2013). A model for total quality management in higher education. *Quality & Quantity*, 47, 1883-1904. doi:10.1007/s11135-011-9632-9.
- Bag, D. (2016). *Business analytics*. London: Routledge. doi:10.4324/9781315464695.
- Barbar, K., Choughri, R., & Soubjaki, M. (2019). The impact of HR analytics on the training and development strategy - Private sector case study in Lebanon. *Journal of Management and Strategy*, 10(3), 27-36. doi:10.5430/jms.v10n3p27.
- Chen, R., Lee, Y-D., & Wang, C-H. (2020). Total quality management and sustainable competitive advantage: Serial mediation of transformational leadership and executive ability. *Total Quality Management & Business Excellence*, 31(5-6), 451-468. doi:10.1080/14783363.2018.1476132.
- Cheng, M. (2017). Reclaiming quality in higher education: a human factor approach. *Quality in Higher Education*, 23(2), 153-167. doi:10.1080/13538322.2017.1358954.
- Debara, D. (2022). HR metrics: What they are, why they matter, and which ones to track. *BetterUp*. Retrieved from <https://www.betterup.com/blog/hr-metrics>.
- Eryilmaz, M.E., Kara, E., Aydoğan, E., Bektaş, O., & Erdur, D.A. (2016). Quality management in the turkish higher education institutions: Preliminary findings. *Procedia - Social and Behavioral Sciences*, 229, 60-69. doi:10.1016/j.sbspro.2016.07.114.
- Ejaz, S., Akbar, W., & Shaikh, M. (2020). Slow adoption of HR Analytics: Understanding from the lens of innovation diffusion theory. *International Journal of Management*, 11(11), 2090-2101. doi:10.34218/IJM.11.11.2020.198.
- Fernandez, V. & Gallardo-Gallardo, E. (2021). Tackling the HR digitalization challenge: Key factors and barriers to HR analytics adoption. *Competitiveness Review: An International Business Journal*, 31(1), 162-187. doi:10.1108/CR-12-2019-0163.

- Gamboa-Suárez, A.A., Avendaño-Castro, W.R., & Núñez, R.P. (2022). Educational quality management in Latin America. *Journal of Language and Linguistic Studies*, 18(2), 52-65.
- Gurusinghe, R.N., Arachchige, B.J.H., & Dayarathna, D. (2021). Predictive HR analytics and talent management: A conceptual framework. *Journal of Management Analytics*, 8(2), 195-221. doi:10.1080/23270012.2021.1899857.
- Hamilton, R. H., & Sodeman, W. A. (2020). The questions we ask: Opportunities and challenges for using big data analytics to strategically manage human capital resources. *Business Horizons*, 63(1), 85-95. doi:10.1016/j.bushor.2019.10.001.
- Jamoliddinovich, U.B. (2022). Fundamentals of Education Quality in Higher Education. *International journal of Social Sciences & Interdisciplinary Research*, 11(1), 149-151.
- Kale, H., Aher, D., & Anute, N. (2022). HR analytics and its impact on organizations performance. *International Journal of Research and Analytical Reviews*, 9(3), 619-630.
- Khan, F. (2010). *Developing a total quality management framework for public sector universities in Pakistan*. (Unpublished doctoral dissertation). National University of Modern Languages, Pakistan.
- Khan, M.N., Malik, S.A., & Janjua, S.Y. (2019). Total quality management practices and work-related outcomes. A case study of higher education institutions in Pakistan. *International Journal of Quality & Reliability Management*, 36(6), 864-874. doi:10.1108/IJQRM-04-2018-0097.
- Kiran, D.R. (2017). *Total quality management - Key concepts and case studies*. First edition. Elsevier.
- Lim, W.M., Ciasullo, M.V., Douglas, A., & Kumar, S. (2022). Environmental social governance (ESG) and total quality management (TQM): A multi-study meta-systematic review. *Total Quality Management & Business Excellence*, doi:10.1080/14783363.2022.2048952.
- Manatos, M., Sarrico, C.S., & Rosa, M.J. (2016). On the integration of quality management in universities. An analysis based on Quality Policy Statements. In *Global Challenges, National Initiatives, and Institutional Responses: The Transformation of Higher Education* (pp.143-158). doi:10.1007/978-94-6300-675-0_8.
- McCartney, S., & Fu, N. (2022). Bridging the gap: why, how and when HR analytics can impact organizational performance. *Management Decision*, 60(13), 25-47. doi:10.1108/MD-12-2020-1581.
- Molina-Azorín, J.F., Tari, J.J., Claver-Cortés, E., & López-Gamero, M.D. (2009). Quality management, environmental management and firm performance: A review of empirical studies and issues of integration. *International Journal of Management Reviews*, 11, 197-222. doi:10.1111/j.1468-2370.2008.00238.x.
- Nair, A. (2006). Meta-analysis of the relationship between quality management practices and firm performance—Implication for quality management theory development. *Journal of Operations Management*, 24(6), 948-975. doi:10.1016/j.jom.2005.11.005.
- Nasim, K. (2021). *Total quality management in higher education: A theoretical model and empirical evidence from Pakistan*. (Unpublished doctoral dissertation), Murdoch University, Australia.
- Nguyen, Q., Nguyen, D.V., Chu, N., & Tran, V.H. (2020). Application of total quality management in developing quality assessment model: The case of Vietnamese higher education. *Journal of Asian Finance, Economics and Business*, 7(11), 1049-1057. doi:10.13106/jafeb.2020.vol7.no11.1049.
- Pease, G. (2015). *Optimize your greatest asset – Your people. how to apply analytics to big data to improve your human capital investments*. New Jersey: John Wiley & Sons.
- Pease, G., Byerly, B., & Fitz-Enz, J. (2013). *Human capital analytics - How to harness the potential of your organization's greatest asset*. New Jersey: John Wiley & Sons.
- Polyakova, A., Kolmakov, V., & Pokamestov, I. (2020). Data-driven HR analytics in a quality management system. *Quality - Access to Success*, 21(176), 74-80.
- Qasrawi, B. T., Almahamid, S. M., & Qasrawi, S. T (2017). The impact of TQM practices and KM processes on organizational performance: An empirical investigation. *International Journal of Quality and Reliability Management*, 34(7), 1034-1055. doi:10.1108/IJQRM-11-2015-0160.
- Qureshi, M.A., Thebo, J.A., Rehman, S., Shahbaz, M.S., & Sohu, S. (2020). The role HR analytics, performance pay and HR involvement in influencing job satisfaction and firm performance. *International Journal of Advanced Science and Technology*, 29(11s), 382-392.

- Salleh, N.M., Zakuan, N., Ariff, M.S., Bahari, A.Z., ... Saman, M.Z. (2018). *Critical success factors of total quality management implementation in higher education institution: UTM case study*. The 6th International Conference on Manufacturing, Optimization, Industrial and Material Engineering. AIP Conference Proceedings, 2044(1). doi:10.1063/1.5080060.
- Saputra, A., Wang, G., Zhang, J.Z., & Behl, A. (2022). The framework of talent analytics using big data. *The TQM Journal*, 34(1), 178-198. doi:10.1108/TQM-03-2021-0089.
- Shafqat, T., Mushtaq, R., Tahir, Z., & Shaheen, W.A. (2021). Effects of total quality management (TQM) on financial and non-financial performance: Evidence from higher educational sector of Pakistan. *Humanities & Social Sciences Reviews*, 9(3), 1027-1037. doi:10.18510/hssr.2021.93101.
- Sila, I. & Ebrahimpour, M. (2003). Examination and comparison of the critical factors of total quality management (TQM) across countries. *International Journal of Production Research* 41(2), 235-268. doi:10.1080/0020754021000022212.
- Suleman, Q. & Gul, R. (2015). Challenges to successful total quality management implementation in public secondary schools: A case study of Kohat district, Pakistan. *Journal of Education and Practice*, 6(15), 123-134.
- Taraza, E. & Anastasiadou, S. (2019). *Evaluation of total quality management (TQM) in Greek higher education using advanced statistical methodologies*. 12th annual International Conference of Education, Research and Innovation, Seville, Spain. ICERI2019 Proceedings, 9450-9460. doi:10.21125/iceri.2019.2290.
- Tarí, J.J. & Dick, G. (2016). Trends in quality management research in higher education institutions. *Journal of Service Theory and Practice*, 26(3). doi:10.1108/JSTP-10-2014-0230.
- VPSC - Victorian Public Sector Commission. *A Dictionary of People Metrics*. Melbourne.
- Vulpen, E. (2021). 10 Employee Training Metrics You Should Know. *Academy to Innovate HR*. Retrieved from <https://www.aihr.com/blog/training-metrics/>.
- Wirges, F., & Neyer, A-K. (2022). Towards a process-oriented understanding of HR analytics: Implementation and application. *Review of Managerial Science*. doi:10.1007/s11846-022-00574-0.
- Zafar, N., Asadullah, M.A., Zia Ul Haq, M., Siddiquei, A.N., & Nazir, S. (2022). Design thinking: A cognitive resource for improving workforce analytics and training evaluation. *European Journal of Training and Development*. doi:10.1108/EJTD-09-2021-0150.