Human Resource Management (HRM) Practices and Female Mechanical Engineer Turnover Intentions: The Mediating Role of Social Capital

Tyrone Walston Gorrick
Human Resource Management (HRM) Practices and Female Mechanical Engineer Turnover Intentions: The Mediating Role of Social Capital

by

Tyrone Walston Gorrick

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We the undersigned committee hereby approve the attached dissertation, “Human Resource Management (HRM) Practices and Female Mechanical Engineer Turnover Intentions: The Mediating Role of Social Capital.”

by

Tyrone Walston Gorrick

Denise Siegfeldt, Ph.D.
Associate Professor
Nathan M. Bisk College of Business
Major Advisor

Gary Burns, Ph.D.
Professor and Department Chair
Industrial and Organizational Psychology

Alexander Vamosi, Ph.D.
Professor Emeritus
Nathan M. Bisk College of Business

Robert Schaller, Ph.D.
Associate Professor
Nathan M. Bisk College of Business

Theodore Richardson, Ed.D.
Dean and Professor
Nathan M. Bisk College of Business
Abstract

Title: Human Resource Management (HRM) Practices and Female Mechanical Engineer Turnover Intentions: The Mediating Role of Social Capital

Author: Tyrone Walston Gorrick

Major Advisor: Denise Siegfeldt, Ph.D.

The objective of the present study was to investigate the effect of human resource management (HRM) practices on female mechanical engineer turnover intentions while examining the mediating role of social capital. This study drew on insights from the HRM, social capital, and turnover theories and related models in the literature to formulate a set of hypothesized relationships and predictions that HRM practices positively influence social capital and social capital negatively affects female mechanical engineers' turnover intention.

Turnover remains a challenging issue for all organizations, driving the need for measures that reduce employee quit intentions and, ultimately, turnover. After all, the literature provides evidence that turnover intention is an antecedent of actual turnover. Furthermore, women represent a small percentage of the employed engineering workforce amidst industry retention statistics indicating that female engineer turnover rates remain very high, making their retention a top priority for managers and industry leaders. Few studies have examined the impact of HRM
practices on engineer turnover intentions, and no known research has investigated how HRM practices influence female mechanical engineer turnover intentions in a mediating social capital context. Filling the noted gap was an important motivation for this study. The data used to test the hypothesized relationships in this study was based on a reduced sample of 436 respondents, obtained through an anonymized survey drawn from employed male and female mechanical engineers with membership ties to the Society of Women Engineers (SWE) and the American Society of Mechanical Engineers (ASME). The researcher used exploratory factor analysis, confirmatory factor analysis, and structural equation modeling to assess the HRM practices, social capital, and turnover intention latent constructs.

The findings reveal that social capital partially mediates HRM practices' effect on female mechanical engineers' turnover intention. HRM practices also negatively and directly influence female mechanical engineers' turnover intention, implying that more HRM practices can reduce female mechanical engineer turnover intentions. The findings give managers and HR practitioners a greater understanding of the interaction effects of HRM practices, social capital, and turnover intentions, which can facilitate organizational change that reduces female mechanical engineer turnover intentions.

**Keywords:** Human resource management practices, social capital, turnover intentions, reliability, validity, exploratory factor analysis, confirmatory factor analysis, and structural equation modeling
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List of Abbreviations

American Society of Mechanical Engineers ............................................. (ASME)
Average Variance Extracted ................................................................. (AVE)
Bureau of Labor Statistics ..................................................................... (BLS)
Comma-Separated Values ....................................................................... (CSV)
Comparative Fit Index ........................................................................... (CFI)
Composite Reliability ............................................................................. (CR)
Confidence Interval ................................................................................ (CI)
Confirmatory Factor Analysis ................................................................. (CFA)
Degrees of Freedom ................................................................................. (df)
Diagonally Weighted Least Squares ....................................................... (DWLS)
Exploratory Factor Analysis ................................................................ (EFA)
Fair Labor Standards Act ....................................................................... (FLSA)
Generalized Least Squares .................................................................... (GLS)
High-Performance Work Practices ......................................................... (HPWP)
High-Performance Work Systems .......................................................... (HPWS)
Human Resource Management ............................................................... (HRM)
Identification ......................................................................................... (IDEN)
Intention to Quit ................................................................................... (INTQ)
Intention to Search ................................................................................ (INTS)
Jeffrey’s Amazing Statistical Program .................................................. (JASP)
Kaiser-Meyer-Olkin .................................................................(KMO)
Latent Variable Analysis ..........................................................(lavaan)
Marital Status ...........................................................................(MARST_ADJ)
Maximum Likelihood ................................................................(ML)
Measure of Sampling Adequacy .................................................(MSA)
Missing at Random ..................................................................(MAR)
Missing Completely at Random ...............................................(MCAR)
Missing not at Random ...........................................................(MNAR)
Network Ties ...........................................................................(NWT)
Number of Children ...................................................................(NMCHIL)
Organizational Tenure..............................................................(TNUR)
Participation, Autonomy, and Job Design .................................(PAJD)
Performance Appraisals and Rewards ......................................(PAR)
Principal Component Analysis ...............................................(PCA)
Principal Factors .....................................................................(PF)
Root Mean Square Error of Approximation ..............................(RMSEA)
Science and Engineering .........................................................(S&E)
Science and Technology ...........................................................(S&T)
Science, Engineering, and Technology ....................................(SET)
Science, Technology, Engineering, and Mathematics ..............(STEM)
Shared Values ..........................................................................(SHVAL)
Social Capital ...........................................................................(SC)
Society of Women Engineers .......................................................... (SWE)
Standardized Root Mean Square Residual ......................................(SRMR)
Structural Equation Modeling ..........................................................(SEM)
Thinking of Quitting ........................................................................(THQT)
Training and Development ................................................................(TD)
Trust ...............................................................................................(TRS)
Tucker-Lewis Index ............................................................................(TLI)
Turnover Intentions ...........................................................................(TI)
Unweighted least squares .................................................................(UWLS)
Weighted Least Squares ....................................................................(WLS)
Work-Life Balance ............................................................................(WLB)
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Additionally, Dr. Siegfeldt provided several recommendations and alternative sources when initial support offers failed to materialize. As the Bob Marley song goes, "When one door is closed, another is opened." Those lyrics were accurate in many respects when I discovered that support for my initial study idea was not possible. Dr. Siegfeldt's positivity was a source of inspiration that helped me retain focus and persevere despite the various challenges.

I am also profoundly grateful to Dr. Alexander Vamosi for helping me navigate the various aspects of factor analysis. I chose my research topic with little awareness of its complexities. I knew different statistical concepts from past learning; however, this research undertaking significantly increased my understanding of variance, Chi-square, validity, and mediation. The realization that factor analysis was a seminal part of my research highlighted the challenges ahead since I had no prior knowledge. In response, I nervously contacted Dr. Vamosi to
seek his help. I can unequivocally state that any reservations in my mind evaporated due to Dr. Vamosi's instant affirmation and support for the statistical element of my research.

Furthermore, his decision to join the dissertation committee laid the groundwork for the subsequent meetings and review sessions. Factor analysis encompasses numerous terms that can make the subject appear daunting. However, Dr. Vamosi's statistics expertise, kindness, patience, and willingness to extend his valuable time were the catalyst that simplified the various complexities, making the subject matter accessible. Many sessions with Dr. Vamosi extended beyond the allotted time, hallmarking his enthusiasm for the subject matter and teaching ability that motivated and stimulated my interest to probe further and develop a deeper understanding of the subject. Most of all, Dr. Vamosi always retained a cheerful disposition that enhanced my learning. I recall lighter moments when we discussed football, a sport near and dear to Dr. Vamosi's heart. For those reasons and more, I remain grateful and will forever cherish the experience and the friendship that resulted from the many learning sessions.

I would be remiss if I did not acknowledge the other dissertation committee members. First, Dr. Schaller was very generous in his support from the outset. In addition to offering practical recommendations aimed at helping me focus my writing, he continued to check on my progress beyond the proposal conference stage. As I prepared for my defense, Dr. Schaller was highly instrumental in providing timely feedback to enhance my dissertation's accuracy and quality. I do
not take the kindness extended for granted and remain grateful for his ongoing support.

Lastly, I sincerely thank Dr. Richardson for helping me focus on my research topic. I recall his pointed questions during the proposal conference that helped me understand the scope of my research and its limitations. Thank you for helping me visualize my research topic from a frame of reference centered on female mechanical engineers. Your sage counseling helped to place me on a path to success, and for those reasons, I remain grateful.

Life happens along the way as one navigates through the dissertation path. I lost my Navy mentor, Commander Leonard King (hereafter called CDR King), to cancer two months ago. To say that he was helpful in this process would be an understatement. I was about to give up on any hopes of getting an engineering organization to reply to my many emails seeking an opportunity to survey engineers in their workforce as part of my study. Many months went by with virtually no solid offers of support. During one of our chats, CDR King asked about my progress, and I explained that it was not going well. Within seconds, he had three possible sources. Those sources proved to be the turning point in my research. Ironically, a critical part of my research touched on the social capital concept because social capital made everything about gaining support for my survey possible. For instance, the first recommendation led to a contact at the Joint Oil Analysis Lab (formerly the Navy Oil Analysis Lab), who referred me to a source at
the Society of Tribologists and Lubrication Engineers, and finally, a contact at the American Society of Mechanical Engineers.

The relevant point is that through my long-standing relationship with CDR King, I could access the resources residing in other individuals to achieve a successful outcome for my survey. I emphasized this point in my dissertation during the discussion of "weak ties." Undoubtedly, I wished CDR King was around to see me complete this dissertation project and finally graduate. However, the Creator had other plans. Sometimes we are fortunate to encounter people who selflessly add to the sum of who we are, placing our lives on a trajectory of achievement and success in the process.

CDR King was that type of person to me and everyone who knew him; he was always ready and willing to give the shirt off his back if necessary. His life touched and advanced the well-being of many. He is the reason I pursued a commission to become a Navy officer, and when my Navy career came to a close, he continued as a great friend and was considered family. He was also the Godfather to my son and the second uncle to my other two kids. He served his country proudly and remained connected to countless navy brothers and sisters because that is who he was – selfless, kind, and interested in caring about others.

He went out of his way to always check in on family and friends on a regular basis in spite of maintaining a busy schedule in his personal life. His memory will forever remain present with me. May his soul continue to rest in eternal peace.
Moreover, this dissertation research would not be possible were it not for the support of other individuals. Specifically, I contacted several large engineering firms with global scope, requesting consent to poll their engineering workforce with zero positive results. Most have yet to reply. The few that provided an email response declined. Given the challenges experienced, I sincerely thank Dr. Roberta Rincon, Associate Director of Research at the Society of Women Engineers; Mr. Tom Costabile, Executive Director and Chief Executive Officer of the American Society of Mechanical Engineers; and Mr. Said Jahanmir. With the months slipping by and no meaningful progress, I took the chance and contacted the Society of Women Engineers and received a prompt response from Dr. Rincon. In addition to providing sage guidance to help me fine-tune my request, Dr. Rincon always provided timely answers to any questions asked during the period.

Furthermore, Mr. Said Jahanmir laid the preliminary groundwork and connection that facilitated my initial email contact and follow-on consultation with Mr. Costabile. For those reasons, I remain incredibly grateful for the support he provided.
Dedication

I am pleased to dedicate this dissertation to my wife, Donette Gorrick, who remains my biggest cheerleader. Her unfailing support in every facet of this journey made all the difference in my getting to this point. She took the lead numerous times to reduce my workload. The dissertation process took away valuable time from us over the years. However, she remained undaunted in her support, for which I am eternally grateful.

I appreciate the many nights she stayed up late to keep me company, offering a cup of tea for my continued alertness and ability to research and write for that extra hour. As I write this piece, it is 5 a.m., and she is already up and about, knowing I am trying to meet another established timeline. She does not know about this dedication, so it will come as a surprise when she eventually finds out. I love you, Don. Thanks for embarking on this journey with me. My success is your success, and your success is my success, a symbol that we are forever linked.

Thanks for everything.
Chapter 1: Introduction

Overview

The objective of the present study was to investigate the effect of human resource management (HRM) practices on female mechanical engineer turnover intentions (TI) while examining the mediating role of social capital (SC). Turnover intentions (behaviors) are an antecedent of actual turnover (Tett & Meyer, 1993; Cohen, Blake, & Goodman, 2016), which implies that the related behaviors that underpin turnover intentions: thinking of quitting, intention to search, and intention to quit or stay (Mobley, Horner, & Hollingsworth, 1978), if not monitored and managed by the employer, can eventually manifest in a turnover decision on the part of the individual or employee.

Furthermore, turnover can be disruptive to the organization due to the human and social capital losses that result from an engineer’s decision to leave, which can impact operational efficiency, effectiveness, and productivity (Zylka & Fischbach, 2017). Moreover, the voluntary departure of talented employees (engineers), and the cost to recruit, hire, and train a new employee is an added cost to the employer and can be extensive (Harden, Boakye, & Ryan, 2018).

This study drew on insights from the HRM, SC, and turnover literature to understand the theories that underpin the three constructs, namely HRM practices, social capital, and turnover intention that comprised the conceptual model and hypothesized model.
Although the focus of this study is the engineering discipline, and specifically, the issues of women’s underrepresentation in the mechanical engineering occupation, the discipline is an integral component of the various science-oriented occupations that receive wide coverage in the policy arena, academia, industry, and print media. In other words, this study extensively leveraged content from the science, technology, engineering, and mathematics (STEM), science and engineering (S&E), science, engineering, and technology (SET), and science and technology (S&T) literature to gain an understanding of the breadth and depth of the problem of women’s low participation rates in engineering coupled with their turnover intentions.

Moreover, the literature on engineer turnover intention is sparse compared to the broader STEM, S&T, SET, and S&E occupational fields where engineering is a subset. The issue of low female representation and retention in the engineering occupation is widely studied within the context of the various science-oriented occupational fields (White & Massiha, 2016; Syed & Chemers, 2011; Rainey, Dancy, Mickelson, Stearns, & Moller, 2018; Fouad, Chang, Wan, & Singh, 2017; Cardador & Caza, 2018; Fouad, et al., 2019).

Syed and Chemers (2011) characterized the underrepresentation of disadvantaged groups and women as a persistent social problem. Further, scholars have identified the need for greater fine-grained and empirically-based research data to inform which practices work best to influence the steady flow of talent into the high-tech occupational arena (Syed & Chemers, 2011). More importantly, the
low participation rate of females in engineering occupations at large exacerbates the perceived shortage of industry-wide talent to staff the hi-tech jobs.

Low pipeline flow of women engineering graduates from the educational arena into engineering careers (Cannady, Greenwald, & Harris, 2014) and female engineer turnover are believed to be the principal causes of the shortage problem (Parsa, Tesone, & Templeton, 2009). The issue was cogently discussed in *Women and Minorities in Science, Technology, Engineering and Mathematics: Upping the Numbers*, which was edited by Burke and Mattis (2007).

The extant research literature offers ample support that employees who voluntarily quit, often leave with valuable knowledge, skills, and abilities that impacts organizational performance. Moreover, advertising, interviewing, screening, hiring, onboarding, and training costs that can range between 90 to 200% of an employee’s annual salary (Allen, Bryant, & Vardaman, 2010). Turnover is also disruptive to a firm’s productivity (Shaw, Gupta, & Delery, 2005), and has a negative impact on financial performance (Heavey, Holwerda, & Hausknecht, 2013). Moreover, turnover is disruptive to a firm’s productivity (Shaw, Gupta, & Delery, 2005), and has a negative impact on financial performance (Heavey, Holwerda, & Hausknecht, 2013). Furthermore, turnover is particularly harmful due to the loss of social capital (Dess & Shaw, 2001; Shaw, Duffy, Johnson, & Lockhart, 2005) knowledge-based organizations where communication is crucial to the efficient and effective transfer of new knowledge to
spark creativity, innovation activities, and product development (Shaw, Duffy, Johnson, & Lockhart, 2005).

Additionally, the unexpected human capital losses resulting from the voluntary turnover of talented workers can erode an organization’s social fabric (Leana & Van Buren, 1999) as well as add to the overall operating costs resulting from the need to attract, recruit, train, and develop new employees (Tziner & Birati, 1996). Smite, Solingen, and Chatzipetrou (2020) cited the disruptive economic, operational, and behavioral effects of software engineer turnover in knowledge-intensive environments where the generation of intellectual capital is crucial.

Huselid (1995) found empirical support for the influence of HRM practices related to employee recruitment and selection procedures, incentive compensation, performance management systems, employee involvement, and training. However, Huselid also examined turnover and found empirical support for the role of HRM practices in reducing turnover. This dissertation research is grounded in the context of the engineering occupation, but focuses narrowly on how HRM practices influences the turnover intentions of female mechanical engineers within a social capital mediating context.

**Statement of the Problem**

Women depart the engineering occupation at more than twice the rate of their male peers (Fouad & Singh, 2011; Hewlett, et al., 2008), and consequently account for a share of only 15% (see Figure 1.1) of the engineering workforce
(Martinez & Christnacht, 2021).

Figure 1.1. Women's Representation in the Engineering Occupation

As previously noted, numerous articles have empirically documented the complexity, persistence, and various causes underlying the problem of female engineer turnover (Singh, et al., 2013; Fouad, Singh, Fitzpatrick, & Liu, 2013; Buse, Bilimoria, & Perelli, 2013; Hewlett, Sherbin, Dieudonne, Fargnoli, & Fredman, 2014). However, the issues persist despite concerted attention and the resources devoted to recruiting and retaining more women in engineering occupations (Fouad, et al., 2019).
Ettinger, Conroy, and Barr (2019) asserted that engineering represented the most male-dominated educational and occupational field in the U.S. Consequently, the relative parity observed in medicine and the legal profession has proved elusive for women as they continue to significantly lag their male peers in most areas of the engineering occupation. (Sibley, 2016; United Nations Educational, Scientific, and Cultural Organization, 2017). The early exit of women from engineering occupations extends internationally, underscoring the scope of the problem. For example, there is ample evidence in the literature that nearly a third of women globally intended to leave the SET/ST field that also includes engineering occupations. Even more troubling is the revelation that those who leave often do so in their first year of employment (Hewlett, et al., 2008).

The evidence points to a similar problem in the US, with turnover estimates approaching 32% (Hewlett et al., 2014). Roughly 30% blamed poor organizational climate for their quit decisions. For those who stay, less than one-third of women graduating with an engineering degree are still working in the field after 20 years (SWE, 2019). Similar studies concluded that the number of women harboring feelings to leave the SET profession is higher across technology-intensive industries, partially explaining why some from industry and policy circles continue to project a shortfall of workers with the requisite expertise (Zaza, Abston, Arik, Geho, & Sanchez, 2020). The most recent data shows that women comprise 57.4% of the U.S. labor force (U.S. Bureau of Labor Statistics, 2021) but remain a significant minority in engineering (Jean, Payne, & Thompson, 2015). Women also
earned 57% of all undergraduate degrees, but only 22% of engineering degrees (Skvoretz, et al., 2020). The relevant takeaway is that increasing women engineer retention rates can greatly add to an organization’s human capital resource pool, while mitigating the larger industry-wide talent shortage problems.

*Engineers that Leave*

In related studies examining why women leave science-oriented occupations at high rates, Hewlett et al. (2008) found that women comprised 41% of the overarching SET corporate workforce's lower scale but experienced a 52% attrition rate. The study evidence suggested that the macho culture of science-oriented organizations coupled with feelings of isolation, marginalization, uncertain career paths, and limited advancement opportunities were the likely causal factors (Hewlett et al., 2008). The finding that 61% of engineers experience difficulties balancing work-family responsibilities partially explains why organizations promoting family-supportive practices reported increased employee satisfaction and commitment (Fouad and Singh, 2011). Table 1.1 highlights common reasons female engineers gave for their decision to quit.
<table>
<thead>
<tr>
<th>Study Author</th>
<th>Principal Quit Reasons</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Ayre, Mills, &amp; Gill, 2013)</td>
<td>Masculinized workplace culture</td>
<td>Provide a supportive culture and better pay</td>
</tr>
<tr>
<td>(Buse, Bilimoria, &amp; Perelli, 2013)</td>
<td>Limited engineering work options Pushed into engineering</td>
<td>Organizations - encourage practices that develop skills, continuous learning, and challenging novel work</td>
</tr>
<tr>
<td>(Ettinger, Conroy, &amp; Barr, 2019)</td>
<td>Poor co-worker/manager respect Challenge fitting in Work-family balance</td>
<td>Individual-level solutions Encourage confidence Organizational – cultural change</td>
</tr>
<tr>
<td>(Fouad, Chang, Wan, &amp; Singh, 2017)</td>
<td>Unequal compensation Poor working conditions Inflexible and demanding environment Unmet achievement needs Lack of recognition Limited advancement opportunities</td>
<td>Employers should promote: Foster career development opportunities Sense of accomplishment Job security and fair compensation Good working conditions Advancement opportunities</td>
</tr>
<tr>
<td>(Fouad, Singh, Cappaert, Chang, &amp; Wan, 2016)</td>
<td>Inhospitable workplace climate Limited advancement opportunities</td>
<td>Implement practices that promote employee engagement</td>
</tr>
<tr>
<td>(Fouad &amp; Singh, 2011)</td>
<td>Poor workplace climate Excessive workload Unclear roles Undermining supervisor</td>
<td>Establish zero-tolerance policy Supportive co-workers and supervisors Organization investment in training &amp; professional development</td>
</tr>
<tr>
<td>(Hunt, 2016)</td>
<td>Primary: Pay/promotion Secondary: • Family-related constraints • Working conditions • Poor job prospects in field</td>
<td>Organization – apply resources that provide: Better pay and promotion Mentoring opportunities</td>
</tr>
<tr>
<td>(Hewlett, et al., 2008)</td>
<td>Hostile workplace culture Isolation – limited mentor or sponsor opportunity Uncertain career path</td>
<td>Promote initiatives that keep women engineers on a technical track Flexible leave of absence programs Expand recruitment - cast a wide net</td>
</tr>
<tr>
<td>(Jean, Payne, &amp; Thompson, 2015)</td>
<td>Chilly organizational climate</td>
<td>Provide family-friendly policies to reduce work-family conflict</td>
</tr>
<tr>
<td>(Singh, Zhang, Wan, &amp; Fouad, 2018)</td>
<td>Work-family conflict Low perceived organizational support Low occupational commitment Actual and potential negative stereotypes</td>
<td>Inclusive work environment Provide a supportive work-life culture Value female engineer contributions Vigilance against negative female engineer stereotypes</td>
</tr>
</tbody>
</table>
Those Who Stay

Contrastingly, Fouad and Singh (2011) and Ayre, Mills, and Gill (2013) found evidence that women engineers do persist or reciprocate in their commitment to the organization when the environment is supportive based on the policies and practices implemented. Likewise, employer practices that facilitate connections and relationships with peers and managers across functional lines benefit from behaviors and attitudes that foster employee satisfaction and commitment. On the other hand, organizations disregarding uncivil behaviors experience increased disengagement and higher quit intentions from the organization and engineering profession (Fouad and Singh, 2011). Table 1.2 provides a snapshot of common reasons women gave for staying in their engineering jobs and careers.
**Table 1. 2. Summary of Reasons Women Stay in Engineering**

<table>
<thead>
<tr>
<th>Study Author</th>
<th>Stay Intention Factors</th>
</tr>
</thead>
</table>
| (Ayre, Mills, & Gill, 2013) | Belief in self  
  Supportive organizational culture  
  Male colleagues’ acceptance and respect  
  Promote sense of belonging  
  Inclusive workplace culture  
  Feeling of being accepted and respected  
  Promotion of equality and diversity |
| (Buse, 2011) | Self-efficacy, confidence, optimism, and identity |
| (Buse, Bilimoria, & Perelli, 2013) | High self-efficacy  
  Ability to thrive in male-dominated culture  
  Self-described engineering identity  
  Motivated by challenge  
  Novelty of profession |
| (Corbett & Hill, 2015) | Clear advancement path  
  Challenging assignments  
  Recognition of contributions  
  Limited training & development  
  Lack of supervisor/co-worker support |
| (Faulkner, 2009) | Supportive workplace culture  
  Manager ‘buy in’ to foster culture change  
  Encourage diversity promoting activities  
  Challenge stereotypes  
  Improved work-life balance |
| (Fernando, Cohen, & Duberley, 2016) | Employer provided  
  - Help, feedback, opportunities, responsibilities, and role models  
  - Supportive organizational culture  
  - Feeling of acceptance and recognition  
  - Sense of belonging  
  - Valued by peers and superiors  
  - Seeing self as an engineer |
| (Fouad, Singh, Cappaert, Chang, & Wan, 2016) | Culture accepting of women  
  Manager’s support of work-life roles  
  Advancement opportunities |
| (Fouad & Singh, 2011) | Organization’s support for:  
  Positive work climate  
  Training and professional development  
  Opportunity for advancement  
  Valuing female contributions |
The Recent Literature on Women in Engineering

Scholars contend that engineering fits into the high barrier to entry education category due to the requirement for academic rigor and advanced technical skills to enter the occupational field (Fouad, Singh, Cappaert, Chang, & Wan, 2016), therefore early preparation is essential. The most recent data shows that very little separates pre-college aged male and female students with the relevant math and science background to pursue engineering studies, yet women accounted for only 24.2% of the engineering degrees earned in 2020 (SWE Fast Facts, 2023, National Center for Science and Engineering Statistics (NCSES), 2023), and represented between a 14% and 15% share of the engineering workforce, which is close to the mark or range reported in other studies (Martinez & Christnacht, 2021; Pew Research Center, 2018).

Furthermore, the results from the various studies on women’s representation in engineering occupations are two sides to the same coin. On the one hand, there is general concern over the number of women who consider engineering education, follows through with enrollment, persist to graduation, and join the occupational field. On the other hand, there is the retention issue due to the high turnover of women in engineering occupations. Given that organizational culture and climate ranks at the top of the list of main reasons women who leave as well as those who stay in the engineering field, it is instructive that organizations continually look to HRM practices that positively influences social capital which can lead to lower
turnover intentions among female mechanical engineers. This study focused on the retention side of the coin by examining how HRM practices influence their turnover intentions in a mediating social capital context. Lastly, a fundamental assumption of this study is that focusing on women's voluntary turnover intentions in the mechanical engineering field can lead to a better understanding of the issues, enabling employers, academics and policymakers to mobilize and employ the right resources and processes.

**Background and Rationale of the Study**

From cures to diseases that lead to economic vitality, enhanced quality of life, national security, prosperity, interest in science-oriented fields such as engineering have been at the forefront of innovation, garnering the attention of government policy leaders, academia, research scholars, and industry, underscoring the crucial role of these occupations in driving innovation and economic growth of the United States (Neal, Smith, & McCormick, 2008; Salzman & Benderly, 2018; Xie, Fang, & Shauman, 2015). After all, engineers work in a variety of industries and sectors of society where the engineering problem-solving skills are crucial skill set (National Academy of Engineering, 2018).

**Implications of Falling Behind in Engineering**

A scientific-based report credited the sciences and engineering occupations with 20 innovations that transformed the twentieth century, underscoring the role engineering plays in the development of new technologies (National Academy of
Engineering, 2018). As a result, there is an imperative to stay ahead in the global competitive space through emphasis on engineering due to the outsized role, engineering know how, and expertise have on industry, research and development, invention, economic development, and quality of life.

Low Female Engineering Representation

Broadly stated, the engineering segment of technology-oriented occupations has experienced challenges in recruiting and retaining talented employees, implying that the demand for female engineers will remain high for the foreseeable future. However, the observation that 30% of the women who left the engineering profession identified organizational climate as the principal reason (Society of Women Engineers, 2019) is reason for concern, but is in line with the findings of other scholars (Ayre, Mills, & Gill, 2013; Fouad & Singh, 2011). Warrick (2017) argued that managers should monitor and manage the culture of their organization to understand, build, and sustain a healthy and effective culture. Table 1.1 highlights additional drivers underlying the reasons women leave the engineering profession, implying.

Underrepresentation and Diversity

The finding that white and Asian males comprise the core of degreed engineers actively employed across the engineering occupation highlights the pervasiveness of the issue and existence of a diversity problem (National Academy of Engineering, 2018). Organizations advocating for parity and greater diversity
across gender in engineering organizations suggest that women's low representation in engineering occupations extends to corporate governance and executive teams, even though increased diversity in leadership facilitates business success (Beninger, 2014). A report chartered by the global non-profit Catalyst organization reached a similar conclusion in asserting that women's low participation levels impact corporate governance and executive teams.

In a study of top management teams, diversity strongly influenced the innovativeness and performance of the average firm’s new product portfolio (Talke, Salomo, & Rost, 2010). Hong and Page (2004) found supporting evidence in their study that diverse problem solver teams outperform teams selected based on skill alone. Likewise, (Smith-Doerr, Alegria, & Sacco, 2017) argued that the multiple perspectives of scientists in diverse teams enhances team productivity, creativity, and problem-solving abilities.

The foregoing evidence suggest that fostering retention of women engineers adds to a firm’s diversity, which can influence overall company innovativeness and performance. As knowledge workers (Davenport, 2005; May, Korczynski, & Frenkel, 2002), engineers consistently work on project teams that can benefit tremendously from the expertise and diverse thought, contributions, and perspectives of female engineer team members. A fundamental assumption in this dissertation study is that fixing the dual problems of female underrepresentation and retention in engineering will go a long way towards addressing the perceived
talent and labor supply problem frequently highlighted in the literature and in the commentary of industry leaders and policymakers.

Fouad and Singh (2011) painted an alarming picture in highlighting that approximately half of the engineering graduates eventually leave the profession (Fouad & Singh, 2011). Hewlett et al. (2008) reached a similar conclusion in an earlier study of women in the SET field. The observation that female SET professionals' attrition rate spikes at the 10-year mark is also particularly telling (Hewlett et al., 2008).

Key Engineering Demographics

Engineering is often aggregated with data from other technology-oriented occupations that include STEM, S&E, S&T, and SET. For example, in a report reviewed for this study, the Bureau of Labor Statistics (BLS) combined engineering and architecture under a single data label that estimated women’s representation in engineering was 14% for full-time wage and salary workers under the engineering and architecture domain (Bureau of Labor Statistics, 2017), aligning with the Pew Research Center report as depicted in Figure 1.2.

Similarly, Figure 1.3 is a National Science Foundation (NSF) report representing a snapshot of women’s participation in the S&E workforce that also includes engineering. Overall, the data representing women’s participation in the engineering occupation varies depending on the information source. For example, the most recent NSF data notes that women account for approximately 16% of
currently employed engineers (National Science Foundation, 2020). Data extracted from a graph in the same report revealed 15.6% as of 2017 (see Figure 1.3).

Likewise, a different report revealed women comprise 15% of the labor force (U.S. Department of Labor, 2019). In summation, women’s participation in the engineering occupation is on an increasing trajectory; however, at a slow pace.

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**Figure 1.2 Women Engineer Labor Force Representation up to 2016**

Purpose of the Study

This dissertation study aims to empirically examine the influence of HRM practices on female mechanical engineer turnover intentions within a framework of mediating social capital. As noted in the preceding paragraphs and the reviewed literature, women are underrepresented in engineering and leave early in their careers (Fouad & Singh, 2011; Hewlett et al., 2008).

In a seminal study, Mobley (1977) argued that turnover is preceded by an employee’s feelings of dissatisfaction towards their employment situation, which
triggers preparatory job search activities (intention to search) to identify the availability of better job alternatives, followed by an intention to quit, and finally, the quit decision. However, it bears mentioning that women bear a significantly larger share of family-oriented responsibilities than their male counterparts, which can add to the pressures they experience in the work environment and their feelings of unmet expectations and turnover intentions (Griffeth et al., 2000).

The preceding argument underscores that quit reasons extend beyond dissatisfaction. (Lee & Maurer, 1997) argued along similar lines, asserting that female turnover reasons may can be contextual. Although the system of HRM practices exists to address the noted problems that influence an employee's quit decision, developing an understanding of how employees perceive implemented practices should be of prime importance to organizations and managers. The fundamental aim of this dissertation study is to contribute to that understanding, enabling managers to use targeted HRM practices to reduce the turnover intentions of female mechanical engineers in a mediated social capital context.

Sibley (2016) asserted that men and women express similar reasons for pursuing an engineering career. However, the research shows that women are more likely to shift their stance to a position of greater social consciousness, where devising solutions to complex problems and making a difference predominate their interests (Sibley, 2016; Buse et al., 2013). Comparatively, women depart the engineering profession at four times the rate of their male peers (Singh et al., 2018). At the noted quit rates, turnover presents a severe problem affecting women's
access to senior leadership positions limiting the availability of mentorship opportunities to younger inexperienced women engineers. Female engineers report a range of experiences driving their decision to leave the profession, underscoring the complexity of the problem.

Work issues related to a hostile work environment and extreme job pressures (Hewlett et al., 2008), a masculinized workplace culture, and gender pay gap (Ayre et al., 2013; Fouad et al., 2016), negative workplace culture and climate (Buse, 2011; Fouad & Singh, 2011), unmet achievement needs, lack of recognition, limited advancement opportunities (Fouad et al., 2017), and pay and promotion opportunities (Hunt, 2016) are among the principal factors driving the departure of women from the engineering profession.

In summary, this dissertation proposal demonstrates that the efficacy of an organization's implemented HRM practices within a mediating social capital context can negatively influence the turnover intentions of its female engineers, leading to greater retention levels across the engineering profession.

Questions that Guide the Research

This study aimed to empirically examine how HRM practices affect female mechanical engineer turnover intentions in a framework of mediating social capital. A single research question applied and is noted as follows:
Research Question

To what extent does social capital mediate the influence of human resource management (HRM) practices on the turnover intentions of female engineers?

Definition of Terms

This section expands and clarifies terms used in various parts of this dissertation study. It is not uncommon to find varying definitions in the research literature for the same construct due to the lack of an overarching consensus among scholars for a particular discipline. The terms used in this dissertation encompass concepts drawn from underlying theories and areas that relate to the constructs of interest in this study.

Causal Ambiguity: This concept relates to when a firm has multiple competing hypotheses about what it should do to create a specific set of resources and capabilities (Barney & Clark, 2007). Likewise, causal ambiguity exists when the sources of a firm's resources and capabilities possess attributes that are taken for granted, unspoken, and tacit (Reed & DeFillippi, 1990) and, therefore, can be classified as invisible assets (Itami, 1987), part of its organizational culture (1986), and oral operational routines (Nelson & Winter, 1982).

Competitive Advantage: According to Porter (1985), competitive advantage is the ability of a firm to implement its generic strategies (low-cost leadership versus product differentiation) to attain a cost advantage and create value for its
customers. Similarly, competitive advantage exists when a firm can generate more economic value than the marginal rival in its product market (Peteraf & Barney, 2003). Lastly, and predating the above definitions, is the contention that competitive advantage comprises the capabilities, resources, relationships, and decisions that permit a firm to capitalize on opportunities and avoid threats within its industry (Hofer & Schendel, 1978).

**High-Performance Work Practices (HPWP):** The strategic human resource management literature emphasizes bundled human resource (HR) practices, commonly referred to as high-performance work practices, high-performance work systems, high-involvement work systems, and high-commitment work systems (Wright & McMahan, 1992). Moreover, the literature uses the high-performance work practices term interchangeably with high-performance work systems (HPWS). Both terms point to the characteristics that allow a firm to view employees as a source of competitive advantage rather than a cost requiring minimization (Becker & Huselid, 1998).

**High-Performance Work Systems (HPWS):** Fundamentally, high-performance work systems view people as a source of competitive advantage instead of a cost to be minimized (Becker & Huselid, 1998). Moreover, Datta, Guthrie, and Wright (2005) cite the work of (Pfeffer, 1998; Kochan & Osterman, 1994) in contending that high performance work systems are systems or bundles of HR practices designed to enhance employees' skills, commitment, and productivity.
Human Resources: The total human capital under the firm's control in a direct employment relationship (Wright et al., 1999).

Human Resources Management (HRM): The HRM concept relates to the management of work and people (Boxall, 2012). HRM also comprises the policies, practices, and systems that influence the workforce" (Bernardin & Russell, 2013, p. 6). The scholarly literature supports that HR practices can enhance employee effectiveness and predict organizational performance (Bernardin & Russell, 2013). Additionally, firm performance is a crucial organizational goal (Wright et al., 1999).

Human Resources Management (HRM) Practices: HRM practices are the HR tools used to manage a firm's human capital pool (Wright, Dunford, & Snell, 2001). Along the same lines, Wright et al. (1993) asserted that HRM practices "are the means through which firms can increase the skills of the workforce and provide incentives for workforce members to contribute" (1999, p. 552).

Invisible Assets: Invisible assets are a firm's intangible assets that include information-based resources such as technological know-how, customer loyalty, accumulated consumer information, corporate culture, the visibility of a brand name, or knowledge of a customer base as well as tangible assets such as people, goods, and money (Itami, 1987).

Job Satisfaction: The extent to which people like or dislike their jobs (Spector, 1997). More broadly, job satisfaction is attitudinal, comprising a
constellation of attitudes about various job facets (Spector, 1997; Ilies, Wilson, & Wagner, 2009).

Organization: Smircich (1983) approached the definition of organization from several dimensions, namely cross-cultural, where organizations are social instruments for task management; corporate culture as it relates to adaptive organizations; and cognition that relates to systems of knowledge in organizations.

Organizational Climate: Organizational climate pertains to the held perceptions of support employees receive from peers, supervisors, and departmental structures that facilitate their task-completion efforts (Konopaske et al., 2018).

Organizational Culture: The norms and values group members widely share and accept (Nuryanto et al., 2020). Other scholars defined the construct as the self-sustaining behaviors, actions, and assumptions an organization creates to detail the acceptable manner of doing things within its environment (Farrell, 2018).

Organizational Commitment: The organizational commitment construct relates to the acceptance of the organization's goals and values, a willingness to exert considerable effort on behalf of the organization, and a strong desire to maintain membership in the organization" (Porter et al., 1974).

Self-Efficacy: Buse (2011) defined self-efficacy as an individual's belief in their ability to succeed in a particular situation. Self-efficacy is a crucial determinant in an individual's choice of activities and environments and influences
the effort expended, persistence, thought, and emotional reaction displayed in the face of obstacles (Lent, Brown, & Hackett, 1994).

**Structural Capital:** The structural dimension of social capital refers to the pattern of connections (social interaction) between actors and includes network ties, network configuration describing the pattern of linkages in terms of such measures as density, connectivity, and hierarchy, and appropriable organization (Nahapiet & Ghoshal, 1997, p. 35).

**Relational Capital:** The relational dimension of social capital underscores is achieved through relationships and include attributes like trust, norms and sanctions, obligations and expectations, and identification (Nahapiet & Ghoshal, 1997).

**Cognitive Capital:** Cognitive, social capital relates to resources that represent shared understanding, interpretations, and systems of meanings between parties achieved through shared language, code, and narratives (Nahapiet & Ghoshal, 1997, p. 35).

**Social Capital Theory:** Social capital gained popularity through the work of Bourdieu (1986) and Coleman (1988). Bourdieu defined social capital as "the aggregate of the actual or potential resources linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu, 1986, p. 21). Similarly, Coleman (1988) contends that social capital exists in relations between and among individuals. This view aligns
with the definition of social capital as embedded relationship assets (Leana & Van Buren, 1999).

**Social Complexity**: Social complexity can be defined as factors that make information incomplete and heterogeneously distributed (Kaufman, 2015). Framed in an RBV context, the concept derives from the ambiguity in the complex nature of organizational interaction and the patterns and combinations of an organization's physical, human, and organizational inputs are combined (Barney, 1991).

**Social Exchange**: The concept of social exchange is a joint activity comprising two or more persons, each with something the other values (Lawler, 2001).

**Social Resources**: According to Lin (1995), social resources are temporary resources available to a person through a person's direct or indirect ties.

**Strategy** is an intended plan; guide, course of action, realized pattern, or consistency of behavior over time, or an organization's manner of positioning its products and services in a given market to achieve a competitive advantage, or an organization's unique way of doing things (Mintzberg, 1987).

**Strategic Assets** are "the set of difficult to trade and imitate, scarce, appropriable, and specialized resources and capabilities that bestow the firm's competitive advantage" (Amit & Shoemaker, 1993, p. 36). Other scholars referred to the construct as tacit and embedded assets with properties that are difficult to imitate and are considered the primary source of a firm's competitive advantage under the RBV (Connor, 2007).
Strategic Human Resource Management (SHRM). The concept is linked to strategic planning, organizational performance, and include line manager input (Martell & Carroll, 1995). SHRM links HRM to the firm's strategic management process to attain business objectives (Paauwe & Boon, 2019). Wright & McMahan (2011) framed SHRM as the pattern of planned human resource deployments and activities to facilitate achieving a firm's goals.

Turnover occurs when employees leave their organization through retirement, resignation, or dismissal. Turnover can be voluntary, where an employee leaves a job of their own volition, or involuntary, as in a firm's dismissal of an employee for cause – poor performance.

Turnover Intention: According to Mobley, Horner, & Hollingsworth (1978), it is the deliberate willfulness to leave the organization and is often framed as the last in a series of withdrawal cognitions or thoughts about quitting.

Significance of the Study

This study is centered on low female representation in the engineering field and uses a model that includes the HRM practices, social capital, and turnover intention constructs to develop an understanding of how a firm's implemented HRM practices influence the turnover intentions of female mechanical engineers within a social capital mediating context.
Organization of the Remainder of the Study

The remainder of this dissertation proposal will adhere to the following organization: Chapter 2 establishes the research literature framework by thoroughly explaining the principal research concepts and theory related to HRM practices and the relationship to engineer turnover intentions. Chapter 3 will explore the applied methodology utilized for the study, including concepts related to ethical considerations, research design, and methodological approach. The research outcomes will include safeguards to ensure the validity and reliability of the collected data.

Additionally, this chapter will specify the procedures and equipment used in the data collection, analysis steps, and measures. Chapter 4 will encompass the research data and present the findings and summary. Moreover, the study results will inform if the findings support the research question and related hypotheses. Finally, Chapter 5 of this dissertation will conclude with recommendations, implications for practice, and future research suggestions.
Chapter 2 : Literature Review

Overview

This literature review will draw on research content and theories grounded in strategic human resource management (SHRM), social capital, and turnover literature. The starting point is the extant literature on HRM practices, namely high-performance work practices, high-performance work systems, and high-commitment – high-involvement work systems or practices and their effect on engineer turnover intentions in a theoretical frame of social capital. The SHRM strategic field underpins human resource management (HRM) practices that will be central to this dissertation.


The emergence of SHRM changed the employer's viewpoint from seeing workers "as hired hands and short-run expense to minimize to human capital assets"
and longer-run value to maximize" (Kaufman, 2015, p. 390). Apart from changing
the view of workers as a commodity (Kaufman et al., 2014), SHRM clarified that
the fundamental purpose of managerial tasks is to align the firm's structure and
human resource systems to drive its strategic objectives (Kaufman et al., 2015).
According to Kaufman (2014), the mid-century IR period included the period from
1950 through 1960. The 1960s marked the separation of personnel management
and IR until 1970. The 1970 to 1980 period signaled the transition to HRM, IR, and
personnel economics (PE). Finally, 1980 to 2014 ushered in the contemporary
human resource paradigm, linking HRM to strategy through two orientations: a
micro-traditional HRM view and a macro-strategic HRM view.

Questions that Guide the Research

This study aims to empirically examine the role of HRM practices in female
mechanical engineer turnover intentions in a framework of mediating social capital
and is guided by a single research question noted in the following:

Research Question. To what extent does mediated social capital influence the effect
of human resource management (HRM) practices on the turnover intentions of
female mechanical engineers?

Relevant Models, Theories, and Frameworks

Theoretical Frameworks

This dissertation study drew on three strands of literature that included
strategic HRM (SHRM), social capital, and turnover. SHRM links HRM practices
to a firm's overarching competitive strategy by recognizing the value that resides in the employees of an organization (Huselid, 1995). Likewise, this study sought to understand the underlying role of social capital on an individual and group level (Bourdieu, 1986; Burt, 1997; Portes, 1998) in influencing HRM practices' effect on female engineers' turnover intentions.

This study drew on the resource-based view (RBV) literature to explain how and why bundled HRM practices and social capital are valuable resources. First and foremost, firms that create value in a manner that is rare, difficult to imitate, and nonsubstitutable can achieve sustained competitive advantage (Barney, 1986). Resources stated in the context of a firm or organization can be strength or a weakness, or tangible or intangible asset permanently or semi-permanently linked to the organization (Wernerfelt, 1984).

The preceding observation implies that resources include assets, capabilities, processes, information, and knowledge sources that enable an organization to employ strategies to become more effective (Barney, 1986). Teece, Pisano, and Shuen (1997) termed a resource a firm-specific asset in a trade secret, specialized manufacturing facilities, or engineering experience. Furthermore, the fundamental resource-based view (RBV) argument implies that sustainable competitive advantage results from unique bundles of resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991; Wernerfelt, 1994).
**Relating RBV to HRM Practices**

Moreover, the resource-based view expanded the conceptualization of the strategic management paradigm literature by shifting the focus from an externally-oriented industrial organization view (structure-conduct-performance paradigm) of firm performance (Porter, 1980; Bain, 1968) to a frame emphasizing the firm's internal organization and internal resources (Barney, 1991; Eisenhardt & Martin, 2000). Stated differently, the RBV emphasizes strategies that exploit the existing or internal firm-specific assets already under the control of the firm (Teece et al., 1997). The foundational assumption of the RBV underscores that resources are heterogeneously distributed among firms (Eisenhardt & Martin, 2000).

Further, the heterogeneity argument implies that all firms have different resource endowments and capabilities (Peteraf, 1993) and that any resource switching takes time and requires money (Wernerfelt, 1995). In other words, resources are “sticky” when a firm is confined to its resource endowment or resource bundle in the short run (Teece et al., 1997). Dierickx and Cool (1989) added to the understanding of the firm resource limitation by noting that it is impossible to rapidly develop new competencies, which is to say that the bundled resources under a firm's control cannot be easily traded.

A relevant example is the unique and complex knowledge resources embedded in the firm's workforce (Teece, 1980). Further, tangible assets (plants and materials) and human resources (labor) have value only if the firm is able to
convert them into valuable outputs or productive resources (Kor & Mahoney, 2004). Penrose (1959) focused on managers' talent as crucial to resource conversion (Carrick, 2013).

More importantly, Penrose's contribution to what emerged as the resource-based theory rests with the understanding that the bundled set of productive resources in possession of a firm is heterogeneous even when they are part of the same industry.

Wernerfelt (1984) an (Barney, 1991) used the resource term to define tangible and intangible assets under the control of a firm. Other scholars have defined the construct as core competencies (Prahalad & Hamel, 1990), competence (Selznick, 1957), capabilities (Stalk, Evans, & Shulman, 1992), dynamic capabilities (Teece, Pisano, & Shuen, 1997), knowledge to emphasize the salient importance of the construct as in the knowledge-based theory (Grant, 1996; Liebeskind, 1996; Spender & Grant, 1996).

Compared to physical assets encompassing tools, technology, and information systems that can be copied or purchased, people are difficult to imitate due to their scarce, specialized, and tacit knowledge (Lippman & Rumelt, 1982); Barney (1991) and Peteraf (1993) concluded that human assets are difficult to imitate because they are not easily understood or observed. Likewise, Coff (1997) linked the difficult-to-imitate or invisible attribute in people to asset specificity, social complexity, and causal ambiguity. The contention is that a firm's HR system is a strategic asset due to the invisible asset nature of human resources when
embedded in the operating system of the organization, enabling value creation (Itami, 1987). Broadly stated, the history, culture, and structure develop over a long time and are not easily imitated by rival firms, contributing to long-run performance advantages (Liu, Combs, Ketchen, & Ireland, 2007).

Framed within the RBV context, the firm's combined managerial and non-managerial learning facilitates the coordination of knowledge and skills of the firm's workforce that cannot be easily replicated by rivals and is, therefore, a strategic asset (Rees & Smith, 2017). Moreover, the RBV argument placed emphasis on the firm's internal resources (physical assets, finance, organizational systems, and people) as a source of competitive advantage (Paauwe & Boon, 2019).

In effect, the firm's possession of a resource with inimitable qualities in turn confers enduring performance advantages as underscored in the resource-based view, facilitating the creation of value and capabilities (Itami, 1987). The underlying contention is that a firm's HR system is a strategic asset because of the invisible asset attribute that facilitates value creation when HR is embedded in the operational system of the organization's resources.

Research Gap

As previously noted, the central aim of this dissertation is to empirically examine the influence of HRM practices on female mechanical engineer turnover intentions in a framework of mediating social capital. Furthermore, this study recognizes that the overwhelming research related to the HRM practices construct
tilts to outcome variables related to firm performance (Huselid, 1995; Becker & Gerhart, 1996; Boselie, Dietz, & Boon, 2005) and to a lesser extent, constructs related to organizational productivity, and organizational effectiveness.

Identifying the Gap

The researcher conducted a nearly exhaustive search of various databases, including the Florida Tech library resources, before concluding that no prior study examined the mediating role of social capital on influencing the relational effect of HRM practices on the turnover intentions of female mechanical engineers. For example, with the search string set to "HRM practices and turnover intentions" and spanning the period from 2006 – 2021, only 25 articles resulted—sixteen of the noted articles related to HRM practices and employee turnover intentions.

The number of articles in the set decreased from 25 to 22 after setting an additional filter that restricted the articles to those extracted from "academic and peer-reviewed journals." Thirteen of the 22 articles related to HRM practices and turnover or turnover intentions. None of the selected articles related to the effect of HRM practices on engineer turnover intentions. Similarly, none of the articles included the social capital construct.

Removing the quotation marks from the search string with the date range of 2015 to 2021 yielded 5,931 articles. The addition of mediating social capital to the search string reduced the possible articles to 1,279. Including quotation marks around the "HRM practices and turnover intentions: The mediated role of social..."
capital" yielded "zero" results. Removing the quotation marks and duplicate articles reduced the total to 1,074 articles with terms related to HRM practices, social capital, and turnover—only 14 of the articles related to HRM practices and turnover intentions. The overwhelming lot of articles included one or more of the key words, but often the articles were unrelated to the research subject. None of the article titles included HRM practices, turnover intentions, social capital, and engineer keywords.

The preceding article search and verification conveys that the present dissertation study fills a gap in the existing literature. Similar searches using Google Scholar yielded a total of 12 articles containing the "engineer" keyword. None of the articles duplicated the objectives of this dissertation study. In summation, the article with the closest relevance to this dissertation research study (Stemming the tide: Predicting women engineers' intentions to leave), adopted a research focus based on women engineers' turnover intentions, but examined psychological factors such as self-efficacy behaviors and outcome expectations (Singh et al., 2013).

The initial review provided additional confidence that a gap exists in the scholarly literature and that this dissertation study on HRM practices and female engineer turnover intentions in the context of mediated social capital would fill the gap, adding to the extant research literature.
HRM Practices

Overview and Theory

There is extensive research linking HRM policies and practices to strategy and organizational performance (Becker & Huselid, 1998; Becker & Gerhart, 1996; Chowan, 2016). Specifically, HRM scholars argue that managerial methods influence organizational performance (Gittell, Seidner, & Wimbush, 2010). However, because strategic success is measured in financial terms, many scholars called for aligning HR with the firm's bottom line (Martell & Carroll, 1995). The precursor to this view was an earlier research effort by the Organization and Strategic Information Service (OASIS) and the subsequent attempt to link HRM to a firm's business results (Ulrich, 1997). Some scholars posit that a firm's HRM system is a strategic asset because of the embodied invisible asset (Itami, 1987) property of HR when embedded in the operational system of the organization.

Amit and Shoemaker (1993) added to the discourse by explaining that strategic assets include attributes or properties in an asset or resource that render it difficult to trade, copy, scarce, and specialized. As a result, firms in control of assets with the preceding attributes are able to attain competitive advantage. Connor (2007) proffered that strategic assets have tangible and intangible value.

Along similar lines of thought, Collis and Montgomery (1995) asserted that path dependency and causal ambiguity add to the imitable quality of strategic resources. Path dependency are resource attributes that develop over time, where
the accumulated learning and experience enable firms that to introduce their products to a market earlier than their competitors. Becker and Huselid (1998) clarified the causal ambiguity concept, noting that it is an attribute that is subtle and difficult to fully comprehend by rivals or company outsiders (Becker & Huselid, 1998).

*A Word About Strategy*

The strategy has multiple definitions, underscoring the competing views surrounding the application of the concept. Mintzberg (1987) characterized the construct as comprising planned actions that are consciously developed and purposeful. Further, strategy can be an intended plan, guide, or course of action; a realized pattern or consistency of behavior over time; an organization's manner of positioning its products and services in a given market to achieve competitive advantage; and lastly, an organization's unique way of doing things (Mintzberg, 1987).

*Strategic HRM in the Organizational Context*

There is an extensive body of research linking HRM policies and practices to strategy and organizational performance (Becker & Gerhart, 1996; Huselid, 1995; Chowhan, 2016; Becker & Huselid, 1998; Martell & Carroll, 1995; Ulrich, 1997; Paauwe & Boon, 2019). The contention is that no single strategy definition applies to the SHRM construct. However, there is a consensus that strategic HRM should encompass characteristics related to a long-term focus linked to strategic
planning, organizational performance, and line manager input (Martell & Carroll, 1995). Strategic success is measured in financial terms, making it essential to align HR with the firm's bottom line or financial performance (Martell & Carroll, 1995). SHRM links the firm's HR function to the decisions supporting its business strategy (Wright, Dunford, & Snell, 2001; Paauwe & Boon, 2019).

**Contextualizing SHRM**

Further, SHRM comprises two significant strands: one related to the fit between HR and strategy and the other centered on the HR-performance link (Delery & Shaw, 2001). More importantly, SHRM implies that people are the source of a firm's competitive advantage, which is emblematic of the definition of SHRM as the "pattern of planned human resource deployments and activities intended to enable an organization to achieve its goals" (Wright & McMahan, 1992, p. 298). In other words, SHRM is about strategically managing people in work organizations (Delery & Shaw, 2001). Along similar lines, Delaney and Huselid (1996) asserted that how organizations manage their people matter because of the influence they can have on the firm’s performance.

**HRM Practices – What They Are?**

Boxall (2012) defined HRM as the management of work and people. A more encompassing definition of HRM is the contention that it is "the personnel policies and managerial practices and systems that influence the workforce" (Bernardin & Russell, 2013, p. 6). Wright and Boswell (2002) go a step further by
relating the HRM construct to two perspectives: a macro view that examines the impact of HR practices on organizations and a micro functionally-oriented frame of reference that explores HR's impact on individuals. Darwish (2013) arrived at a similar conclusion; however, noting that the micro-macro view marks the transition of HRM from the traditional view to the strategic, where the HR system, comprising the bundled HR practices, are the resources of interest.

The human resource management (HRM) field comprises the various practices used to manage organizational personnel (Wright & McMahan, 1992) according to functions such as selection, training, appraisal, and rewards identifiable to the HR department context. HRM is the summation of the technical knowledge resident in the noted functions. On the other hand, strategic HRM is a macro view of the role and function of HRM in the larger organizational context. Therefore, SHRM is the "pattern of planned human resource deployments and activities intended to enable an organization to achieve its goals" (Wright & McMahan, 1992, p. 298).

**HPWPs and HPWS and Bundled Practices**

Traditional HRM emphasizes individual HR practices. At the same time, strategic HRM focuses on bundled HRM practices or the specific configuration or systems of HR activities that determine organizational-level performance outcomes typically referred to as high-performance work practices (HPWP), high-performance work systems (HPWS), and high-commitment – high-involvement
work systems. High-performance work systems (HPWS) are used interchangeably with high-performance work practices (HPWP) in the scholarly research literature; however, the common understanding is that multiple HRM practices are a system (Wright & Boswell, 2002). Gittell, Seidner, & Wimbush (2010) noted that HPWP activities comprise high-performance work systems represented as labels generally associated with HR practices. HPWS achieves its efficacy by bundling the various practices underpinning the phenomenon.

The HRM community of research scholars identified 35 work practices across three themed areas or categories: (1) high employee involvement practices – self-directed teams, quality circles, and access to company information, (2) human resource practices – recruitment processes, performance appraisals, work redesign, and mentoring, and (3) reward and commitment practices – financial rewards, family-friendly policies, job rotation, and flex hours (Sung & Ashton, 2005). Similarly, high-performance work systems encompass staffing, self-managed teams, decentralized decision-making, training, flexible work assignments, communication, and compensation (Becker & Huselid, 1998).

While there is no single definition of strategic human resource management (SHRM), there is consensus that the construct should possess characteristics related to a long-term focus linked to strategic planning, and organizational performance, and includes line manager input (Martell & Carroll, 1995). As the name implies, SHRM links HRM to the firm's strategic management process to attain business objectives (Paauwe & Boon, 2019). SHRM theorists labeled HRM practices that
are performance-enhancing, high-performance work practices (Huselid, 1995). Other scholars noted that performance-enhancing HR practices comprise high-performance work systems (HPWS) and high-commitment – high-involvement work systems (Kaufman, 2010). Regardless of the label, the underlying theme is that firms can attain high performance by employing HRM practices that recognize and influence employees' ability to generate value (Gittell et al., 2010).

The related argument is that HPWPs increase employees' knowledge, skills, and abilities, empowering employees to use their KSAs for organizational benefit, leading to increased productivity, job satisfaction, lower turnover, improved decision-making and organizational performance (Combs, Liu, Hall, & Ketchen, 2006). Huselid (1995) reached a similar conclusion in his seminal work that HPWPs improve firm productivity and financial performance and reduce turnover (Huselid, 1995).

HRM practices viewed through the SHRM lens comprise high-performance work practices (HPWPs), high-performance work systems (HPWS), high-commitment work systems, and high-involvement work systems (Jiang, Lepak, Hu, & Baer, 2012), and include incentive compensation, training, employee participation, selectivity, and flexible work arrangements (Huselid, 1995). Becker and Huselid (1998) emphasize that the system of HRM practices and policies, rather than individual practices, creates the imitability necessary for firm performance and competitive advantage.
Other researchers advanced arguments along the same lines, noting that the characteristic of interest that confers the unique qualities to HRM practices is the bundled practices that are available to managers that shapes their interactions, rather than a single practice (Macduffie, 1995). However, there is no consensus on which practices are most beneficial or impactful (Bothelo, 2017). As a result, questions persist regarding the mechanisms that lead to desired organizational outcomes (Jiang, Lepak, Hu, & Baer, 2012) However, it bears mentioning that Huselid (1995) found empirical evidence that HRM practices (HPWP) reduce employee turnover.

Kaufman (2010) described the relationship between HRM practices and firm performance as strategic HRM (SHRM). The SHRM argument suggests that people are the source of a firm's competitive advantage because of the invisible-intangible quality of human resources (Itami, 1987) that makes it possible for firms to attain better organizational performance and effectiveness (Ostroff & Bowen, 2000). Moreover, there is also evidence that HRM practices influences the productivity, motivation, satisfaction, and commitment of employees. The preceding argument is in line with the contention that state-of-the-art HRM practices relate to firm profitability and lower employee turnover (Huselid, 1995). After all, HRM practices influence the skills, attitudes, and behaviors of a firm's employees, who in turn exert an influencing effect on the organization's performance (Ostroff & Bowen, 2000).
In definitional terms, HRM systems comprise the bundles of HRM practices or high-performance work practices (HPWP) that facilitate the achievement of organizational objectives (Wright & McMahan, 1992). Similarly, HR practices represent firms' means to motivate employees, eliciting behaviors that facilitate achieving the organization's goals (Wright et al., 1999).

Accordingly, Huselid (1995) argued that HRM practices work to influence employees' skills through a firm's acquisition and development of its human capital. Other scholars argue effectively by providing research evidence for a relationship between HRM practices and organizational effectiveness and performance (Wright, McCormick, Sherman, & McMahan, 1999; Delaney & Huselid, 1996). Many scholars have advanced the argument that bundles of HRM practices, rather than individual practices, can positively affect organizational performance (Wright & McMahan, 1992; Delery & Doty, 1996; Chowan, 2016).

Conversely, many scholars have challenged this contention, noting that it is unclear which HRM practices and how the system of practices contribute to organizational effectiveness (Pfeffer, 1994; Kaufman, 2010), commonly referred to as the "black box" effect (Messersmith et al., 2011). The extant research literature casts HR practices under three approaches: universalistic, configure, and contingency. Under the universalistic approach, some HR practices are suitable for all firms. However, there are indications that HR practices have interrelated effects, implying that they work together best rather than individually (Ichniowski, Shaw, & Prennush, 1997; Jiang et al., 2012).
The configural approach examines patterns of multiple HR practices and their impact on firm performance. The bulk of the research under the configural approach pertains to high-involvement or high-performance work systems (Huselid, 1995; Pfeffer, 1994), where employee involvement, participation, and empowerment are important attributes that underscore the primacy of teams, expanded job duties, employee ownership, performance-based pay, and rewards tied to unit performance (Ostroff & Bowen, 2000). Lastly, the contingency approach holds that HR practices depend on contextual factors related to strategy, technology, and environmental stability.

In an empirical research study of worker productivity on steel finishing lines, Ichniowski, Shaw, & Prennush (1997) found support that innovative HRM practices enhance worker productivity. For context, innovative work practices pertain to flexible job design, employee participation in problem-solving teams, multiple skills training, extensive screening and communication, and employment security (Ichniowski et al., 1997).

**HRM Practices and the Resource-Based View Link**

Drawing on the resource-based view, a firm's resource endowment (internal resources) can be a source of sustained competitive advantage if they add value to the firm's productive processes, are deemed rare, difficult to imitate, and not subject to replacement through technological obsolescence (Barney, 1991; Wernerfelt, 1984). Resources are "all assets, capabilities, organizational processes, firm
attributes, information, and knowledge controlled by a firm" (Barney, 1991, p. 101). It follows that a firm's employees can be a valuable resource because of the knowledge and expertise they possess. Pfeffer (1994) echoed a similar sentiment in asserting that in contrast to the conventional strategic industrial economics view that focuses on technology, patents, or strategic positioning for competitive advantage, success is possible through efficient and effective workforce management.

HRM is often framed in terms of the policies, practices, and structures used to manage employees. In a strategic context, HRM is the combination of practices adopted to improve organizational effectiveness and performance outcomes (Boselie, Dietz, & Boon, 2005). Substantial empirical research links HR practices to organizational performance by influencing employee attitudes and behaviors, (Katou, Budhwar, & Patel, 2014; Nishii, Lepak, & Schneider, 2008; Huselid, 1995)

However, it is worth noting that the empirical evidence for a positive relationship between HRM and organizational performance presents weak statistical evidence (Paauwe, 2009). Despite the convergence in belief among scholars associating HR practices with organizational outcomes by influencing employee attitudes and behaviors, other researchers suggest a different and more complex perspective where employee perception of the implemented HR practices precedes behaviors and attitudes (Nishii, Lepak, & Schneider, 2008).

More importantly, an employer's expected outcome resulting from implementing a set of HR practices will be interpreted differentially due to unique
employee dispositions that can lead to varying perceptions and meaning each employee attaches to the instituted HR practices (Nishii et al., 2008). Further, Paauwe (2009) posited that there are two main approaches in the HRM-organizational performance debate: best practices and best fit.

The principal focus in both approaches identified a changing trend that preferred a set (bundle) of HR practices over individual practices. The set of HR practices and policies comprise the content of the HRM system. The action an organization takes to enhance its HR practices and policies can improve acquisition, development, retention, and human resource utilization. In other words, HRM systems can impact organizational performance by influencing employee attitudes and behavior. This concept is fundamental to the purpose of the present study that sought to employ HRM practices to influence the turnover intentions of female mechanical engineers in a context of mediating social capital.

**HRM Practices – Do they Matter?**

HR practices generally matter because they represent a firm's investments in its people (Ostroff & Bowen, 2000; Wright et al., 1999). They also matter because of underlying practices, such as selection and training, that enhance employee skills and abilities that facilitate employee performance of activities that enable the achievement of organizational goals (Ostroff & Bowen, 2000). Pfeffer (1998) advanced seven HR practices (employment security, selective hiring of new personnel, self-managed teams and decentralized decision-making, pay-for-
performance, extensive training, reduced status differentials, and extensive information sharing) as universally beneficial to performance.

A firm's management utilizes HR practices to direct employee attitudes and behaviors toward alignment with the organization's business strategy. In other words, a principal objective of HR is to influence individual employee attitudes and behaviors to enhance organizational performance (Ostroff, 1992). Moreover, HR practices are key in driving firm performance (Huselid, 1995).

Furthermore, HR practices matter because of underlying practices, such as selection and training that enhance employee skills and abilities that facilitate employee performance of activities that enable achievement of organizational goals (Ostroff & Bowen, 2000). Pfeffer (1998) advanced seven HR practices (employment security, selective hiring of new personnel, self-managed teams and decentralized decision-making, pay-for-performance, extensive training, reduced status differentials, and extensive information sharing) as universally beneficial to performance.

In general, HR practices are broad-based in that they influence individual-level and organizational-level phenomena. Ostroff and Bowen (2000) characterized the individual-organizational split as the macro-micro continuum where the micro-level delineated individual attributes such as ability, motivation, performance, and attitudes.

Contrastingly, the macro view pertains to the organizational level, structure, strategy, culture, and effectiveness (Ostroff & Bowen, 2000). Wright and Boswell
(2002) posited similar arguments asserting that micro HRM research seeks to understand the impact of HR practices on individuals by examining variance across characteristics related to skills, attitudes, and behaviors, while macro HRM research examines the impact of HR practices at the organizational level of analysis.

Social Capital

According to Parnes (1986), capital is generally associated with produced goods used to further the production process, as in a factory building, machinery, or a retail store and its related inventory. Further, capital is an investment requiring using resources at some cost. The productive capacity of capital is the fundamental reason individuals and societies invest in the construct. The French sociologist Pierre Bourdieu defined capital as accumulated labor (in its materialized form or its "incorporated," embodied form), which, when appropriated on a confidential basis by agents or groups of agents, enables the use of social energy in the form of reified or living labor. (Bourdieu, 1986, p. 15).

The concept of embodied capital is another way of stating that transformed capital in a person is not spontaneous because it demands that actors invest time and effort to nurture its development. Bourdieu (1986) further explicated the construct, noting that capital exists in three forms: economic capital that allows for conversion into money or institutionalized property rights; cultural capital that is
convertible to economic and educational qualifications; and social capital founded in social obligations that is also convertible to economic capital.

Social capital is relational and underpinned by two common threads. First, sociability can convey positive consequences; second, nonmonetary forms of social capital can be essential sources of power and influence (Portes, 1998). Unlike the economic capital in an individual's bank account and human capital (education – knowledge, skills, and abilities) that resides in a person's head, social capital exists in the structure of relationships (Portes, 1998). There is ample evidence in the research literature that social capital is a source of value (Nahapiet & Ghoshal, 1997; Burt, 1997) and performance (Baker, 1990; Lins, Servaes, & Tamayo, 2017; Tsai & Ghoshal, 1998; Mahajan & Benson, 2013).

The significance of the argument that social capital is a source of value is reinforced by the supporting argument that human capital resulting from education and individual ability is often the stated reason for those who rise to the top or are successful. However, there is a contention that human capital "is useless without the social capital of opportunities to apply it" (Burt, 1997, p. 339). Social capital gained popularity through the work of Bourdieu (1986) and Coleman (1988).

Bourdieu (1986) defined social capital as the actual resources linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition. Bourdieu's definition of the concept conveyed that group participation was the equivalent of a resource benefit to individuals. Accordingly, social capital comprises a network of unending
relationships, requiring the expenditure of time and effort to create a resource benefit usable in the short or long term by the individual possessing the resource (Bourdieu, 1986).

Coleman (1988, 1990) argued that "unlike other forms of capital, social capital inheres in the structure of relations between persons and among persons. It is lodged neither in individuals nor in physical implements of production" (Coleman, 1990, p. 302; 1988, p. S98). Coleman analogized the wholesale diamond market to explicate the point of trust and strength of ties underpinning social capital. Specifically, the strong ties among Jewish families and the existing trust allow transactions in diamond exchange markets to occur without cumbersome rules and insurance that would be costly due mainly to the loss of social capital if a group member acted dishonestly. As stated, social capital reduces transaction costs.

Further, Coleman (1988) posited that social capital originated from two intellectual perspectives: the first defined within the context of "the actor as socialized and action as governed by social norms, rules, and obligations" (1988). In this case, the social context shapes and constrains the actor's actions. Under the second perspective, the actor's actions and goals are independently derived and underpinned by a totality of self-interest (Coleman, 1988, p. 95), as in utility maximization from classical economics, representing the quest by an individual to obtain the highest level of economic satisfaction or pleasure from their choices (Leightner, 2005).
Burt (1997) viewed the social capital concept through the frame of its cause in noting that it is a quality created between people. Fundamentally, membership in social networks conveys benefits that "include privileged access to knowledge and information, preferential opportunities, for new business, reputation, influence, and enhanced understanding of network norms" (Inkpen & Tsang, 2005, p. 150). Burt (1997) used the example of a business manager to illustrate that the value added to a firm depends on the manager's ability to know who, when, and how to coordinate internally and externally with the firm as dependent on the manager's network of contacts. Portes (1998) added clarity to the concept by asserting that "social capital is decomposable into two elements: first, the social relationship itself that allows individuals to claim access to resources, and second, the amount and quality of those resources" (Portes, 1998, pp. 3-4).

Two additional viewpoints on Bourdieu's work on social capital convey that it is the property of an individual actor and that it facilitates the actor's exertion of power on a group or individual (Claridge, 2015). Similarly, the social capital attribute exists in relationships between and among individuals and is owned jointly by the parties engaged in a relationship (Nahapiet & Ghoshal, 1998). Putnam, Leonardi, & Nonetti (1993) advanced a similar argument in asserting that social capital comprised networks, norms of reciprocity, and trust.

Moreover, social capital is composed of multiple entities, sharing the common elements of social structure that facilitate actors' actions (1988). Other scholars defined social capital as "knowledge and organizational resources that
enhance the potential for individual and collective action in human social systems" (McElroy, Jorna, & Engelen, 2006, p. 125). It is instructive to reinforce that social capital's major elements or components are trust, beliefs, norms, rules and networks (McElroy, Jorna, & Engelen, 2006).

The relevance of social capital (structural, relational, and cognitive) to the study of engineer turnover intentions in the face of HR practices relates to understanding the value of connections to those in power within and external to the organization. A pertinent example is the finding that indigenous communities with solid group solidarity, but few (weak) connections to the powerful within and outside the community remained poor (Narayan & Cassidy, 2001).

**HRM Practices and Social Capital**

Leana and Van Buren (1999) were among the first researchers to explore how HRM practices facilitate the creation of social capital, positing that the construct can be an attribute of individual actors, communities, and organizations. Leana and Van Buren (1999) explored organizational social capital in-depth, defining the construct as "a resource reflecting the character of social relations within the firm" (Leana & Van Buren III, 1999, p. 538).

Social capital is realized from organizational members' collective goal orientation and shared trust levels that enable successful action and value creation. Nahapiet and Ghoshal (1998) also connected HRM to social capital, arguing that social capital facilitates the intellectual capability of organizations. Just as physical
capital (plant and equipment) involves changes in materials to facilitate production, social capital is created when the relations among people change to facilitate action that considers consequences and the following result (Coleman, 1990). Likewise, Coleman (1988) contended that social capital exists in the structure of relations between and among actors, which aligns with the definition that social capital is the embedded assets in relationships (Leana & Van Buren III, 1999).

Kwon and Adler (2014) contend that the influence of social capital resides in the information, influence, and solidarity perks available to members of a group or individuals due to existing relationships with other actors. Social capital plays a crucial role in effectively functioning in various organizational settings. For example, the extant literature suggests that the social capital construct influences creativity. The research literature provides evidence that organizational social capital founded in the relationships among employees in the work setting matter (Green, Wu, Whitten, & Medlin, 2006) because of the construct's capacity to influence performance through activities that include knowledge sharing and transfer.

Furthermore, Adler and Kwon (2002) argued that the internal and external linkages within and between organizations can facilitate their effective functioning. Social capital research is often framed from a public (group) perspective; however, it bears mentioning that group-level social functions require private (individual) level actions. For example, Burt (1997) highlighted the social capital viewpoint, noting that individual actors accrue advantages by their status or location in the
social hierarchy. The observation that networks materialize from the activities of individuals who invest the necessary time to connect reinforces the private (individual) argument (Glaeser, Laibson, Scheinkman, & Soutter, 1999).

However, the group perspective argument states that "social structures that make possible social norms and the sanctions that enforce them do not benefit primarily the person or persons whose efforts would be necessary…. but benefit all those who are part of such a structure" (Coleman, 1988, p. 116). Further, Leana and Van Buren III (1999) posit that the social capital benefit possessed by individuals also confers to the organization.

A pertinent example is the manager that can bridge structural holes (Burt, 1997), increasing their individual stores of social capital in the form of abilities gained that in-turn facilitate the resolution of organizational problems. Although the private (individual) and public (group or community) perspectives represent different assumptions, the social capital positions do not conflict (Leana & Van Buren III, 1999).

In summation, the individualistic perspective of social capital provides individuals access to resources through information assistance from their grouped network connections. Contrastingly, the collective (group or community) approach confers benefits based on the ability of the group or community to engage in collective action fostered through existing cohesive relationships (Villalonga-Olives & Kawachi, 2015). Likewise, social capital is individually-oriented when
embedded in an actor's social network comprising social support, information
channels, and social credentials.

According to Adler and Kwon (2009), researchers have used social capital
to explain the differential success factors of individuals in various network settings.
In other words, they were finding out how the direct and indirect connections of a
drew similarities between social capital and other forms of capital (physical–
financial, economic capital), noting that the construct is a resource that can be used
to invest in other forms of capital.

In general, an engineer's embedded knowledge, skills, and abilities can be
invested in the existing social climate of the organization or the social capital that
exists in engineer colleagues within the firm. This line of thinking supports the
assertion that individual and collective actors' investments in developing one's
external and internal networks can provide access to valuable contacts and
information (Adler & Kwon, 2009).

Lastly, appropriability is a crucial attribute of social capital (Coleman,
1988), which is to say the ties in a person's network of social relationships are
convertible or can be used for different purposes. In an organizational setting where
a person's network links to someone in a leadership or managerial position, as in a
mentorship role, this can yield valuable career information and advice that benefits
the individual.
Social Capital Dimensions

There is no single consensus in the characterization of social capital. However, key social capital attributes include norms of reciprocity, recognition, and trust (Adler & Kwon, 2002). Nahapiet and Ghoshal (1998) divided the construct across three dimensions: structural, relational, and cognitive. Putnam (1993) and Portes (1998) described the construct from the perspective of shared norms and norms of reciprocity. Lin and Lu (2011) related social capital to interaction ties, trust, and shared values. Bourdieu (1986) explained that social capital encompasses the diversity of resources accessible through informal social ties, while Coleman (1988), Kawachi (2006), and Putnam (2000) explored individual social capital perspectives.

As previously noted, the central underpinning of social capital relates to the network of relationships that facilitate the availability of resources for the benefit and action of individuals and members of a network (Baker, 2012; Nahapiet & Ghoshal, 1997; Bourdieu, 1986; Coleman, 1988). Neira, Lacalle-Calderon, Portela, & Perez-Trujillo (2019) argued that social capital is multidimensional and is best examined across the spectrum of all dimensions rather than in isolation. Neira et al. (2019) postulated that trust, social networks, and social norms comprised the most common elements of social capital.

Nahapiet & Ghoshal (1998) similarly argued that social capital exists in three separate but interrelated clusters characterized as structural, relational, and
cognitive social capital dimensions. Further, each social capital dimension relates to specific constructs that further define the underlying social activity. The structural social capital dimension examines social interaction ties or the extent of social interaction ties between actors.

**Structural Dimension**

Structural social capital is the framework for developing interpersonal relations in a firm’s employees (Mahajan & Benson, 2013). Nahapiet and Ghoshal (1998) drew on Granovetter's (1992) structural embeddedness theory that characterized the social system and network of relations to anchor the structural social dimension. Structural social capital constitutes the pattern of relationships or network ties between actors in a network (Inkpen & Tsang, 2005). In other words, whom one knows affects what they can know" (Burt, 1992). Nahapiet and Ghoshal (1998) expressed a similar sentiment in relating the construct to "whom one can reach, and how they reach them" (Nahapiet & Ghoshal, 1998).

The central observation under the embeddedness theory construct is that economic action is embedded in social relations, which affect behavior and institutions (Granovetter, 1985). As such, the location of an actor's contacts in a social structure conveys advantages that can facilitate access to jobs and other valuable resources (Tsai & Ghoshal, 1998).

It is worth noting that the structural hole argument also influenced the development of the structural social capital dimension, where information and
control advantages accrue to the broker of relations between members of a group who are otherwise disconnected in a social structure (Burt, 1997). Moreover, Burt (1997) argued that a person's position in a structure of exchange is an asset due to the existing connections, trust, and obligations to certain others. Burt (1997) characterized structural holes as disconnections between individuals that create gaps in awareness of existing benefits actors can provide to each other. Further, structural holes are gaps, weak ties, and acquaintances (Granovetter, 1973), between non-redundant contacts in a network cluster that causes actors to focus on their activities, leaving little time to interact with people in the other clusters (Burt, 1997).

Moreover, "our acquaintances (weak ties) are less likely to be socially involved with one another than are our close friends (strong ties)" (Granovetter, 1983, p. 201). Granovetter (1973) summarized the concept of the weak tie in arguing that "whatever is to be diffused can reach a larger number of people, and traverse greater social distance (i.e., path length) when passed through weak ties rather than strong" (Granovetter, 1973, p. 1366).

On a macro level, weak ties promote social cohesion. From an individual perspective, weak ties are crucial because they facilitate mobility opportunities by providing unique information unavailable in a strong tie setting. Weak ties can also serve the interest of female engineers who may learn of training opportunities and new projects that can be a source of future career advancement and better pay.
Altogether, weak ties operate through networks with less density than strong ties. The preceding argument explains why weak ties assure wider diffusion by involving more people, facilitating information transfer over a greater social distance. Contrastingly, strong ties have long-lasting, frequently exercised attributes and are emotionally close (Granovetter M. S., 1973).

In summation, the structural social capital dimension encompasses network ties relating to the pattern of connections, such as density, connectivity, and hierarchy of relationships that employees share. It also includes the network configuration (range of accessible information; and appropriable organization) patterns of social exchange that enable social capital created for one purpose to serve as a source for resources under an alternate framework (Nahapiet & Ghoshal, 1998).

**Relational Dimension**

Relational social capital refers to the quality and depth of relationships conceived through trust, norms, and identification (Inkpen & Tsang, 2005). Along similar lines, the relational dimension underscores the role of direct ties between actors, with trust, norms, and identification as key motivating factors in the decisions forged between actors (Inkpen & Tsang, 2005). According to Rousseau, Sitkin, Burt, and Camerer (1988), trust is based on the social judgments about a particular party's benevolence – goodwill, and competence where costs and risks may be an issue.
Nahapiet and Ghoshal (1998) echoed a similar sentiment in arguing that trust and trustworthiness, norms and sanctions, obligations and expectations, and identity and identification comprise the key characteristics of the relational dimension. Nahapiet and Ghoshal (1998) returned to Granovetter's, (1992) work on social embeddedness to illustrate the role of social relations in influencing economic outcomes and resource sharing. Specifically, the guiding force of the social capital dimension is the personal relationships developed through long-term interactions (history) that reinforces trust, relational closeness, expectations, and reputations (Adler & Kwon, 2002).

Trust is a recurring theme in the social capital literature (Nahapiet & Ghoshal, 1997, 1998; McElroy, Jorna, & Engelen, 2006; Adler & Kwon, 2002, 2009; Dess & Shaw, 2001; Birasnav, Chaudhary, & Scillitoe, (2019); and features prominently under the relational dimension due to the prevailing ties that promote information sharing and knowledge transfer between actors (Wijk, Jansen, & Lyles, 2008; Inkpen & Tsang, 2005). In other words, the atmosphere of trust promotes openness, limiting opportunistic behavior that also serve to lower transaction costs between network members (Adler & Kwon, 2002).

Moreover, trust facilitates cooperation, and cooperation facilitates trust (McElroy, Jorna, & Engelen, 2006). Leana and Van Buren (1999) linked trust as a necessary element for collective action. Further, trust develops over time, but can readily disintegrate (Leana & Van Buren, 1999). Just as trust increases over time as parties in a relationship learn about each other's trustworthiness (Vanneste,
Puranam, & Kretschmer, 2014), so too does social capital (Leana & Van Buren, 1999). It is therefore incumbent upon organizations to reinforce trust in its employment practices and policies by deploying HRM practices in a manner that fosters a climate of trust. The contention that managers and employees at different levels will likely collaborate when shared trust, interaction opportunities, and commitment to a common goal or purpose exists underscores the salience of social capital (Tantardini & Kroll, 2015).

Norms of reciprocity are the act of doing someone a favor with the implicit knowledge that if one need a favor in the future, that person will reciprocate by stepping in to lend a hand. Accordingly, the described act provides cohesion in a community setting. The same applies to engineers who extend favors or help one another on a person-to-person basis or in a team or organizational setting. In other words, sociocultural settings' underlying shared norms and beliefs facilitate individual and collective action (Adler & Kwon, 2009). Rules are crucial to generating social capital (Adler and Kwon, 2009). McElroy et al. (2006) asserted that rules are norms with sanctions attached. It defines what is socially acceptable but also includes the "or else" factor or punishment for violating the established norm.

**Cognitive Dimension**

The cognitive dimension of social capital relates to "those resources which represent shared understanding, interpretations, and system of meanings between
parties achieved through shared language, code, and narratives” (Nahapiet & Ghoshal, 1997, p. 35). A shared language is a common vocabulary between individuals that facilitates discussion and information exchange, which is crucial to developing social relations. Moreover, a common language is important for the development and exchange of knowledge, shared meaning, and mutual understanding between collaborative partners (Nahapiet and Ghoshal, 1998).

Beliefs resides under the cognitive dimension and are characterized as shared strategic visions, interpretations, and systems of meaning crucial to the development of social capital (Nahapiet and Ghoshal, 1998). According to Adler and Kwon (2009), the emergence of social capital is unlikely in an environment where people lack a common understanding. A common belief system promotes communication of ideas, facilitating common experiences, worldviews, assumptions, and expectations that lead to collective action (Adler and Kwon, 2009).

Portes (1998) argued along similar lines echoed a similar sentiment in asserting that shared experiences and common beliefs foster a sense of community (commonality of norms, religion, values, customs, or identity), and solidarity – common sense of purpose and agreement that can unify a group or community. McElroy et al. (2006) linked common belief systems to enhanced information flows in organizations. The preceding observations suggest that engineers (male and female) can benefit from adopting a common belief system centered on work
experiences that lead to common expectations, a shared sense of purpose, and joint action.

Adler and Kwon (2002) identified two categories of cognitive social capital: shared goals and shared culture. Shared goals represent the extent to which individuals in a network share a common understanding and approach to network tasks (Inkpen & Tsang, 2005). On the other hand, shared culture relates to the rules and norms that determine behavioral norms in a network (Inkpen & Tsang, 2005). The cognitive dimension shares similarities with the relational dimension in that a shared organizational culture facilitates knowledge transfer between actors in an existing network.

Drawing on the work of Jacobs (1961), Loury (1977), Coleman (1990), and Putnam (1993), Glaeser, Laibson, Scheinkman, & Soutter (1999) contend that there is ample evidence in the research literature that social capital and the underlying trust that the construct engenders is widely influential on economic and political phenomena. For example, Arrow (1972) argued against commercialization of the U.S. blood donation system due to the risks if altruism and the trust it engenders is removed.

The overarching contention is that altruism — truth and trust play an oversized role in the operation of a society's economic system (Arrow, 1972). In a similar vein, Fukuyama (1995) argued that lies the level of trust in a society serves to strongly influence its economic success. The assumption that follows is that the level of social capital, namely social structural capital, social relational capital, and
social cognitive capital among a firm's employees is equally influential to its success.

**Organization Linkage of Social Capital**

There is growing evidence in the research literature linking social capital to the organizational context (Leana & Van Buren III, 1999). Organizational social capital is defined as "a resource reflecting the character of social relations within the organization, realized through members' levels of collective goal orientation and shared trust" (Leana & Van Buren III, 1999, p. 540). Several scholars have also demonstrated the crucial role of social capital in organizational performance (Leana & Pil, 2006; Andrews, 2010; Felício, Couto, & Caiado, 2014). The preceding arguments imply that (female engineers) can benefit from information that leads to more significant training opportunities and opportunities for advancement.

However, individuals work within the structure of an organization and through their connections to networks that include co-workers, supervisors, and manager. It follows that employees can benefit from an organization’s implementation of social capital-enhancing practices, which can serve as a motivator for employees to reciprocate by using their talent and experience (human capital) to enhance productivity, performance, and competitive advantage.

Social capital crosses several levels of analysis in that it applies to individuals, groups, organizations, communities, and even nations (Leana & Van Buren III, 1999). This observation strengthens the argument that female engineers,
through awareness of the social capital structure at the organizational level, can leverage social capital through the strength of their networks (weak and strong ties) for advantage within the existing network of the firm.

Kogut and Zander (1996) defined a firm as "a social community specializing in the speed and efficiency in the creation and transfer of knowledge" (1996, p. 503). The knowledge-based theory literature establishes that a firm's management of individual and collective knowledge resources in its employees is crucial to its performance outcomes (Boone & Ganeshan, 2008). Additionally, the research literature provides ample evidence that social capital can play a crucial role in effectively transferring knowledge within and between firms (Collins & Hitt, 2006). Kirsch, Ko, and Haney (2010) associated social capital as an antecedent to clan control in describing knowledge-based environments where work is nonroutine and complex, and there is an imperative to exercise control within a team structure.

Under a team structure, work behavior is shaped by norms, values, and shared vision, facilitating team acceptance (Kirsch, Ko, & Haney, 2010). In other words, leveraging the underlying social capital (norms, values, and shared vision) in teams fosters team-based control of nonroutine work efforts. Knowledge workers are defined as individuals with great expertise, experience, and education, involved in work whose purpose is the creation, distribution, and application of knowledge (Davenport, 2005).
Further, May, Korczynski, and Frenkel (2002) placed the engineering occupation in the knowledge worker category because of the underlying cognitive foundation of engineers' knowledge and expertise. Swart and Kinnie (2003) linked social and human capital to the success of knowledge-based organizations, noting that the knowledge and skills of workers, in conjunction with the expertise gained from their network of relationships, can facilitate the achievement of competitive advantage. Knowledge workers are also associated with firm creativity and innovation (Shujahat, et al., 2019), implying that engineers are a vital source of a firm's innovation capability.

However, knowledge, skills, and abilities are a human capital attribute residing in engineers. This reality elevates the importance of intra-firm knowledge transfer, which occurs through the connections and formal network relationships (Boone & Ganeshan, 2008). Moreover, knowledge often exists in context-restrained, firm-specific, tacit, and embedded complex social structures and team relationships, limiting its transferability (Lam, 1997). Collins and Hitt (2006) reached a similar conclusion in highlighting the difficulty of conveying tacit knowledge. Furthermore, under the RBV, organizations that establish conditions conducive to an organizational culture that facilitate knowledge development and learning can achieve sustained competitive advantage (Banerjee, Gupta, & Bates, 2017).

Firms viewed through an organizational development lens are social systems, existing to aid in the achievement of human needs and goals (Knowles,
Moreover, there is evidence in the social capital research literature that voluntary employee turnover can wreak havoc on an organization's social fabric (Leana & Van Buren, 1999). Simply stated, rival firms can use the external social networks of a competing firm to recruit away other network members, draining valuable human capital from the organization (Dess & Shaw, 2001).

The existing consensus holds that organizational theory alone cannot explain the consequence of the resulting turnover outcomes. After all, an employee's decision to quit or withdraw from the employment relationship is not spontaneous, but one that follows a deliberate process of thinking about quitting due to disaffected feelings (Mobley W. H., 1977). Prusak and Cohen (2001) starts with the trust element of social capital as key to the effective functioning of any business organization. Generally, individuals withdraw from personal connections where trust is lacking. Further, a person is less likely to share information with a colleague who is not trusted. Trust in a team environment could help an organization since, with information sharing, knowledge transfer can affect the firm's productivity, performance, and ability to attain competitive advantage. Prusak and Cohen (2001) sum up the importance of trust by asserting that the attribute fosters stronger relationships that enhance the productivity of personnel and the efficient functioning of the organization. Moreover, "trust thrives where managers give employees no reason to distrust" (Prusak & Cohen, 2001, p. 90).

Just as individuals can reciprocate with helping behaviors due to levels of an existing trust, the same is possible in a group setting (Villalonga-Olives &
Kawachi, 2015), implying that social capital works at the individual and group levels.

Further, the social capital value a person derives depends on their personal connections and personal relationships (Lesser, 2000). For example, engineers often work in teams, making trust an essential part of forging the relationships that promote collaboration and knowledge sharing (Lesser, 2000). Contrastingy, Prusak and Cohen (2001) temper the benefits of social capital by drawing attention to the turbulence (volatility) of the modern business environment beset by constantly changing structures to meet the competitive challenges, and the emerging threat due to an emphasis on virtual work that comes from technology that enables employees to telecommute and work in off-site settings and spaces. In other words, the unintended consequences of work flexibility can drive workers further apart, limiting the necessary networking and relationship-forming activities.

**Weak Ties versus Strong Ties**

Granovetter (1973) posited the argument that in interpersonal networks, small-scale interactions lead to manifest into large-scale patterns. In an empirical study of the importance of social networks, Granovetter (1973) found supporting evidence that most workers in his sample that had voluntarily and recently changed jobs obtained their job information from an acquaintance rather than a close friend. This revelation led to the weak tie argument asserting that our acquaintances (weak
ties) are less likely to be connected in a relationship compared to our close friends or strong ties (Granovetter, 1973).

A parent–child relationship or a close friend that individual trusts, shares information, and interacts with regularly are pertinent examples of strong ties and therefore represent a dense clump of social structure, as in Network 1. The opposite is true for weak ties. In other words, our acquaintances (weak ties) represent people we know but interact with on an infrequent basis, have less trust, and share less information. Our acquaintances, however, are connected to their own close clump of social structure (Network 2), forming crucial bridges that connect Network 1 and 2. The absence of bridges between Network 1 and Network 2 would confine the persons to information shared between close friends in the network (Granovetter, 1983).

The links between individuals as described (see Figure 2.1) shows that if person (A) occupies a central nodal position through strong connections to persons B and C, as shown in Figure 8 below, there is a likelihood of at least a weak tie or relationship, as represented by the dotted line between B and C.
Figure 2.1. Weak Tie - Strong Tie Framework

Adapted from The Strength of Weak Ties, Granovetter (1973).

An alternate way of illustrating this concept is to assert that the people we interact with regularly will likely become our strong ties. One benefits from this interaction through new information and ideas gained that can influence job hunting and promotion opportunities through the linkages between individuals as Granovetter (1973) described.

Given that a person (A) occupies a central nodal position through strong connections to persons B and C, as shown in Figure 8 below, there is a likelihood of at least a weak tie or relationship, as represented by the dotted line between B and C. An alternate way of illustrating this concept is to assert that the people we interact with regularly will likely become our strong ties. One benefits from this interaction through new information and ideas gained that can influence job hunting and promotion opportunities (Granovetter, 1973; 1983). Granovetter (1973) also discussed the concept of a bridge as a line connecting two points in a network that otherwise would be disconnected. Referring to the diagram above, A
is indirectly related to F through a bridge between B – F. Likewise, A is indirectly connected to D due to the existence of a bridge connection (relationship) between C and D. Moreover, “all bridges are weak ties” (Granovetter, 1973, p. 1364).

The significance of the weak tie argument is that because weak ties are indirectly connected to a strong tie, someone occupying a weak tie position would likely have a strong relationship that is outside one’s immediate circle that could have new information that can serve our information needs for the resolution of a problem. On a firm level, bridges can facilitate information exchange through connections that link employees in separate networks.

On a less positive side for the organization, bridges can allow employees with high human capital to learn job opportunities in competing firms, leading to high voluntary turnover levels (Randel & Ranft, 2007). Moynihan and Pandey (2008) noted that an employee’s membership in external organizations provides fruitful information regarding job opportunities that, in turn, can facilitate voluntary turnover. It bears mentioning then that inter-organizational information exchange is high for employees harboring turnover intentions. (Randel & Ranft, 2007). Table 2.1 highlights some of the attributes and characteristics of a typical network structure.
Table 2. 1. Social Capital Network Structure Attributes

<table>
<thead>
<tr>
<th>Social Capital Attribute</th>
<th>Theory</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Network Structure</td>
<td>Weak Ties: (Granovetter, 1973)</td>
<td>Degree of strength in a person’s social ties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Social clique (strong tie) – friends and co-workers</td>
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<td></td>
<td></td>
<td>Strong emotionally intense and frequent connections</td>
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<tr>
<td></td>
<td></td>
<td>o Cohesive contacts - all members have same information (redundant)</td>
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<tr>
<td></td>
<td></td>
<td>• Ties external to social clique (weak)</td>
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<tr>
<td></td>
<td></td>
<td>o Less emotionally intense and infrequent ties or connections</td>
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<td></td>
<td></td>
<td>o Information more restricted and unique</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Bridges social distance by accessing information from outer circle</td>
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<tr>
<td></td>
<td></td>
<td>o Better source of job information</td>
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<tr>
<td></td>
<td></td>
<td>o Positive influence on job status when connected to high status persons</td>
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<tr>
<td>Social Network Structure</td>
<td>Structural Holes (Burt R. S., 1992)</td>
<td>Pattern of relations among alters and egos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Structural hole – disconnected alters</td>
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<tr>
<td></td>
<td></td>
<td>• Advantages obtained through multiple connections</td>
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<td></td>
<td></td>
<td>Salience of Structural Holes:</td>
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<tr>
<td></td>
<td></td>
<td>• Holes in social structure implies separation between individuals who are aware of each other, but are focused on their own activities.</td>
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<tr>
<td></td>
<td></td>
<td>o Structural holes separate non-redundant information</td>
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<td></td>
<td></td>
<td>• Timely access to unique information</td>
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<tr>
<td></td>
<td></td>
<td>• Better bargaining power and control over resources</td>
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<td></td>
<td></td>
<td>• Greater visibility and career opportunity</td>
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<tr>
<td></td>
<td></td>
<td>• Use of brokerage to span structural holes</td>
</tr>
<tr>
<td>Social Resources and Occupational Status (Lin, Vaughn, &amp; Ensel, 1981)</td>
<td>Social Resource Theory (Lin N., 1999)</td>
<td>Initial occupational status due to education (human capital)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Access to resources in social networks determines socioeconomic status</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Weak ties lead to higher status attainment</td>
</tr>
<tr>
<td>Network-Bridging Tie (Levin, Walter, Appleyard, &amp; Cross, 2015)</td>
<td>Network-bridging tie – relationship that spans a structural hole in a network</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bridging ties – links to contacts in a network that are not connected</td>
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<tr>
<td></td>
<td></td>
<td>• Can be strong or weak – depends on:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Time spent together</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Emotional intensity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Intimacy</td>
</tr>
</tbody>
</table>
The preceding Table 4 attributes underscores the significance of social ties in an organizational setting since employees tend to use relationship motivation tools to nurture on-the-job personal friendships and social support, and job facilitation motivation actions to maintain social ties that can enhance on-the-job success (Randel & Ranft, 2007). Ostroff (1992) cited the work of Emery and Trist (1960) in asserting that organizational effectiveness is dependent on the technical and social structure of the organization.

In a similar vein, organization effectiveness results from congruence between the technical and social domains of an organization (Ostroff, 1992). For context, social capital comprise the assets embedded in relationships (Leana & Van Buren, 1999). Stated from an employee satisfaction-organizational productivity perspective, social capital attributes such as trust (Argyris, 1964; Likert, 1967), interaction, and relationships may influence positive behaviors, facilitating the achievement of organizational objectives (Ostroff, 1992).

Satisfaction and commitment are generally viewed as idiosyncratic individual level attitudes and behaviors. However, there is evidence in the research literature that satisfaction and commitment can take on a shared value appearance in a work setting (Ostroff, 1992). The preceding observation lends credence to the social capital argument that social capital serves as a conduit for the exchange of knowledge and expertise among employees due to existing social networks and informal relationships (Steinfield, DiMicco, Ellison, & Lampe, 2009).
Turnover

Engineers comprise a crucial segment of an organization’s human capital due to their ability, effort, and knowledge set that are the primary inputs to fostering a firm’s innovation process (Zenger & Lazzarini, 2004). Relatedly, the knowledge, skills, abilities, and creativity resident in employees represent a valuable human capital resource. Consequently, companies strive to retain their best and brightest employees. Therefore, there is an incentive for firms to guard against voluntary employee turnover due to the negative effects of employee replacement and selection costs, as well as the shocks to the firm’s human and social capital.

The employee turnover issue cuts across all occupations, making the construct one of the most complex and widely examined organizational phenomenon (Hom, Griffeth, & Sellaro, 1984). The turnover construct has many antecedents that can include an individual’s perceived ease of movement between jobs, extent of dissatisfaction, level of organizational commitment, work and non-work life matters, perceived organizational support, and organizational culture (Dwivedi, Kaushik, & Luxmi, 2013). Turnover can be involuntary, as in the case where an employee is dismissed or the employer severs the relationship with the employee due to a firing, poor or declining performance, or violation of some organizational norm or standard (Huselid, 1995). In the case of this dissertation, emphasis will be on the voluntary turnover element.
Turnover Theory

Mobley (1977), Mobley, Griffeth, Hand, and Meglino (1979), and Muchinsky and Morrow (1980) made seminal contributions in defining the early models that explained and shaped the turnover landscape. Since then the concept has garnered the attention of scholars, producing a vast body of turnover research literature (Bluedorn, 1980; Mobley W. H., 1977; Mobley, Griffeth, Hand, & Meglino, 1979; Shaw, Duffy, Johnson, & Lockhart, 2005) – voluntary and involuntary, as well as turnover intentions (Skelton, Nattress, & Dwyer, 2020; Nasurdin, Ling, & Khan, 2018).

Turnover is the result of an employee leaving a firm permanently (Cascio, 1991) due to job dissatisfaction, often posited as an important factor and antecedent in the turnover intentions of employees (Holtom, Mitchell, & Lee, 2005). Contrastingly, job satisfaction and organizational commitment are key elements in explaining turnover theory (Steel, 2002).

Turnover Types

Turnover can be voluntary or involuntary. Voluntary in the sense that it is a personal decision where the employee withdraws from the employment relationship or exits the organization on their own accord (Shaw, Gupta, & Delery, 2002). Consequentially, the voluntary turnover construct has garnered the attention of scholars and practitioners as early as 1917, persisting to the present (Hom, Lee, Shaw, & Hausknecht, 2017). Those early scholarly works identified the criticality
of turnover; noting the construct has a material impact on the functioning of an
organization due to direct costs, work disruptions, and loss of organizational
memory (Allen, Bryant, & Vardaman, 2010).

Voluntary turnover hurts organizational performance due to the hiring and
replacement costs that can range between 90 and 200% of an employee’s annual
salary (Allen et al., 2010). In a similar vein, turnover is disruptive to organizational
productivity (Shaw, Gupta, & Delery, 2005), and as a consequence impacts
financial performance (Heavey, Holwerda, & Hausknecht, 2013). The national data
shows that 41.4 million U.S. workers voluntarily quit in 2018, representing a
turnover rate of 27% (Mahan, Nelms, Bryan, & Pearce, 2019). Likewise, the
Bureau of Labor Statistics reported a national quit rate of 27.9% for the year ended

**Good Versus Bad Turnover**

Along similar lines, turnover is often characterized as functional (good)
turnover, related to low performing and easy to replace employees, versus
dysfunctional (bad) turnover representing high-performing employees that are
difficult to replace (Holtom, Mitchell, & Lee, 2005; Tziner & Birati, 1996; Cascio,
1991). It is important to distinguish between the two forms of turnover, because
many employers track the construct in an aggregate form, rather than separate the
top performers from the poor ones (Holtom et al., 2005). After all, turnover is
costly to an employer because of the time and effort required to select, interview,
and train new employees. Cascio (1991) broke down these costs in finite detail, noting that turnover comprises separation costs that comprise costs related to exit interviews, administrative costs, severance pay.

Accordingly, turnover also drives costs on the recruitment side of the spectrum, such as employee replacement costs as in position advertising, review of prospective employee applications and references, medical exams and orientation. Lastly, turnover adds to the costs of training a new employee. The cumulative effect is that turnover can summate to 3.4 to 5.8% of a firm’s annual operating budget (Waldman, Kelly, Aurora, & Smith, 2004).

Engineer Turnover Intention

Holtom et al. (2005) contends that job dissatisfaction is an antecedent to voluntary turnover. Contrastingly, the scholarly literature shows a consistently significant negative correlation between turnover and satisfaction (Locke, 1976). This observation led turnover scholars to question whether other attributes are at play in the employee withdrawal (turnover) decision process (Porter & Steers, 1973). Turnover theory scholars addressed the question by positing that an employee’s decision to quit or withdraw from the employment relationship is not a ‘snap’ decision, but has psychological undercurrent that affects the withdrawal process. An expansion of this line of thinking suggests that experienced job dissatisfaction leads to thoughts of quitting, followed by a series of intermediate steps as noted in Figure 2.2 and Figure 2.3. Moreover, the affected employee
examines the utility of each decision before arriving at the actual or final decision to quit (Mobley W. H., 1977).

**Turnover Decision Process**

Elaborating further, an employee’s feelings of dissatisfaction towards their employment situation can trigger preparatory job search activities to identify the availability of better job alternatives, followed by job accessibility success, acceptance, and the decision to quit or resign (Blau, 1993). Hom and Griffeth (1991) argued that employee turnover follows a sequence that begins with employee dissatisfaction that arouses thoughts of quitting. Thoughts of quitting leads to consideration of the benefits of a job search versus the costs of exiting the organization. In the event of optimistic employment opportunities, the employee will initiate the job search process, signaling an intent to quit that can yield alternatives that are evaluated and compared. If comparisons favor alternatives, the employee then quits.
Figure 2.2. Employee Turnover Decision Process

Note: From Intermediate linkages in the relationship between job satisfaction and employee turnover, by William H. Mobley (Mobley, 1977)
Turnover Intention

There is no precise definition of turnover intention; however, several scholars define the construct as the final step in the decision-making process leading up to a person quitting a job. Scholars assert that turnover is a difficult concept to accurately predict and therefore advise examining the construct as turnover intentions instead (Bluedorn, 1980; Dwivedi, 2015).

Although the principal focus of this dissertation is on turnover intention, it is instructive to briefly highlight the significance of the turnover construct from
various perspectives. For example, Mobley (1977) revolutionized turnover research by providing a detailed view of the process through a psychological lens. The extant research literature also examines the turnover construct from perspectives related to turnover intention (Mobley, Horner, & Hollingsworth, 1978; Martin, 1979; Satardien, Jano, & Mahembe, 2019), job satisfaction (Mobley, Griffeth, Hand, & Meglino, 1979; Brayfield & Rothe, 1951; Zimmerman, Swider, & Boswell, 2019), job dissatisfaction (Hom & Kinicki, 2001), organizational commitment (Zimmerman, Swider, & Boswell, 2019; Brien, Thomas, & Hussein, 2015; Mowday, Steers, & Porter, The measurement of organizational commitment, 1979), job embeddedness (Mitchell & Lee, 2001; Wheeler, Harris, & Harvey, 2010), and job-fit and person-fit perspectives (Steel, 2002), and personal factors and work experiences (Spencer & Steers, 1980).

Moreover, Nyberg and Ployhart (2013) examined collective turnover to understand how the construct depletes human capital at the organizational level. Likewise, Hevey, Holwerda, and Hausknecht (2013) empirically examined the causes and consequences of turnover, illustrating the broad impact and significance of the construct within the context of the firm.

Mobley, Griffeth, Hand, and Meglino (1979) drew on the work of (Dulaney, 1961, 1968; Fishbein & Ajzen, 1975; Locke, 1968; Mobley, 1977; Ryan, 1970) in contending that intentions precede behavior and is the best predictor of turnover. Arguing along similar lines, Bluedorn (1982) stated that turnover intention is linked to actual turnover. In a similar vein, Bothma and Roodt (2013) cited empirical
evidence of turnover intention serving as a valid proxy for actual turnover. Further, intentions are characterized as intention to search for a job or intention to quit (Mobley et al., 1979), where intention to search and the search behavior precede the quit decision and the turnover act (Mobley W. H., 1977).

In examining turnover intentions, Dwivedi (2015) noted that “turnover cognitions represent mental decisions intervening between an individual’s attitudes regarding a job and the stay or leave decision” (Dwivedi, 2015, p. 454). In a similar vein, Bluedorn (1982) recommended the use of turnover intention verses actual turnover, citing complexity in accurately predicting the construct, compared to intentions. Fundamentally, voluntary turnover has wide-ranging implications for organizations because of the negative consequences that results from the depletion of an organization’s human capital (knowledge, skills, and abilities), disruption of established organizational collaborative patterns, and employee replacement and training costs depletes financial gains (Heavey, Holwerda, & Hausknecht, 2013; WeiBo, Kaur, & Zhi, 2010; Chow, Ng, & Gong, 2012).

Moreover, Griffeth, Hom, & Gaertner (2000) asserted that turnover intention is a key antecedent of actual turnover. It is therefore in the performance and financial interest of a firm’s management to take an interest in their employees’ well-being. Likewise, it is well documented in the turnover literature that job satisfaction and organizational commitment are critical determinants of turnover intention and withdrawal cognitions (Tett & Meyer, 1993), making management of job satisfaction and organizational commitment attitudes crucial factors in

Samad and Yusuf (2012) found support that an employee’s perception of organizational support for their well-being in the form of extrinsic factors (pay and security) and intrinsic factors (freedom, feedback, identity, variety, interaction and friendship) that led to stronger emotional attachment to the organization. This line of thinking is in concert with the social exchange theory literature position that a firm’s support or encouragement of employer-employee, employee-co-worker, and employee-organization interaction can lead to an increased obligational felling to the organization (Harden, Boakye, & Ryan, 2018). A similar effect is likely if an organization implements HRM practices that establishes conditions that fosters social capital, enabling development that in turn influence the level of job satisfaction and organizational commitment.

**HRM Practices and Turnover Intentions**

There is evidence in the extant literature that turnover intention is the strongest predictor of actual turnover (Griffeth, Hom, & Gaertner, 2000) In a meta-analytic study of employee turnover, Griffeth et al. (2000) noted that managerial interventions can deter employee quit tendencies. For example, Royalty (1998) posited that child-bearing and related family responsibilities contribute to
workforce interruptions and can play an influential role in female employee quit rates.

The relevant argument is that HRM practices targeted at improving female engineer work-life balance (WLB) can temper the impact of organizational work roles in the occupational domain. Further, women are more likely to remain with their organization as they age (Griffeth, Hom, & Gaertner, 2000). However, the research evidence suggests women have a lower attachment to the labor force than their male counterparts (Royalty, 1998).

Perceived fairness of merit pay distribution influenced employee commitment more than the amount of pay (Folger & Konovsky, 1989). Moorman, Blakely, and Niehoff (1998) found that just procedures or fairness perceptions and demonstration of concern for employee well-being were more influential than pay in committing employees to stay. The foregoing argument characterizes the social exchange relationship, underscoring perceived organizational support or the extent that an organization values their employees (Eisenberger, Fasolo, & Davis-LaMastro, 1990).

Eisenberger et al., (1990) also noted that the general perception of employer support or care influences employee conscientiousness in the performance of job responsibilities. The same study found positive support for affective commitment, expressed as an employee’s emotional attachment to their organization; and lastly, innovation tendencies despite the absence of anticipated direct rewards (Eisenberger et al., 1990). The preceding findings align with the underlying
reasoning that committed employees are least likely to leave their organization (Allen & Meyer, 1990).

In their study of organizational commitment, Allen and Meyer (1990) divided the construct into three components: affective, continuance, and normative commitment. Affective commitment relates to an employee’s emotional attachment tendencies that influences their identification and involvement in the organization. Continuance commitment highlights the costs an employee associates with leaving the organization, while normative commitment defines the general feeling of obligation to the organization (Allen & Meyer, 1990). Concisely stated, strong affective commitment underscores employees who stay with their organization because they “want to”, while employees exhibiting strong affective commitment do so because they “want” to, while continuance commitment characterizes employees who “need to”, and normative commitment characterizes employees who feel they “ought” to stay with their organization (Allen & Meyer, 1990).

Likewise, employees’ perception of organizational support encourages reciprocation manifested by increased commitment (Moorman, Blakely, & Niehoff, 1998). A study undertaken by Bambacas and Kulik (2013) found that the extent of employees’ embeddedness in organizations serve to reduce their turnover intentions.

Turnover increases organizational inefficiencies due to the human capital deficit costs (Shaw, Duffy, Johnson, & Lockhart, 2005). A prediction from the McKinsey and Company consulting firm that talent for smart, sophisticated
business people who are technologically literate, globally astute, and operationally agile is a most important corporate resource places the argument of why turnover matters to an organization in perspective (Dess & Shaw, 2001).

According to Dess and Shaw (2001), turnover serves to deplete the stock of skills resident in the organization, and is also instrumental in altering the organization’s social structure and fabric due to the loss of key members (Leana & Van Buren, Organizational social capital and employment practices, 1999). Additionally, the financial costs resulting from voluntary engineering turnover manifests itself as separation or exit interviews, advertising and selection costs, new hire training and development, and other hidden costs (Dess & Shaw, 2001).

*Job Satisfaction*

Job satisfaction is defined as the extent to which people like or dislike their jobs (Spector, 1997). More broadly, job satisfaction is attitudinal, comprising a constellation of attitudes about various facets of a given job (Spector, 1997; Ilies, Wilson, & Wagner, 2009). Other researchers view the construct as the degree to which organizational members hold a positive affective orientation toward membership in the system (Martin, 1979). The job satisfaction concept bears significant importance to organizations and organizational behavior scholars because of its perceived role in contributing to low employee turnover (Spector, 1997).
Furthermore, job satisfaction components include satisfaction with pay, promotion, work, supervision, and co-workers. Relating pay and promotion to job satisfaction are consequential considering that scholars have offered similar empirical support. Hunt (2016) provides a relevant example in finding empirical support that the main driver of female engineer exit from the career field was due mainly to dissatisfaction with pay and promotion opportunities.

The preceding observation aligns with the argument that employees who leave (quit) have stronger negative attitudes compared to their counterparts who stayed in their jobs (Hellriegel & White, 1973). Federico, Federico, & Lundquist (1976) bolsters the pay-job satisfaction argument in finding an association between higher salary and longer tenure. Conversely, shorter tenure was associated with differences in an individual’s expected and actual salary (Federico et al., 1976). The job satisfaction construct is critical to understanding and explaining the employee-employer relationship. The mutual unwritten expectation regarding organizational policies and work practices typifies the employer-employee contract (Patrick, 2008). After all, higher employee commitment and low turnover are the resulting benefits that can accrue to the employer for promises made and promises kept to the employee.

Organizational Commitment

The 1970-80’s timeframe marked the early stages of organizational commitment research with notable scholarly works. The research literature views
organizational commitment in terms of behaviors and attitude. Elaborating further, behaviors that exceed normative expectations lead individuals to forego alternative courses of action and align with their organization (Mowday, Steers, & Porter, 1979). The attitudinal perspective links the identity of the person with their organization (Mowday et al., 1979).

Organizational commitment is defined as "a strong belief in and acceptance of the organization's goals and values, a willingness to exert considerable effort on behalf of the organization, and a strong desire to maintain membership in the organization" (Porter, Steers, Mowday, & Boulian, 1974). Organizational commitment is critical to understanding and explaining the employee-employer relationship (Mowday, Porter, & Steers, 1982) due to the affective and calculative dimensions that underpin the construct. The construct is defined as "a strong belief in and acceptance of the organization's goals and values, a willingness to exert considerable effort on behalf of the organization, and a strong desire to maintain membership in the organization" (Porter, Steers, Mowday, & Boulian, 1974). The research literature views organizational commitment through the prism of behaviors and attitude. Elaborating further, behaviors that exceed normative expectations lead individuals to forego alternative courses of action and align with their organization (Mowday, Steers, & Porter, 1979).

Commitment is the “affective or emotional attachment to the organization such that the strongly committed individual identifies with, is involved in, and enjoys membership in, the organization” (Allen & Meyer, 1990, p. 2). The affective
concept relates to a person’s feelings and emotions about a given situation or condition. The views a person holds about their organization, work environment, work, and colleagues are pertinent examples.

**HRM Practices and Organizational Commitment**

Green, Wu, Whitten, and Medlin (2006) found support linking SHRM to individual performance, organizational commitment, and job satisfaction. Further, the same study found a positive and significant relationship between HRM and firm performance. In an empirical research effort of firms engaged in steel, apparel, and medical instruments manufacturing, Appelbaum, Bailey, Berg, & Kalleberg (2000) found support for the efficacy of HPWS in improving steel industry uptime, throughput time reduction across the apparel industry segment, and increased decision-making opportunity in the medical instrument manufacturing segment. Moreover, Applebaum et al., (2000) measured worker outcomes and found support that HPWPs indirectly and positively influenced organizational commitment and job satisfaction through trust and intrinsic rewards.

**HRM Practices and Job Satisfaction**

As previously stated, Green, Wu, Whitten, and Medlin (2006) found support linking SHRM to individual performance and job satisfaction. The same study found a positive and significant relationship between HRM and firm performance. Figure 2.4 is the conceptual research model framework depicting the
relationship and interactions between HRM practices, social capital, and the turnover intention constructs.

**Figure 2.4. Conceptual Research Model**

- **Control Variables**
  - Age
  - Marital Status
  - Number of Children
  - Tenure
  - Firm Size
Conceptual and Hypothesized Research Models

The conceptual model conveys how the latent variables relate to this dissertation study. Figure 2.5 is the hypothesized research model. Figure 2.5 details the HRM practices, social capital, and turnover intention constructs that are the main variables of interest. Given the paths outlined (Path H1, H2, H3, and H4), HRM practices was predicted to directly influence the impact of social capital through Path H2, and social capital was predicted to impact turnover intention through Path H3. The H4 mediator was predicted to influence (through mediation) the relationship of HRM practices on (female mechanical engineer) turnover intentions through the indirect path of H2 X H3. The final prediction suggested that

Figure 2.5. Hypothesized Research Model
HRM practices would also directly influence turnover intentions. The various interactions were predicted to answer the research question and explain the four hypothesized relationships to understand the type of mediation determined: partial, full, or no mediation. Based on the assumption that HRM practices influences engineer turnover intentions through a mediated framework of social capital, this dissertation research study predicts the following related to the research hypotheses in Figure 2.5.

\[ H1: \text{HRM practices will positively influence social capital.} \]

\[ H2: \text{Social capital will negatively influence female mechanical engineer turnover intentions} \]

\[ H3: \text{HRM practices will negatively influence female mechanical engineer turnover intentions.} \]

\[ H4: \text{Social capital will mediate the influence of HRM practices on female mechanical engineer turnover intentions.} \]

It is widely argued in the scholarly literature that people are a critical resource that enables organizations to achieve outstanding performance and competitive advantage (Delaney & Huselid, 1996). The alignment of HRM practices with the strategic objectives of the organization meant that the HR function was not confined to labor-related functions, but business functions that
contributed to organizational efficiency and revenue growth or a value creation source (Becker & Gerhart, 1996).

In view of the need to understand the impact of a firm’s human resource management practices on engineer turnover intentions, this study drew on the related theories in the literature underpinning HRM practices (the resource-based view), social capital dimensions and network theory, and turnover. It is instructive to note that a group of organizations during the 1980s were the first to recognize the people (employee)-firm performance link, and were credited as “excellent organizations” for employing progressive HRM practices that recognized the value of employees (Delaney & Huselid, 1996).

Some of the initiatives implemented at the time included employee participation, empowerment, job redesign, training, and contingent incentive compensation or pay-for-performance. The researcher did not know at the time that several of the HRM practices selected for this dissertation relate to the progressive HRM practices from the 1980s. However, it makes the focus of this study prescient because some of those practices were assessed to understand the various interactions with social capital to influence female mechanical engineer turnover intentions. The assumption is that a firm’s HRM practices (high-performance work systems and high-performance work practices) employed as bundled practices (Becker & Huselid, 1998) can influence the relationships forged between employees through the existing and newly formed social networks in the
organization (Collins & Clark, 2003) to reduce turnover cognitions (thought) and the behaviors that follow that can lead to employee quit decisions.
Chapter 3 : Research Methods

Overview

The present study adopted an exploratory-quantitative approach to understanding how HRM practices influence female mechanical engineers’ turnover intentions with social capital as a mediating variable. Exploratory research generates novel (new) hypotheses or explanations from a previously unexplored problem (Jaeger & Halliday, 1998). In general terms, exploratory research facilitates the development of new and interesting revelations by navigating through a research topic (Swedberg, 2020).

Furthermore, the researcher followed the positivist paradigm (Park, Konge, & Artino, 2021) to investigate the underlying theory and constructs that guide the course of the study. Positivism is often used in quantitative research because it emanates from deductive reasoning instead of observation to verify existing a priori hypotheses where causal relationships between variables are examined (Park et al., 2021).

As noted in the preceding chapters, there is extensive evidence in the extant research literature that females are underrepresented in the technology workforce and various engineering disciplines across industries (Colwell, Bear, & Helman, 2020; Varma, 2018; Seron, Silbey, Cech, & Rubineau, 2018). The literature review identified many articles on turnover and turnover intentions in various disciplinary contexts; however, few articles focused on how HRM practices influence the
turnover intentions of engineers. Moreover, the number of articles in the research repository is minuscule when focused on the turnover of female mechanical engineers.

Along similar lines, there is extensive evidence in the scholarly literature examining the role of HRM practices on constructs related to organizational performance (Becker & Gerhart, 1996), firm financial performance (Huselid, 1995; Becker & Huselid, 1998), organizational effectiveness (Ostroff & Bowen, 2000), innovation (Beugelsdijk, 2008), productivity (Datta, Guthrie, & Wright, 2005), and firm competitive advantage (Boxall & Steeneveld, 1999; Wright, McMahan, & McWilliams, 1994).

The HRM construct is frequently studied from the employee’s perspective, where the worker is viewed as a resource. Specific examples examine the extent of an employee’s contributions to the employment relationship from the point of view of work engagement, job satisfaction, commitment, performance, person-job fit, and to a lesser extent, turnover intentions. Huselid’s (1995) study on the effect of HRM practices on turnover, productivity, and financial performance is a pertinent example. Similarly, Heavey, Holwerda, and Hausknecht (2013) examined HRM practices in the context of employee investments and inducements as antecedents to collective turnover. However, fewer studies explore the impact of HRM practices on turnover intentions. The same applies if considering the impact of social capital on turnover intentions.
A nearly exhaustive search of the literature for articles exploring the impact of HRM practices on the turnover intentions of female mechanical engineers in a social capital, mediated context yielded zero results, suggesting no known study in the research literature. This dissertation research aims to bridge the gap in the existing literature by exploring and reporting the interrelationships and effects of the HRM practices, social capital, and turnover intention constructs as presented in the conceptual research model introduced in Chapter 2 (see Figure 3.1).

**Figure 3.1. Conceptual Research Model**

In general, firms employ HRM practices to influence employee behaviors that lead to increased productivity and organizational performance outcomes (Messersmith, Lepak, Patel, & Gould-Williams, 2011; Pavlov, Mura, Franco-Santos, & Bourne, 2017). A key assumption is that HRM practices are not meant to influence firm productivity and performance attributes alone, but also the firm’s
human resources in the context of employee turnover. There is support in the research literature that voluntary employee turnover affects organizations in many ways, including the direct and indirect effects on productivity and profitability due to human capital losses, search and recruitment of new and qualified employees, and subsequent retraining (Ongori, 2007).

The current study focuses on turnover intention based on evidence in the existing literature that turnover intention is a strong predictor or antecedent of voluntary employee turnover (Griffeth, Hom, & Gaertner, 2000; Direnzo & Greenhaus, 2011; Tett & Meyer, 1993). Other researchers posited similar arguments, underscoring that turnover intention is a proxy and predictor for actual turnover. In other words, higher turnover intention leads to higher actual turnover (Sun & Wang, 2017; Oh & Chininzer, 2021). The Mobley (1977) model was also introduced in Chapter 2 (see Figure 3.2) and summarizes the turnover process as a series of cognitions that are precursors to an employee’s ultimate decision to quit or stay with a given employer or organization.
Similarly, Bothma and Roodt (2013) asserted that turnover intention is the final step in an employee’s decision-making process before the actual quit behavior. It also mentions that behavioral intention reliably predicts actual behavior (Bothma & Roodt, 2013). As a result, this study focuses on the “thinking of quitting,” “intention to search,” and intention to quit” elements of the Mobley model. Further, this study contends that HRM practices impact female mechanical engineer turnover intentions directly and through the mediated effect of social capital.
Researcher Positionality

This study employed a positivist quantitative research approach where the researcher is an objective observer and is independent of the study content. Postpositivism connotes the traditional research approach or scientific method that challenges traditional tenets of the truth of knowledge. The inference is that one cannot be certain about knowledge claims as it relates to studying the behavior and actions of humans (Creswell & Creswell, 2018). Moreover, postpositivists adopt a deterministic stance by asserting that causes influence outcomes, as in experiments.

Park, Konge, and Artino (2021) linked positivism to the “hypothetico-deductive” model of science, where theory obtained from the existing literature is the starting point for building a testable hypothesis and design for an experimental study. Swanson and Holton (2005) answered the why of adopting a quantitative research approach instead of a qualitative one by noting that quantitative studies allow for studies of large groups of people where it is possible to generalize from the study sample to groups outside the sample boundary. Contrastingly, the qualitative approach affords a deep examination and understanding of a given selected study group at the expense of attaining generalizability.

The researcher’s professional career encompasses the spectrum of various technical competencies that underpin naval aviation, having served nine years in the enlisted ranks as an Aviation Support Equipment Technician and 17 years as an Aerospace Aviation Maintenance Duty Officer for a combined 26-year career in the
United States Navy. Further, the researcher also served as a journeyman electrician, performing industrial-level and home electrical installation, repair, and maintenance upkeep on various switch gears, motors, air conditioning systems, and electronic equipment. The researcher is currently an Acquisition Program Manager in the Naval Air Systems Command enterprise, encapsulating a career that aligns with the technology arena and engineering competencies.

Organization of the Remainder of this Chapter

The remainder of this chapter comprises five main sections that present the underlying concepts and procedures of how social capital mediates HRM practices' effect on female mechanical engineers' turnover intentions.

Section 1 introduces the study intent (purpose, objective, and goals), and the research question that guide the study, and hypotheses that will be tested. Section 2 describes the sample and presents details relevant to the target population and implications for external validity or generalizability of the study to situations beyond female mechanical engineers. Likewise, internal validity, which is the accuracy or soundness of an experiment, is briefly examined. This section also describes the sampling technique used and the underlying justification. Lastly, the decision underscoring the sampling size is discussed. Section 3 focuses on the survey instrument. This section presents the rationale underpinning the decision to obtain survey data. An overview of the survey questions’ source and development is discussed, including a description of the specific survey tool employed. Section 4
details the steps in the data collection process, including data recording, transfer (download), and subsequent editing (cleaning) to ensure data consistency.

Additionally, the instructions provided to participants relative to the voluntary nature of their participation in the survey and privacy safeguards are included. Lastly, guidelines for conducting research with human subjects and approvals granted by Florida Tech to engage in this dissertation research are covered.

Section 5 is the final section of this chapter, and discusses the statistical procedures employed to study and analyze the data. Assessing the relationship between the unobserved latent constructs (HRM practices, social capital, and turnover intentions) and the observed (measured) indicator variables are central to the study objective. Social capital is the mediating variable in the conceptual research model (Figures 2.4 and 3.1) and hypothesized research model (Figures 2.5 and 3.3) framework. Turnover intention is an antecedent of voluntary turnover and is the dependent variable influencing the effect of HRM practices on female mechanical engineer turnover intentions.

As such, exploratory factor analysis (EFA) is used to identify the number of factors that exist in the data, and as a data reduction technique. Along similar lines, confirmatory factor analysis is employed to determine the applicable measurement model to define and assess the following structural equation modeling (SEM) procedures.
Research Question and Hypotheses

A single research question was employed to guide this study that examined whether social capital mediates HRM practices to influence its effect on female mechanical engineer turnover intentions. Although the study focused on female mechanical engineers, comparisons were made with male mechanical engineers to highlight any gender differences.

*Research Question*

To what extent does social capital mediate the impact of human resource management practices on the turnover intentions of female mechanical engineers?

*Hypotheses*

Based on the assumption that HRM practices influence female mechanical engineer turnover intentions through a mediated social capital framework, this dissertation research study proposes the following three research hypotheses depicted in Figure 3.3.
The first hypothesis (Path H1) predicted that supportive or more employer HRM practices would directly and positively influence social capital. The second hypothesis (Path H2) predicted that social capital will directly and negatively influence female mechanical engineer turnover intentions, leading to less turnover intention behaviors. The third hypothesis (Path H3), examined the HRM practices and turnover intention constructs, predicting that supportive HRM practices will negatively influence the turnover intentions of female mechanical engineers, resulting in less or reduced quit intention behaviors that can lead to actual turnover. The fourth and final hypothesis (Path H4) predicted that social capital would mediate the effect or relationship between HRM practices and female mechanical engineer turnover intentions through the indirect Path A*B. In summation, the

**Figure 3.3. Research Hypotheses Summary**
expectation was that the implementation of employer HRM practices conducive to the creation of more social capital among female mechanical engineers would result in lower turnover intentions.

The four hypotheses are summarized as follows:

\[ H1: \text{HRM practices will positively influence social capital.} \]

\[ H2: \text{Social capital will negatively influence female mechanical engineer turnover intentions.} \]

\[ H3: \text{HRM practices will negatively influence female mechanical engineer turnover intentions.} \]

\[ H4: \text{Social capital will mediate the influence of HRM practices on female mechanical engineer turnover intentions.} \]

Sample Selection

The study’s target population was female mechanical engineers; however, the researcher included both male and female mechanical engineers to examine and compare the varying effects of the HRM practices and social capital variables on their turnover intentions from a gendered perspective. The engineers that were the focus of this study were members of the American Society of Mechanical Engineers (ASME) and organizations. The large membership size of the organization increased the likelihood of obtaining a sufficiently large sample. For example, membership in the ASME organization is open to collegiate-level students pursuing engineering careers and mechanical engineers worldwide. As of
the timeframe of this study, the ASME ranks exceeded 90,000 members (Costabile & Erler, 2022). Likewise, the Society of Women Engineers (SWE) organization membership is available to collegiate-level individuals of all genders pursuing engineering careers, as well as individuals working in the engineering or the STEM career field on a full or part-time basis. As of the timeframe of this study, the SWE website reported a membership level exceeding 40,000 members (Horting & Wirsing, 2022).

The initial survey announcement went out to prospective respondents via the SWE Twitter feed on September 7, 2021. A subsequent posting went out to respondents on December 6, 2021, due to a low initial survey response rate. The ASWE also provided research assistance by releasing the survey to their membership in September 2021. Upon request, the ASME extended the survey listing through November 2021 to increase respondent participation.

Over 90% of the responses to the survey occurred during the month of December 2021. The survey data collection effort ended on March 13, 2022, with 819 respondents attempting the survey. As expected, there was a reduction in the number of completed responses following the data-cleaning effort. Specifically, the researcher deleted all responses with missing data entries to prevent overestimation (Yong & Pearce, 2013).

To determine the respondent’s tenure at their present firm, the survey asked participants to indicate the following: “In what year did you join your current organization?” Respondents indicated a specific year, such as 1995, 2005, 2010,
and 2017. The researcher transformed the data to a specific number of years to make the data useful for analysis, using 2021 as the end of the data collection effort. A formula was created to subtract the year the respondent began employment at their current firm from 2021.

**Sampling Method and Sample Size**

The sampling method used in this study aligned best with the purposive sampling technique described in the literature (Terrell, 2016; Etikan, Musa, & Alkassim, 2015). Susanto et al. (2022) described purposive sampling as pertaining to a distinct group of people that fit the researcher’s study criteria. Male and female mechanical engineers were the only members from the engineering discipline that met the criteria for this research project.

The combined survey was assembled with the Qualtrics Survey tool and distributed to potential male and female mechanical engineer respondents online via both SWE and the ASME organizations. The researcher used the established rule of thumb, where 10 participants per survey scale item were deemed an acceptable sample size (Boateng, Neilands, Frongillo, Melgar-Quinonez, & Young, 2018). The present study comprised 39 survey items, implying that a sample of 390 was necessary for the analysis.

**Internal Validity and External Validity**

It was important from the outset to examine the extent that the study met basic internal and external validity criteria. First, internal validity and external validi
validity were used to assess the degree of credibility of the findings in a study. In general, internal validity holds importance because it assesses the extent that the noted changes in a dependent variable are because of the independent variable, and not other exogenous or endogenous factors (Clemens, Bowman, & Mowen, 2021). To account for other exogenous factors, several control variables were added to the model: age, gender, marital status, number of children, firm size, and organizational tenure. Also, since the study is not about actual quit rates and turnover intention is confined to a short period of time, the effect of reverse causality was unlikely.

Along similar lines, external validity examines the degree of generalizability of the results to the real world. The question is whether outcomes specific to mechanical engineers are generalizable to other engineering professions or male-dominated industries. This issue will be explored more fully in chapter 5 of the dissertation.

Survey Instrument

The present study adapted survey scales from the HRM practices, social capital, and turnover research domains to develop a 39-item survey scale for this research. The researcher utilized the Qualtrics software tool to develop the survey questionnaire format, comprising a single survey instrument design, based on modified questionnaire items adapted from previously validated scales pertaining to HRM practices (Boon, Boselie, Hartog, & Paauwe, 2011), social capital (Chiu, Hsu, & Wang, 2006; Lin & Lu, 2011), and turnover intention (Mobley, Horner, &
Hollingsworth, 1978; Netemeyer, Boles, & McMurrian, 1996; Hom & Griffeth, structural equations modeling test of a turnover theory: cross-sectional and longitudinal analysis, 1991; Bluedorn, A. C., 1982). Each scale was modified to represent the study context better and limit the total number of survey items to prevent survey fatigue among likely survey participants.

Model Variables

In the present study, scales were adapted from existing instruments in the research literature to measure three latent constructs: HRM practices, social capital, and turnover intentions. The researcher applied minimal modifications to scale items to ensure the context of the questions was relevant to the study. Adjustments were also made to limit the number of items to prevent respondent survey fatigue.

Independent Variable

HRM Practices. The HRM practices construct is a shortened version of a comprehensive seven-scale measure developed by Boon et al. (2011). This study utilized four of the seven scales: (1) participation, autonomy, and job design (PAJD), (2) performance appraisals and rewards (PAR), (3) training and development (TD), and (4) work-life balance (WLB). The four scales encompass 18 survey items. PAJD was measured using five items, PAR was measured by four items, TD by five items, and WLB by four items.

The Boon et al. (2011) study utilized seven scales based on the assertion that training and development; participation, autonomy, and job design;
performance appraisals and rewards; teamwork and autonomy; work-life balance; recruitment and selection; and employment security represented 38 of the most frequently used high-performance work practices (HPWP) in the scholarly HRM practices literature. It is worth noting that the Boon et al. observation aligned with an earlier finding in the literature, suggesting that processes related to selection, promotion, and placement; rewards; development; and appraisals comprised HR activities that were germane to all organizations (Edgar & Geare, 2005).

Mediator Variable

Social Capital. Nahapiet and Ghoshal (1998) described the social capital construct as existing across three frames of reference comprising structural, relational, and cognitive. The structural dimension generally encompasses resources related to network ties, network configuration (hierarchy), and appropriable organization. Likewise, the relational dimension comprises resources related to trust and trustworthiness, norms and sanctions, obligations and expectations, and identity and identification. Along similar lines, the cognitive dimension includes resources related to shared representations, interpretations, and systems of meaning, such as shared language and codes, shared narratives, and shared values.

The number of social capital dimensions represented in this study was limited to four: (1) network ties (NWT) for the structural dimension, (2) trust (TRS), and (3) identification (IDEN) for the relational dimension, and (4) shared values (SHVAL) for the cognitive dimension. Survey scales were subsequently
adapted from Chiu, Hsu, and Wang (2006) and Lin and Lu (2011) as follows: First, modified four-item scales for network ties and identification were adapted from Chiu et al. (2006). Second, the researcher adapted two items from Lin and Lu (2011) for trust and three for shared values. All items were modified to fit the present study's context, purpose, and objective. For consistency, all survey items were presented on a five-point Likert scale arrangement.

**Dependent Variable**

*Turnover Intention.* This study drew on the turnover intention framework posited by Mobley, Horner, and Hollingsworth (1978), where an individual’s decision to quit or stay in their job is preceded by a series of mental decisions (Figure 3.2) that include thinking of quitting, followed by intention to search for alternatives, intention to quit or stay, and eventually; the final quit/stay decision. It is noteworthy that the turnover literature provides ample support that thinking of quitting, intention to search for job alternatives, and intention to quit precedes turnover intention cognitions (Sager, Griffeth, & Hom, 1998; Mobley, W. H., 1977). Consequently, the turnover intention construct was represented by three latent variables: (1) thinking of quitting (THQT), (2) intention to search (INTS), and (3) intention to quit (INTQ).

The researcher adopted a two-item scale from Mobley, Horner, and Hollingsworth (1978) to represent the thinking of quitting construct. Likewise, the intention to search for job alternatives was assessed with a two-item scale adapted from Bluedorn (1980). Two scales from the research literature were combined to
measure the intention to quit. The researcher adapted and modified a Hom and Griffeth (1991) two-item scale in the first instance. Similarly, three scale items were selected from Bluedorn (1982) to assess a participant’s likelihood of quitting over three, six, and twelve months. The present study asked respondents to report their quit intentions over three, nine, and twelve months respectively.

*Control Variables*

This research included age, gender, marital status, number of children, firm size, and organizational tenure as control variables because certain demographic characteristics can influence an individual’s turnover intention in the organizational setting. An abbreviated naming convention was assigned to each control variable for easy identification during the analysis. Specifically, age was assigned (AGE), marital status (MARST_ADJ), number of children in the household (NMCHIL), job tenure (TNUR), and firm size (FRMSZ).

*Survey Instructions to Participants*

The survey introduction included a statement describing the purpose of the research, the name of the researcher, and the name of the Dissertation Committee Chair. It also stipulated that the survey was voluntary and that the population of interest was currently employed male and female mechanical engineers. The study excluded engineering professionals from other (non-mechanical engineering) engineering disciplines to bind and focus the scope of the study. Additionally, individuals employed in an engineering capacity, but who did not possess a four-year degree in the mechanical engineering discipline were also excluded.
Lastly, the researcher advised respondents that the survey would take approximately 10 to 12 minutes. Question one asked respondents to acknowledge whether they consented to take the survey. Respondents answering yes were allowed to continue through the entire survey instrument. The survey included a rule that excluded respondents who declined to consent to participate in the survey data collection. The model variables are summarized in Tables 3.1, 3.2, and 3.3, and were measured on a five-point Likert scale.
Table 3.1. HRM Practices Scale

<table>
<thead>
<tr>
<th>Likert Scale</th>
<th>1 = Not at all, 2 = Very Little, 3 = Somewhat, 4 = Great, 5 = Very Great</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To what extent do you perceive your organization offers the following HR practices?</td>
</tr>
<tr>
<td><strong>Participation, Autonomy, and Job Design (PAJD)</strong></td>
<td></td>
</tr>
<tr>
<td>PAJD1</td>
<td>Challenging work</td>
</tr>
<tr>
<td>PAJD2</td>
<td>Work that gives me the opportunity to express myself</td>
</tr>
<tr>
<td>PAJD3</td>
<td>The opportunity to participate in the decision-making processes</td>
</tr>
<tr>
<td>PAJD4</td>
<td>The opportunity to take responsibility for my own tasks</td>
</tr>
<tr>
<td>PAJD5</td>
<td>Possibilities to present my opinion on matters</td>
</tr>
<tr>
<td><strong>Performance Appraisals and Rewards (PAR)</strong></td>
<td></td>
</tr>
<tr>
<td>PAR1</td>
<td>Periodic evaluation of my performance</td>
</tr>
<tr>
<td>PAR2</td>
<td>Performance-related pay</td>
</tr>
<tr>
<td>PAR3</td>
<td>A competitive salary</td>
</tr>
<tr>
<td>PAR4</td>
<td>Attractive benefits package</td>
</tr>
<tr>
<td><strong>Training &amp; Development (TD)</strong></td>
<td></td>
</tr>
<tr>
<td>TD1</td>
<td>The opportunity to participate in training courses and workshops</td>
</tr>
<tr>
<td>TD2</td>
<td>The opportunity to develop new skills and knowledge for my current job or for possible jobs in the future</td>
</tr>
<tr>
<td>TD3</td>
<td>Coaching that supports my development</td>
</tr>
<tr>
<td>TD4</td>
<td>The opportunity to do another job within my organization</td>
</tr>
<tr>
<td>TD5</td>
<td>An increase in job responsibilities if I perform well at my current tasks</td>
</tr>
<tr>
<td><strong>Work-Life Balance (WLB)</strong></td>
<td></td>
</tr>
<tr>
<td>WLB1</td>
<td>Flexible working hours</td>
</tr>
<tr>
<td>WLB2</td>
<td>Policies that support working parents</td>
</tr>
<tr>
<td>WLB3</td>
<td>The opportunity to work part-time if I needed to</td>
</tr>
<tr>
<td>WLB4</td>
<td>The opportunity to arrange my work schedule so I can meet my family obligations</td>
</tr>
</tbody>
</table>
Table 3.2. Social Capital Scale

<table>
<thead>
<tr>
<th>Likert Scale</th>
<th>1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate the extent of your agreement with the following statements:</td>
<td></td>
</tr>
<tr>
<td><strong>Network Ties (NWT)</strong></td>
<td></td>
</tr>
<tr>
<td>NWT1</td>
<td>I maintain close social relationships with some members of my organization.</td>
</tr>
<tr>
<td>NWT2</td>
<td>I spend a lot of time interacting with some members of my organization.</td>
</tr>
<tr>
<td>NWT3</td>
<td>I know some members of this organization on a personal level.</td>
</tr>
<tr>
<td>NWT4</td>
<td>I have frequent communication with some members of my organization.</td>
</tr>
<tr>
<td><strong>Trust (TRS)</strong></td>
<td></td>
</tr>
<tr>
<td>TRS1</td>
<td>My organization proactively addresses their members’ problems.</td>
</tr>
<tr>
<td>TRS2</td>
<td>In general, my organization is very trustworthy.</td>
</tr>
<tr>
<td><strong>Identification (IDEN)</strong></td>
<td></td>
</tr>
<tr>
<td>IDEN1</td>
<td>I feel a sense of belonging toward my organization.</td>
</tr>
<tr>
<td>IDEN2</td>
<td>I have the feeling of togetherness or closeness in my organization.</td>
</tr>
<tr>
<td>IDEN3</td>
<td>I have a strong positive feeling toward my organization.</td>
</tr>
<tr>
<td>IDEN4</td>
<td>I am proud to be a member of my organization.</td>
</tr>
<tr>
<td><strong>Shared Values (SV)</strong></td>
<td></td>
</tr>
<tr>
<td>SHVAL1</td>
<td>I think that my organization provides information that reflects my values.</td>
</tr>
<tr>
<td>SHVAL2</td>
<td>I agree with what my organization considers to be important.</td>
</tr>
<tr>
<td>SHVAL3</td>
<td>The activities of my organization are in line with my personal values.</td>
</tr>
</tbody>
</table>
Table 3.3. Turnover Intention Scale

<table>
<thead>
<tr>
<th>Likert Scale</th>
<th>1 = Never, 2 = Sometimes, 3 = About Half the Time, 4 = Most of the Time, 5 = Always</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Please indicate the extent of your agreement with the following statements:</td>
</tr>
<tr>
<td><strong>Thinking of Quitting = THQT</strong></td>
<td></td>
</tr>
<tr>
<td>THQT1</td>
<td>How often do you think of quitting your job?</td>
</tr>
<tr>
<td>THQT2</td>
<td>How often do you think of leaving the engineering career field?</td>
</tr>
<tr>
<td><strong>Intention to Search = INTS</strong></td>
<td></td>
</tr>
<tr>
<td>INTS1</td>
<td>I have searched for an alternative job since I joined my organization</td>
</tr>
<tr>
<td>INTS2</td>
<td>I am actively seeking a job or role other than my present job</td>
</tr>
<tr>
<td><strong>Intention to Quit = INTQ</strong></td>
<td></td>
</tr>
<tr>
<td>INTQ1</td>
<td>I intend to remain in my profession but to leave my current company at or before the end of this year</td>
</tr>
<tr>
<td>INTQ2</td>
<td>I intend to leave my position during the next 3 months</td>
</tr>
<tr>
<td>INTQ3</td>
<td>I intend to leave my position during the next 9 months</td>
</tr>
<tr>
<td>INTQ4</td>
<td>I intend to leave my position during the next 12 months</td>
</tr>
<tr>
<td>INTQ5</td>
<td>I would consider taking another job</td>
</tr>
</tbody>
</table>
Ethical Considerations

The researcher followed all requirements for compliance with the established Florida Institute of Technology Institutional Review Board (IRB) processes and received approval to conduct the present study. No element of the survey questionnaire content or study approach posed a risk or danger to any study participants. Further, the distribution pattern of the survey was web-based and anonymized, ensuring participant privacy and confidentiality throughout the data collection process. Lastly, survey questions were framed to prevent collecting personally identifiable information traceable to any participant.

Data Collection Process

The researcher utilized the Qualtrics web-based survey analysis tool provided on the Florida Tech web service portal to develop and distribute the survey instrument to interested participants. Respondents accessed the survey through a published notification extended to members of the American Society of Mechanical Engineers (ASME) and the Society of Women Engineers (SWE) organizations. Initial researcher engagement with the SME was via email communication and a follow-on Webex interview. The researcher utilized published “how to” content requesting research support on the SWE website. Both organizations expressed interest in female engineer turnover and offered support for the study through a general announcement to their membership.
The study was administered anonymously to male and female mechanical engineers affiliated with the ASME and SWE. Participants followed a link publicized on each organization’s monthly online calendar. The researcher requested an extension of the survey announcement due to an initial low response rate that was subsequently granted. The survey included a statement advising participants that the study was voluntary and that they could opt-out at any point of the survey.

Data Handling

The dataset was downloaded from Qualtrics as a comma-separated values (CSV) file, a text file format that interfaces with the Jeffrey’s Amazing Statistical Program (JASP) open-source (free) graphical statistical software package. Apart from the free, open-source underpinnings of JASP, the justification for using the program was founded on its user-oriented and real-time capability to explore and analyze latent variable models, factor analysis, and structural equation modeling (Rosseel, 2012). Further, JASP is based on the latent variable analysis (lavaan) package, written in the R-programming language.

The initial download included 17 header items (start date, end date, status, IP address, progress, finished, recipient last name, recipient first name, recipient email, external data reference, location latitude, location longitude, distribution channel, user language, and consent) that were not necessary for the follow-on data
analysis. Those headers were subsequently removed after converting the file to an Excel format for ease of use during the data cleaning phase.

Data Cleaning and Missing Responses

As previously noted, the survey yielded a total of 819 responses. Six of the responses included two email invites and four previews to test the functionality of the survey. These responses were excluded from the collected responses leaving 813 responses. Further data review identified many missing item responses in a randomized pattern. The missing responses were confined to the survey's demographic or variable section.

The literature divides missing data into three categories, namely missing completely at random (MCAR), missing at random (MAR), and missing not at random (MNAR), and recommends various mitigation approaches depending on the percentage of data that is missing (Mirzaei, Carter, Patanwala, & Schneider, 2022; Montiel-Overall, 2006). The missing data in the survey responses exceeded 40%, so the deletion method was followed (Mirzaei et al., 2022).

The researcher elected to remove responses with missing values or unanswered questions from the survey, equating most closely to listwise or Complete Case Analysis deletion (Mirzaei, Carter, Patanwala, & Schneider, 2022). The final data-cleaning step eliminated 377 responses from the sample data, leaving 436 responses for a survey response rate of 53.6%
Effect of Data Cleaning and Statistical Power

Sampling bias is possible in the parameter estimates of survey results when responses are deleted for missingness. The listwise deletion technique, while acceptable under specific circumstances, has drawbacks in that it eliminates a significant portion of the survey responses, increasing the likelihood of survey bias, information loss, and a reduction in statistical power. Statistical power is the probability of rejecting the null hypothesis, given that the null hypothesis is false.

The null hypothesis represents a position that an observed difference in a result is due to chance. On the other hand, the alternative hypothesis argues that the observed difference in a result is not due to chance (Hirkenhoff & Fogli, 2013). Montiel-Overall (2006) contend that besides loss of statistical power (Roth & Switzer, 1995), estimates of missing values are likely unbiased where listwise deletion is used with large samples.

Data Analysis Procedures

The cleaned data was imported into the open-source JASP Version 0.17.1 release statistical software program for follow-on analysis of the model by way of a three-step approach comprising exploratory factor analysis, confirmatory factor analysis, and structural equation modeling. The conceptual and operational models (Figure 3.1 and 3.3) used in this study underpins the reasons behind the use of exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM) to assess the data. Specifically, the conceptual
research model comprises unobserved, latent variables for HRM practices, social capital, and turnover constructs.

**Factor Analysis**

Factor analysis assesses whether a large set of observations or scores for a group of objects can be parsimoniously represented (Fabrigar & Wegener, *Exploratory factor analysis*, 2012). Stated differently, factor analysis determines the underlying structure of associations for a set of measures. The research models (operational and conceptual) used in this study underpin the reasons behind the use of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) in conjunction with structural equation modeling (SEM).

There are two types of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The basis of EFA is the common factor model, which implies that the variance can be decomposed into common and unique variances. In other words, the common factor analysis approach separates the variance shared by the items from the unique variance (Pett, Lackey, & Sullivan, 2003). Unique variance comprises error variance and systematic variance relative to the measured variable. Communalities represent the common variance of the analyzed variable (Ford, MacCallum, & Tait, 1986). EFA has multiple uses that include dimension reduction and identification of latent constructs causing variation in the observed variables (Rogers, 2022).
Factors are unobservable variables but are also characterized by other labels in the scholarly literature, including hypothetical constructs, dimensions, latent variables, synthetic variables, and internal attributes (Watkins, 2018). Likewise, measured variables are observed variables that go by other names, such as manifest variables, indicators, and items.

**Exploratory Factor Analysis (EFA)**

As the name implies, EFA is exploratory and should be used where the principal objective is to identify latent constructs where support is lacking to specify an a priori model (Fabrigar, MacCallum, Wegener, & Strahan, 1999). In other words, EFA is used when there is no clear expectation about the underlying relationships between the variables in the study model (Rogers, 2022). The present study used previously validated scales from the literature of the extant HRM practices, social capital, and turnover intention to develop the survey. However, some of the items were modified to fit the context of the research objective. In other cases, items were eliminated from the research to limit the number of survey questions and reduce the likelihood of survey fatigue. In other words, EFA was chosen as the factor analysis technique used in this research to ensure the instrument remained reliable and valid.

The alternative to EFA is principal component analysis (PCA), a popular technique in the factor analysis literature where the objective is dimension reduction or to reduce a large set of indicators (items) into a smaller set of variables
The overwhelming evidence in contemporary research argues that PCA is not a true common factor analysis technique (Osborne, 2014; Brown, 2015; Fabrigar, MacCallum, Wegener, & Strahan, 1999).

Brown (2015) provided a cogent argument identifying the concepts that place PCA outside the boundaries of the common factor model. First, the common factor model partitions the variance into common and unique (error) variance, while PCA makes no distinction between common and unique variance.

PCA accounts for the variance in the observed measures rather than explaining the interrelated correlations. Lastly, PCA is more suited as a data reduction technique where the objective is to reduce a large set of measures to a smaller, more manageable set of variables. In contrast, EFA provides the means to assess the dimensionality of a set of items to uncover the smallest set of interpretable factors that can explain their intercorrelations. (Brown, 2015). The researcher used EFA instead of principal component analysis (PCA) for these reasons.

**Exploratory Factor Analysis Best Practices**

The contemporary research literature highlights various recommended best practices for researchers to follow in assessing and reporting EFA results (Watkins, 2018; Howard, 2016; Fabrigar & Wegener, 2012; Applebaum, et al., 2018). Howard (2016) suggested researchers adopt a five-step EFA decision process for acceptable EFA result reporting as follows:
1) Conduct data inspection to ensure adequate sample size (> 200 participants), use Bartlett’s Test of Sphericity, and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA);  
2) Avoid using principal component analysis (PCA) as the factor analytic method.  
3) Avoid the Kaiser criterion > 1 rule; however, use the scree plot and parallel analysis to determine the number of factors to extract;  
4) Choose factor rotation based on the expected factor correlation. Use varimax orthogonal rotation if the factors are uncorrelated, and oblique oblimin if the factors are correlated;  
5) Use a factor loading cutoff based on the .40 – .30 – .20 rule where satisfactory variables load on their primary factors above .40, below .30 on alternative factors, and show a primary – alternative difference of .20. Watkins (2018) made similar best practice recommendations concerning information that should be included in an EFA report.  

Factor Extraction Methods  

Brown (2015) identified maximum likelihood (ML), principal factors (PF), weighted least squares (WLS), unweighted least squares (UWLS), generalized least squares (GLS), imaging analysis, minimum residual analysis, and alpha factoring as factor extraction techniques used to estimate the common factor model (Brown, 2015). ML and PF are common factor extraction methods, with ML appearing as the most widely used estimation method in the factor analysis literature.  

However, it is worth noting that ML assumes the existence of a multivariate normal distribution of the variables. The normality assumption is unlikely to hold since the latent variables were constructed using Likert-scaled items. Consequently,
it is recommended that factors be extracted using weighted least squares with Oblimin rotation (Rogers, 2022.)

**Polychoric Correlation Matrix**

The Pearson product-moment correlation also assumes the normality of the distributed variables, which implies that the data was measured on an interval or ratio scale and is continuous (Watkins, 2018). However, Likert-scale items are rank-order ordinal data that is also categorical. Along the same lines, Likert-type items and dichotomous variables fail normality assumptions, typical of real data sets (Watkins, 2018). Further, Watkins argued that the non-normal attributes of Likert items can negatively impact the correlation coefficients and related EFA results, and therefore favors using polychoric correlations in instances where less than five Likert categories measured the variables.

**Sample Size**

The scholarly literature supports that the respondent-to-item ratio in a survey scale should be at least 5:1 (Fabrigar & Wegener, 2012). The total number of scale items in the present study was 39, implying a sample of at least 195 respondents. Other researchers favor a 10:1 subject (participant) to item ratio (Boateng, Neilands, Frongillo, Melgar-Quinonez, & Young, 2018). VanVoorhis and Morgan (2007) cited Tabachnick and Fidell’s (2019) study, where 300 cases received a good measure for factor analysis.
Furthermore, the literature offers support that large sample sizes (> 300 responses) imply lower measurement error, stable factor loadings, replicable factors, and generalizable results to the referent population (Boateng et al., 2018). As previously noted, the finalized sample size was 436, within the rule-of-thumb range recommended in the research literature.

**Missing Data**

Missing data were handled during initial data cleaning by means of listwise deletion, which involved eliminating survey responses with any missing items (Wang & Aronow, 2021; Pepinsky, 2018). A fair amount of the research literature cites a preference for multiple imputations (MI) as an acceptable treatment for missing observations in collected data (Kenward & Carpenter, 2007; Schafer, 1999), as opposed to listwise deletion due to the potential for bias where it was the elimination method (Wang & Aronow, 2021; Pepinsky, 2018). However, Pepinsky (2018) supported that both approaches could exhibit bias or unbiasedness under specific circumstances.

**Factor Analysis Adequacy**

Bartlett’s test of sphericity was examined to determine the factorability of the correlation matrix. Bartlett’s test of sphericity indicates whether the observed correlation matrix is an identity matrix, which is evident when there is an insufficient relationship within a data set (Howard, 2016). It follows that a
significant Bartlett’s test means that the data is not an identity matrix, and is therefore, suitable for factor analysis.

Furthermore, an acceptable correlation matrix will contain ones on the diagonal and zeros on the off-diagonal, which equates to a statistically significant Chi-square. However, the factor analysis research demonstrates that Chi-square is often significant in cases of large samples and recommends using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) to determine factor analysis adequacy (Pett, Lackey, & Sullivan, 2003; Brown, 2015).

The KMO measure of sampling adequacy (MSA) assesses the extent of correlation between the items in the EFA correlation matrix (Taherdoost, Sahibuddin, & Jalaliyoon, 2022). The literature provides a range of values to determine the acceptability of a given data set for factor analysis. 0.60 and 0.70 are commonly given as the threshold or cutoff values to perform factor analysis (Howard, 2016).

**Simple Structure**

This study employed exploratory factor analysis (EFA) as a dimension reduction technique to determine the simplest model structure (parsimony) or simplest means of interpreting the observed model data (Yong & Pearce, 2013; Watkins, 2018). Simple structure (parsimony) in factor analysis is best characterized as the process of accounting for the “observed correlations among all
the variables in terms of the smallest number of factors and the smallest possible residual error” (Ferguson, 1954, p. 281).

A simple structure is a pattern of results such that each item loads highly onto one and only one factor (https://stats.oarc.ucla.edu/spss/output/factor-analysis/). More specifically, a simple structure is attained if each factor has three or more items with high loadings, no items with high loadings on two or more factors (double loadings), and no items that do not have high loadings on any factor.

**Confirmatory Factor Analysis**

According to Brown (2015), confirmatory factor analysis (CFA) is used to identify factors that account for the variation and covariation among a set of indicators or items. In general terms, CFA provides a means of testing theory and is used when the researcher has prior knowledge of the underlying structure of the construct under assessment (Pett, Lackey, & Sullivan, 2003). Further, CFA assesses the relationship between observed measures and is a hypothesis-driven technique (enables hypothesis testing) that requires pre-specification of the hypothesized study model. As a result, CFA is conducted before the specification of the structural model. It is often referred to as the measurement model in structural equation modeling.

After evaluating the dimensionality of the model items with EFA, CFA will be employed to derive a suitable measurement model before using SEM. CFA
offers greater modeling flexibility than EFA. For instance, CFA allows the researcher to model correlated errors, improving the model’s goodness-of-fit. It also allows for a more rigorous assessment of the reliability and validity of the latent constructs.

**Goodness-of-Fit**

The Chi-square statistic is used to test the fit of a measurement model. A statistically significant Chi-square value equates to poor model fit. However, the extant literature is replete with examples noting that a large sample size can lead to significance. Bergh (2015) echoed a similar finding concerning the sensitivity of significance tests to sample size, noting that trivial differences can manifest as statistically significant. In general, evidence of statistical significance, where $p < 0.01$, indicates poor model fit with the data. An acceptable Chi-square statistic for the measures of fit indicates significance or $p$-value greater than 0.01.

Many other indices have been developed to assess model fit. The most reported measures are the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) and its confidence interval (CI), and the Standardized Root Mean Square Residual (SRMR). Ideally, the requirements for a good model fit include a value greater than 0.95 for CFI and TLI, RMSEA less than 0.06, and insignificant $p$-value, a 90% confidence interval for RMSEA that doesn’t contain 0.08 or higher, and an SRMR less than 0.08 (Kline, 2011, and Hooper & Mullen, 2008).
Validity and Reliability

Assessing validity provides assurance that the research instrument measures what it is intended to measure (Terrell, 2016; Suruccu & Maslakci, 2020). Assessing the validity of the instrument utilized in this study involves assuring that each scale (HRM practices, social capital, and turnover intention) measures the underlying constructs.

Reliability

Reliability is the extent to which an instrument consistently produces the same results. As such, reliability is a measure of internal consistency assessed using Cronbach’s alpha. A scale or instrument should possess reliability (Suruccu & Maslakci, 2020). The research literature notes that a valid instrument is always reliable, but a reliable instrument is not necessarily valid (Suruccu & Maslakci, 2020; Kimberlin & Winterstein, 2008). Along these lines, a reliable instrument assesses the degree of reproducibility of the results from repeated measures under the same conditions (Bannigan & Watson, 2009). In other words, reliability provides evidence that the instrument consistently measures what it is intended to measure (Terrell, 2016; Heale & Twycross, 2015). DeVellis (2017) argued that a reliable scale (instrument) must represent a true form of the variable under assessment.
Cronbach’s Alpha

The scholarly literature includes several means of assessing reliability. Test-retest reliability, interrater reliability, and Cronbach’s alpha are popular forms (Ronkko & Cho, 2022). This study will use the derived values from the EFA and CFA analysis to assess reliability based on Ronkko and Cho’s (2022) assertion that Cronbach’s alpha and McDonald’s omega are the two most used reliability coefficients.

Other researchers reached similar conclusions regarding the popularity of Cronbach’s alpha as a reliability measure (Kimberlin & Winterstein, 2008; O’Leary-Kelly & Vokurka, 1998; Bannigan & Watson, 2009). Cronbach’s alpha coefficients can range from 0 to 1, where evidence of high coefficients implies high reliability (O’Leary-Kelly & Vokurka, 1998). In general, high correlations (Cronbach’s alpha > 0.7) provide evidence of instrument reliability (Twycross & Shields, 2004).

Construct Validity

There are three main types of validity: content, construct, and criterion (Heale & Twycross, 2015; Suruccu & Maslakci, 2020). The present study focused on construct validity, the extent to which the variables accurately measured the research constructs (Fallon, 2016), including HRM practices, social capital, and latent turnover intentions.

Bannigan and Watson (2009) asserted that construct validity is the principal form of validation for a test. It bears mentioning that construct validity comprises
convergent validity and discriminant validity. Convergent validity examines the relationship between the observed variables that measure the latent variables or shows the extent of the relationship between the observed and latent variables. For convergent validity, items measuring the same construct will show strong correlations. In contrast, discriminant validity examines the relationship between the constructs. If two constructs are highly correlated, whether they measure different attributes or the same thing becomes unclear. For discriminant validity items measuring different constructs will show low correlations (Goodwin, 1999; Clark & Watson, 2019)

**Structural Equation Modeling (SEM)**

A structural equation model (SEM) comprises the measurement and structural models. The distinguishing characteristic of a measurement model relates to the link between the latent variable and the items or indicators – observed measures. On the other hand, the structural model defines the relationship between the model’s constructs (latent variables). In this study, the mediation model represents the structural component of the SEM.

For example, the mediation model in the current study comprises three latent variables: HRM practices, social capital, and turnover intentions. The measurement model will assess the relationship between each latent variable and the indicator variables. On the other hand, the structural model will assess the relationship between the latent variables. In other words, the structural model will
determine how HRM practices relate to social capital, how social capital relates to turnover intentions, and how HRM practices relate to turnover intentions.

**Mediation Models**

Nahapiet and Ghoshal (1998) argued that social capital is a multidimensional concept embedded in relational resources, mutual acquaintance, recognition networks, personal relationships, and shared representations, interpretations, and systems of meaning. Because of the multifaceted nature of social capital, an underlying assumption of this study suggests that social capital interacts or intervenes with HRM practices to influence turnover intentions. In other words, social capital mediates the effect of HRM practices on turnover intentions.

According to MacKinnon (MacKinnon, 1994), mediation explains how or why two variables are related. Baron and Kenny (1986) proffered a similar argument, noting that a mediator accounts for the relationship between a predictor (independent variable) and criterion (dependent) variable. This is analogous to the present study that sought to understand how HRM practices (independent variable) affect turnover intentions (dependent variable) in the presence of social capital as a mediating variable.
The path diagram depicted below in Figure 3.4 details the causal chain that comprises mediation. Effectively, a mediation model is a series of regressions. Specifically, regressing the mediator variable M on the independent variable X measures Path A; regressing the dependent variable Y on M measures Path B; and regressing Y and X measures Path C.

**Figure 3.4. Mediation Model**

Mediation includes direct effects and indirect effects. The direct effect is given by Path C, and the indirect effect is measured by Path A x Path B. According to Baron and Kenny (1986), a mediating variable is deemed strongest (full mediation) when there is an indirect effect (A x B), but no direct effect. On the other hand, the presence of both indirect and direct effects results in partial mediation. It should also be noted that there can be no mediation if either Path A or Path B is insignificant.
Chapter 4: Findings

Overview

The principal objective of the present study was to examine the role of HRM practices on the turnover intentions of female mechanical engineers within a mediated social capital context. As previously noted, HRM practices, social capital, and turnover intentions are latent variables or constructs that are not directly observable. In response, measurement scales were adapted to capture the underlying dimensions of the HRM practices construct. Specifically, the HRM practices consisted of the underlying variables, related to participation, autonomy, and job design (PAJD), performance appraisals and rewards (PAR), training and development (TD), and work-life balance (WLB). Likewise, social capital comprised network ties (NWT), trust (TRS), identification (IDEN), and shared values (SHVAL). Lastly, turnover intentions encompassed thinking of quitting (THQT), intention to search (INTS) and intention to quit (INTQ).

EFA Steps and Procedures

Factor Extraction

There are several fundamental steps and procedures when performing EFA: factor extraction, factor rotation, determining the appropriate number of factors, interpreting the factors and evaluating the quality of the solution, and rerunning the model if the model is adjusted (Brown, 2015).
The factors were extracted using weighted least squares (WLS) based on a polychoric correlation matrix versus the commonly used Pearson correlation matrix due to the underlying ordinal nature (derived from a Likert-type scale) of the existing data set, and in keeping with factor analysis best practices (Rogers, 2022; Shi, Maydeu-Olivares, & Rosseel, 2020).

**Factor Rotation and Retention**

Rotating the factors makes the solution easier to interpret and evaluate. The chosen rotation technique was oblique, oblimin, based on the assumption that the resultant factors were correlated and a better representation of reality that yields a better simple structure (Howard, 2016; Conway & Huffcutt, 2003), an oblique rotation produces equivalent solutions to an orthogonal rotation when the factors are uncorrelated (Osborne & Costello, 2009; Brown, 2015).

The number of factors to extract was determined using parallel analysis and scree plots. Parallel analysis is a Monte Carlo-based technique that generates random data parallel to the existing real data set, enabling the determination of the number of factors to retain based on comparisons of the simulated and real eigenvalues (Cokluk & Kocak, 2016). Under parallel analysis, the number of factors where the eigenvalue of the simulated data is higher than the real data is deemed significant. It is worth noting that Hayton, Allen, & Scarpello (2004) asserted that parallel analysis was among the most accurate factor retention method.
The factor solution was evaluated for simple structure, meaningfulness and interpretability of the factors, and model fit. Poorly defined factors or poorly behaved items were eliminated, and the model was rerun. The models were evaluated using several measures of goodness-of-fit: chi-square p-value, CFI, TLI, RMSEA, its p-value and 90% confidence interval, and SRMR (Brown, 2015.)

The default factor loading cutoff was retained at the 0.40 cutoff level based on recommendations in the literature which helped to reduce the dimensionality and interpretability of the data (Howard, 2016). The KMO and Bartlett’s tests were also selected to enable a follow-on examination of the reports. Additional fit indices, parallel analysis based on factor analysis, and exclude cases pairwise were also checked.

Missing observations in the survey responses were accounted for by manually applying listwise deletion during data cleaning. This yielded an N of 436 observations, placing the sample in the good-to-very good range (Henson & Roberts, 2006), and exceeding the 200 minimum sample size recommended in the factor analysis literature (Howard, 2016) as well as the 300 observations threshold for studies involving a polychoric matrix (Rogers, 2022). All the analysis was conducted with the JASP Version 0.17.1 statistical software.
EFA Model Results

*HRM Practices*

Mardia’s test for multivariate normality (Table 4.1) was examined, which revealed a significant $p$-value ($< 0.001$) for all three models associated with HRM practices. In other words, the null hypothesis was rejected that the data distribution was multivariate normal due to the significant skewness and kurtosis observed in the reported data.

**Table 4.1. Mardia’s Test of Multivariate Normality Results**

<table>
<thead>
<tr>
<th>Assumption Test</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Skewness</td>
<td>Karstosis</td>
<td>Skewness</td>
</tr>
<tr>
<td>Value</td>
<td>41.54</td>
<td>467.78</td>
<td>41.54</td>
</tr>
<tr>
<td>Statistic</td>
<td>3018.78</td>
<td>41.94</td>
<td>3018.78</td>
</tr>
<tr>
<td>df</td>
<td>1140</td>
<td>1140</td>
<td>969</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

*Note: EFA HRM Practices: Results extracted from Mardia’s Test for Multivariate Normality*

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) and Bartlett’s test of sphericity were examined based on the threshold guidelines in the literature. Again, all three models demonstrated data adequacy, indicating average KMO values above 0.90 were excellent, and Bartlett’s test of sphericity
(Table 4.2) was highly significant ($p < .001$), evidence rejecting the null hypothesis that the estimated correlation matrix is an identity matrix (Pett, Lackey, & Sullivan, 2003; Rogers, 2022).

**Table 4.2. EFA: HRM Practices KMO and Bartlett's Results**

<table>
<thead>
<tr>
<th>Data Inspection Attribute</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Overall MSA</td>
<td>0.9409</td>
<td>0.9409</td>
<td>0.9388</td>
</tr>
<tr>
<td>Bartlett’s Test of Sphericity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-square</td>
<td>4465.21</td>
<td>4465.21</td>
<td>4211.01</td>
</tr>
<tr>
<td>Degrees of freedom (df)</td>
<td>153.00</td>
<td>153.00</td>
<td>136.00</td>
</tr>
<tr>
<td>Significance (p-value)</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

*Note.* Results are based on a factor loading cutoff of 0.40. Sample size = 436.
Model 1 Assessment

The output for Model 1 is summarized in Table 4.3.

Table 4.3. HRM Practices: Model 1 Factor Loadings (Parallel Analysis)

<table>
<thead>
<tr>
<th>Factor Loadings</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Factor 5</th>
<th>Factor 6</th>
<th>Uniqueness</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAJD4</td>
<td>0.7250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3333</td>
</tr>
<tr>
<td>PAJD3</td>
<td>0.4227</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3806</td>
</tr>
<tr>
<td>TD2</td>
<td>0.4101</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4353</td>
</tr>
<tr>
<td>PAR1</td>
<td>0.7022</td>
<td>0.5156</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.2772</td>
</tr>
<tr>
<td>PAJD1</td>
<td>0.6156</td>
<td>0.7461</td>
<td>0.5975</td>
<td></td>
<td></td>
<td></td>
<td>0.6039</td>
</tr>
<tr>
<td>TD4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4312</td>
</tr>
<tr>
<td>TD5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4901</td>
</tr>
<tr>
<td>TD1</td>
<td>0.7562</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.1494</td>
</tr>
<tr>
<td>WLB1</td>
<td></td>
<td>0.7399</td>
<td>0.4392</td>
<td></td>
<td></td>
<td></td>
<td>0.2086</td>
</tr>
<tr>
<td>WLB4</td>
<td></td>
<td>0.7399</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4449</td>
</tr>
<tr>
<td>WLB3</td>
<td></td>
<td></td>
<td>0.5516</td>
<td>0.4328</td>
<td></td>
<td></td>
<td>0.4794</td>
</tr>
<tr>
<td>PAJD2</td>
<td></td>
<td></td>
<td></td>
<td>0.4328</td>
<td>0.3475</td>
<td></td>
<td>0.3475</td>
</tr>
<tr>
<td>PAJD3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4270</td>
</tr>
<tr>
<td>PAR2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4750</td>
</tr>
<tr>
<td>PAR3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3713</td>
</tr>
<tr>
<td>PAR4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4420</td>
</tr>
<tr>
<td>TD3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4310</td>
</tr>
<tr>
<td>WLB2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4528</td>
</tr>
</tbody>
</table>

Note: Applied rotation method is oblimin.

Parallel analysis was employed in conjunction with 18 items that loaded onto six factors. However, six did not load adequately (values < 0.40), and five factors had two or less items with loading above 0.40. Also, a six-factor solution was not ideal in view of the existing theory that suggested at most three factors. Examination of the scree plot (Figure 4.1) suggested two factors as the appropriate number to extract (the number of factors before the scree begins). As a consequence, the model was manually constrained to two factors for a second EFA iteration with 18 items.
Model 2 Assessment

In Model 2, seventeen items loaded onto two factors, with no cross-loadings. All WLB items and TD4 load onto Factor 2, while the remaining twelve load onto Factor 1. TD5 failed to load on any factors and was removed from the preferred model (Model 3), summarized in Table 4.4. All the items were highly loaded without cross-loading, producing a parsimonious two-factor solution.
Table 4.4. HRM Practices: Model 3 Factor Loadings

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Uniqueness</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAR1</td>
<td>0.8708</td>
<td></td>
<td>0.3934</td>
</tr>
<tr>
<td>PAR3</td>
<td>0.7604</td>
<td></td>
<td>0.3797</td>
</tr>
<tr>
<td>PAJD2</td>
<td>0.7400</td>
<td></td>
<td>0.4655</td>
</tr>
<tr>
<td>PAJD1</td>
<td>0.7330</td>
<td></td>
<td>0.5415</td>
</tr>
<tr>
<td>PAR2</td>
<td>0.7169</td>
<td></td>
<td>0.4938</td>
</tr>
<tr>
<td>PAJD4</td>
<td>0.7007</td>
<td></td>
<td>0.5285</td>
</tr>
<tr>
<td>TD1</td>
<td>0.6605</td>
<td></td>
<td>0.4510</td>
</tr>
<tr>
<td>PAJD5</td>
<td>0.6461</td>
<td></td>
<td>0.4156</td>
</tr>
<tr>
<td>PAJD3</td>
<td>0.6257</td>
<td></td>
<td>0.4710</td>
</tr>
<tr>
<td>TD2</td>
<td>0.6030</td>
<td></td>
<td>0.5299</td>
</tr>
<tr>
<td>PAR4</td>
<td>0.5236</td>
<td></td>
<td>0.4796</td>
</tr>
<tr>
<td>TD3</td>
<td>0.4949</td>
<td></td>
<td>0.4958</td>
</tr>
<tr>
<td>WLB4</td>
<td></td>
<td>0.7192</td>
<td>0.4230</td>
</tr>
<tr>
<td>WLB1</td>
<td></td>
<td>0.7132</td>
<td>0.3718</td>
</tr>
<tr>
<td>WLB3</td>
<td></td>
<td>0.7103</td>
<td>0.6206</td>
</tr>
<tr>
<td>WLB2</td>
<td></td>
<td>0.5532</td>
<td>0.4764</td>
</tr>
<tr>
<td>TD4</td>
<td></td>
<td>0.5051</td>
<td>0.6151</td>
</tr>
</tbody>
</table>

*Note.* The applied rotation method is Oblimin.
Model 3 Assessment

Several goodness-of-fit measures were evaluated. The acceptability thresholds and summary results are reported in Tables 4.5 and 4.6.

Table 4.5. Goodness-of-Fit Acceptability Thresholds

<table>
<thead>
<tr>
<th>Absolute Fit Indices</th>
<th>Acceptable</th>
<th>Excellent</th>
<th>Poor</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square ($\chi^2$)</td>
<td>$P &gt; .05$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root Mean Square Error Approximation (RMSEA)</td>
<td>$&lt; 0.08$</td>
<td>$&lt; 0.05$</td>
<td>$&gt; 0.10$</td>
<td>(Hu &amp; Bentler, 1999)</td>
</tr>
<tr>
<td>RMSEA 90% Confidence Interval (upper bound)</td>
<td>$&lt; 0.08$</td>
<td>$\leq .05$</td>
<td>$&gt; 0.10$</td>
<td>(Hu &amp; Bentler, 1999)</td>
</tr>
<tr>
<td>Standardized Root Mean Square Residual (SRMR)</td>
<td>$&lt; .08$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Incremental Fit Indices                                    |            |           |      |                          |
| Comparative Fit Index (CFI)                               | $> 0.90$   | $\geq .95$ | $< 0.90$ | (Hu & Bentler, 1999) |
| Tucker – Lewis Index (TLI)                                | $> 0.90$   | $\geq .95$ | $< 0.90$ | (Hu & Bentler, 1999) |

Table 4.6. HRM Practices: Goodness-of-Fit Results

<table>
<thead>
<tr>
<th>Measure</th>
<th>$\chi^2$ p-value</th>
<th>TLI</th>
<th>CFI</th>
<th>SRMR</th>
<th>RMSEA 90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>$&lt; .001$</td>
<td>.9203</td>
<td>.9691</td>
<td>.0205</td>
<td>.0714 .06 – .083</td>
</tr>
<tr>
<td>Model 2</td>
<td>$&lt; .001$</td>
<td>.8890</td>
<td>.9147</td>
<td>.0383</td>
<td>.0845 .077 – .093</td>
</tr>
<tr>
<td>Model 3</td>
<td>$&lt; .001$</td>
<td>.8911</td>
<td>.9178</td>
<td>.0378</td>
<td>.0864 .078 – .095</td>
</tr>
</tbody>
</table>
The results for Model 3 were mixed. The chi-square goodness-of-fit statistic was highly significant, suggesting an unacceptable fit, which was unsurprising considering cautions in the research literature of the strong likelihood of yielding a poor or reject indication where the sample size was large, even though the model misspecification might be trivial (Shi, Maydeu-Olivares, & DiStefano, 2018).

HRM Practices Summary Results

The CFI and TLI are incremental fit indices that compare the fit of a hypothesized (proposed) model to a baseline or reference model (Xia & Yang, 2019). The reported CFI was good, with CFI (0.918) just above the 0.90 cutoff value for fit acceptability. The TLI of 0.891 was less than 0.90, but exceeded the 0.90 minimum for fit acceptability. Inspection of the RMSEA and 90% confidence interval yielded a result that was just outside the acceptable range (< 0.08). In contrast, the reported SRMR (0.0378) indicated a good fit (≤ 0.05) (Shi, Maydeu-Olivares, & DiStefano, 2018).

Social Capital - Model 1 and Model 2 EFA Assessment

The same assessment process was used to evaluate the 13 social capital items for two models. For both models, the overall KMO measure of sampling adequacy was greater than 0.90 (Table 4.7), indicating suitable data for factor analysis. Bartlett’s test of sphericity was highly significant (< .001) for Model 1 and Model 2, providing support that the correlation matrix was not an identity matrix.
Table 4. 7. Social Capital EFA Summary Results

<table>
<thead>
<tr>
<th>Data Inspection Attribute</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Overall MSA</td>
<td>0.9453</td>
<td>0.9453</td>
</tr>
<tr>
<td>Bartlett’s Test of Sphericity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Approx. Chi-square</td>
<td>3608.10</td>
<td>3608.10</td>
</tr>
<tr>
<td>• Degrees of freedom (df)</td>
<td>32</td>
<td>78</td>
</tr>
<tr>
<td>• p-value</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Note. Results based on a factor loading cutoff of 0.40. Sample size = 436. All models were estimated using weighted least squares (WLS).

The parallel analysis results suggested retaining four factors, as did the existing theory. However, all the loadings on factors 3 and 4 were inadequate, falling below the cutoff of 0.40. An examination of the parallel analysis table revealed that the real data eigenvalues for the third and fourth factors were only marginally larger than their simulated values, possibly due to chance or sampling error (Rogers, 2022). Examination of the scree plot (Figure 4.2) also suggested retaining two factors.
Figure 4.2. Social Capital Scree Plot

The EFA was rerun after manually fixing the number of factors to two. The loadings reported in Table 4.8 show a clean, simple structure, with high loadings for all the items and no cross-loadings.
Table 4.8. Social Capital: Model 2 Factor Loadings

The items for NWT loaded well on the second factor, while SHVAL, IDEN, and TRS loaded onto Factor 1. The goodness-of-fit measures are summarized in Table 4.9. Inspection of Model 2 TLI, CFI, and SRMR fit indices indicated that all values were acceptable. However, the Chi-square, RMSEA, and the 90% confidence interval were not. Overall, the researcher’s assessment is that the model was a good fit.

Table 4.9. Social Capital: EFA Goodness-of-Fit Summary Results

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>$p$-value</th>
<th>TLI</th>
<th>CFI</th>
<th>SRMR</th>
<th>RMSEA</th>
<th>RMSEA 90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>83.02</td>
<td>&lt;.001</td>
<td>.965</td>
<td>.986</td>
<td>.017</td>
<td>.060</td>
<td>.045, .077</td>
</tr>
<tr>
<td>Model 2</td>
<td>226.39</td>
<td>&lt;.001</td>
<td>.928</td>
<td>.951</td>
<td>.032</td>
<td>.087</td>
<td>.075, .099</td>
</tr>
</tbody>
</table>
Turnover Intention

*EFA Model Assessment*

For turnover intention, all nine items loaded onto three factors with no
cross-loadings and a simple structure (Table 4.10). The factors align perfectly with
the model developed by Mobley (1977) and Mobley, Horner and Hollingsworth
(1978): Intention to Quit (Factor 1), Intention to Search (Factor 2), and Thinking
about Quitting (Factor 3).

**Table 4. 10. Turnover Intention: EFA Factor Loadings Output**

<table>
<thead>
<tr>
<th>Factor Loadings</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Uniqueness</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTQ3</td>
<td>0.909</td>
<td></td>
<td></td>
<td>0.192</td>
</tr>
<tr>
<td>INTQ2</td>
<td>0.892</td>
<td></td>
<td></td>
<td>0.217</td>
</tr>
<tr>
<td>INTQ1</td>
<td>0.876</td>
<td></td>
<td></td>
<td>0.283</td>
</tr>
<tr>
<td>INTQ4</td>
<td>0.743</td>
<td></td>
<td></td>
<td>0.290</td>
</tr>
<tr>
<td>INTQ5</td>
<td>0.505</td>
<td></td>
<td></td>
<td>0.426</td>
</tr>
<tr>
<td>INTS2</td>
<td></td>
<td>0.836</td>
<td></td>
<td>0.294</td>
</tr>
<tr>
<td>INTS1</td>
<td></td>
<td>0.782</td>
<td></td>
<td>0.294</td>
</tr>
<tr>
<td>THQT2</td>
<td></td>
<td></td>
<td>0.866</td>
<td>0.255</td>
</tr>
<tr>
<td>THQT1</td>
<td></td>
<td></td>
<td>0.843</td>
<td>0.265</td>
</tr>
</tbody>
</table>

*Note: Applied rotation method is oblimin.*

Tables 4.11 and 4.12 summarize the data adequacy statistics and goodness-of-fit
respectively. The overall KMO (0.885) was good, indicating the suitability of the data for
factor analysis. Bartlett’s test was highly significant, reinforcing that the data was not an
identity matrix and suitable for factor analysis. As before, the Chi-square goodness-of-
fit test (< 0.001) was highly significant.
Table 4.11. Turnover Intention: EFA Output - KMO and Bartlett's Results

<table>
<thead>
<tr>
<th>Data Inspection Attribute</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Overall MSA</td>
<td>0.8850</td>
</tr>
</tbody>
</table>

**Bartlett's Test of Sphericity:**
- Approx. Chi-square: 2873.17
- Degrees of freedom (df): 36.00
- p-value: < .001

*Note.* Results based on a factor loading cutoff of 0.40. Sample size = 436. All models based on weighted least squares (WLS), oblique oblimin, and polychoric estimation.

Table 4.12. Turnover Intention: EFA Goodness-of-Fit Summary Results

<table>
<thead>
<tr>
<th>Measure</th>
<th>Fit Indices</th>
<th>Value</th>
<th>Acceptable</th>
<th>Excellent</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absolute Fit</strong></td>
<td><em>Chi-square</em>, p-value</td>
<td>&lt; .001</td>
<td>&gt; 0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMSEA</td>
<td></td>
<td>0.1235</td>
<td>&lt; 0.08</td>
<td>&lt; 0.05</td>
<td>&gt; 0.10</td>
</tr>
<tr>
<td>RMSEA 90% CI</td>
<td></td>
<td>0.101 – 0.148</td>
<td>&lt; 0.08</td>
<td>&lt; 0.05</td>
<td>&gt; 0.10</td>
</tr>
<tr>
<td>SRMR</td>
<td></td>
<td>0.0168</td>
<td>&lt; 0.08</td>
<td>&lt; 0.05</td>
<td>&gt; 0.10</td>
</tr>
<tr>
<td><strong>Incremental Fit</strong></td>
<td>TLI</td>
<td>0.9152</td>
<td>&gt; 0.90</td>
<td>&gt; 0.95</td>
<td>&lt; 0.90</td>
</tr>
<tr>
<td></td>
<td>CFI</td>
<td>0.9719</td>
<td>&gt; 0.90</td>
<td>&gt; 0.95</td>
<td>&lt; 0.90</td>
</tr>
</tbody>
</table>

Reviewing the additional fit indices revealed that RMSEA (0.124) and RMSEA 90% CI (0.101 – 0.148) were greater than 0.10, suggesting a poor model fit. In contrast, the SRMR (0.017) value revealed a good fit. Clark and Bowles (2018) contend that most fit indices were developed with continuous data models.
Consequentially, model fit indices do not always work as intended, hence the need for researchers to exercise caution in interpreting results, and to employ other goodness-of-fit metrics to determine global model fit (Chen, Curran, Bollen, Kirby, & Paxton, 2008).

The CFI exceeded the 0.95 level, demonstrating an excellent fit (Clark & Bowles, 2018). In summation, the model was deemed a good fit based on the reported SRMR value and the argument advanced by Shi, Maydeu-Olivares, & Rosseel (2020) that RMSEA was an unstandardized parameter and showed a tendency to exceed the 0.05 cutoff based on the number of indicators (items) on a factor.

Construct Reliability and Validity

A CFA was conducted to assess and establish the measurement instrument's reliability, convergent validity, and discriminant validity.

Reliability Assessment

As previously noted, the consistency of a measure conveys that an instrument is reliable. Further, Cronbach’s alpha is a commonly reported measure of internal consistency reliability in the research literature (Cheung, Cooper-Thomas, Lau, & Wang, 2023; Kimberlin & Winterstein, 2008); however, the extant literature provides evidence that composite reliability (CR) is a better measure of reliability and alternative to Cronbach’s alpha when applied to SEM studies (Cheung et al., 2023).
Convergent Validity

Convergent validity and discriminant validity were checked by employing a computational technique advanced by Fornell and Larcker (1981) that uses the average variance extracted (AVE) and the composite reliability (CR) values derived from the factor loadings. Convergent validity is indicated when the AVE value is less than the CR, and each AVE value is greater than 0.5 (Suruccu & Maslakci, 2020). Using the criteria recommended in the research literature where the benchmark CR value was set at 0.70 (Hair, Black, Babin, & Anderson, 2010), and AVE > 0.50, the CR and AVE were computed individually for the HRM practices, social capital, and turnover intention constructs.

Discriminant Validity

Discriminant validity assesses the degree to which a study’s factors or latent constructs differ. Cheung et al. (2023) argued that an indication of no cross-loadings, where each indicator loads on a unique factor, is evidence of discriminant validity. This study adopted a more robust approach by drawing on the Fornell and Larcker (1981) criteria to assess the extent of validity among the factors in the instrument.

Model Summary

Nine models were assessed for reliability and validity: 3 factor models x 3 populations. The populations are the entire sample (Male and Female or ALL),
female and men only. The three-factor models are based on the EFA analysis and are summarized in Table 4.13.

Table 4.13. Summary of Factor Models

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Mediator Variable</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRM Practices Factor 1</td>
<td>Social Capital Factor 2</td>
<td>Turnover Intention Factor 3</td>
</tr>
<tr>
<td><strong>Model 1 – Comprehensive</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation, Autonomy &amp; Job Design</td>
<td>Trust</td>
<td>Intention to Quit</td>
</tr>
<tr>
<td>PAJD1 – PAJD5 (5 items)</td>
<td>TRS1 – TRS2 (2 items)</td>
<td>INTQ1 – INTQ5 (5 items)</td>
</tr>
<tr>
<td>Performance Appraisals &amp; Rewards</td>
<td>Identification</td>
<td></td>
</tr>
<tr>
<td>PAR1 – PAR4 (4 items)</td>
<td>IDEN1 – IDEN4 (4 items)</td>
<td></td>
</tr>
<tr>
<td>Training &amp; Development</td>
<td>Shared Values</td>
<td></td>
</tr>
<tr>
<td>TD1 – TD3 (3 items)</td>
<td>SHVAL1 – SHAVL3 (3 items)</td>
<td></td>
</tr>
<tr>
<td><strong>Model 2 – Refined</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation, Autonomy &amp; Job Design</td>
<td>Network Ties</td>
<td>Intention to Quit</td>
</tr>
<tr>
<td>PAJD1 – PAJD5 (5 items)</td>
<td>NWT1 – NWT4</td>
<td>INTQ1 – INTQ5</td>
</tr>
<tr>
<td>Performance Appraisals &amp; Rewards</td>
<td>(4 items)</td>
<td>(5 items)</td>
</tr>
<tr>
<td>PAR1 – PAR4 (4 items)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training &amp; Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TD1 – TD3 (3 items)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Model 3: Parsimonious</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work-Life Balance</td>
<td>Network Ties</td>
<td>Intention to Quit</td>
</tr>
<tr>
<td>WLB1, WLB2, WLB3, WLB4</td>
<td>NWT1 – NWT4</td>
<td>INTQ1 – INTQ</td>
</tr>
<tr>
<td>(4-items)</td>
<td>(4 items)</td>
<td>(5-items)</td>
</tr>
<tr>
<td>Training &amp; Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TD4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Model 1 – Comprehensive includes 12 items for HRM practices and 9 for Social Capital. These factors from the EFA explained the largest percentage of the common variance for HRM practices and Social Capital.

Model 2 – Refined retains the 12 items for HRM practices but measures the Social Capital construct using the four items associated with network ties (NWT).

Model 3 – The parsimonious model arrangement uses the factors containing the fewest items for HRM practices and Social Capital. The HRM Practices construct was measured with the four items involving work-life balance (WLB1, WLB2, WLB3, WLB4), and TD4, while Social Capital is defined as in Model 2. For each model, turnover intention (TI) uses the five items related to the intention to quit observed variable (INTQ).

Tables 4.14, 4.15, and 4.16 are summary tables for the three population groups that contain all the information necessary to assess the reliability and validity. Cronbach’s alpha was estimated in JASP, while CR and AVE were derived using an Excel template adopted from Patel (2023).

An examination of the three tables revealed that Cronbach’s Alpha and CR significantly exceeded the 0.70 minimum advocated in the literature for all nine models, establishing reliability for the measurement scale (Suruccu & Maslakci, 2020).

Convergent validity was readily established for most models. AVE was smaller than the reported CR in all models and populations. Further, except for
ALL (Male/Female) and Female under the parsimonious model, each AVE value met the 0.5 recommended criteria (Fornell & Larcker, 1981), effectively establishing convergent validity. The two AVEs that did not meet the criteria fell short by a small margin, so there was no concern regarding convergent validity.

Patel (2023) asserted that it was necessary to establish discriminant validity for all factors or latent constructs comprising a CFA/SEM study, positing that evidence of the main diagonal values exceeding the off-diagonal column and row values were the necessary criteria to establish discriminant validity, in other words, the square root of the AVE (main diagonal) must be greater than the correlation between the factors.

When evaluating discriminant validity in the comprehensive model (Table 4.14), it was observed that discriminant validity did not hold for social capital and HRM practices for any population group. In other words, the correlation between HRM and social capital was larger than the two main diagonal elements for each group.

The results were somewhat better in the refined model (Table 4.15). Specifically, the correlations were smaller than the main diagonal elements for ALL and Females, suggesting establishment of discriminant validity. However, discriminant validity remained an issue for males. Following employment of the parsimonious model (Table 4.16), the main diagonal values exceeded the off-diagonal column and row values, for each population group, indicating the absence of validity issues for all models.
In summary, discriminant validity findings are essential in evaluating the trustworthiness of the results when estimating the mediation models related to the research. The results inform the researcher that it is acceptable to proceed with the SEM mediation analysis using the refined factors for ALL, FEMALE, and the parsimonious factors for all groups; however, the researcher should proceed with caution in the use of the comprehensive measures of HRM practices and social capital together as noted in (Model 1.).

In summary, discriminant validity findings are extremely important in evaluating the trustworthiness of the results when estimating the mediation models related to the research. The results inform the researcher that it is acceptable to proceed with the SEM mediation analysis using the refined factors for ALL and FEMALE, and the parsimonious factors for all groups, but that we should proceed with caution using the comprehensive measures of HRM practices and Social Capital together (Model 1.).
### Table 4.14. Model 1 (Comprehensive) Reliability and Validity Metrics

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Cronbach’s α</th>
<th>CR</th>
<th>AVE</th>
<th>HRM</th>
<th>SC</th>
<th>TI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male/Female</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 1</td>
<td>HRM</td>
<td>0.9123</td>
<td>0.9297</td>
<td>0.5247</td>
<td>0.724</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 2</td>
<td>SC</td>
<td>0.9083</td>
<td>0.9309</td>
<td>0.6002</td>
<td>0.8274</td>
<td>0.775</td>
<td></td>
</tr>
<tr>
<td>Factor 3</td>
<td>TI</td>
<td>0.8842</td>
<td>0.9209</td>
<td>0.7003</td>
<td>-0.5377</td>
<td>-0.5967</td>
<td>0.837</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 1</td>
<td>HRM</td>
<td>0.9089</td>
<td>0.9276</td>
<td>0.5168</td>
<td>0.719</td>
<td></td>
<td></td>
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<tr>
<td>Factor 2</td>
<td>SC</td>
<td>0.9100</td>
<td>0.9309</td>
<td>0.6002</td>
<td>0.8274</td>
<td>0.775</td>
<td></td>
</tr>
<tr>
<td>Factor 3</td>
<td>TI</td>
<td>0.9156</td>
<td>0.9399</td>
<td>0.7581</td>
<td>-0.4202</td>
<td>-0.4236</td>
<td>0.871</td>
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</tbody>
</table>

156
Table 4.15. Model 2 (Refined) Reliability and Validity Metrics

<table>
<thead>
<tr>
<th>Name</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRM</td>
<td>0.9123</td>
<td>0.9302</td>
<td>0.7258</td>
</tr>
<tr>
<td>SC</td>
<td>0.8017</td>
<td>0.8452</td>
<td>0.7603</td>
</tr>
<tr>
<td>TI</td>
<td>0.8957</td>
<td>0.9267</td>
<td>0.8469</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Male/Female</th>
<th>HRM</th>
<th>SC</th>
<th>TI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>0.9123</td>
<td>0.9302</td>
<td>0.5268</td>
</tr>
<tr>
<td>Factor 2</td>
<td>0.8066</td>
<td>0.8452</td>
<td>0.5781</td>
</tr>
<tr>
<td>Factor 3</td>
<td>0.8953</td>
<td>0.9267</td>
<td>0.7173</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Female</th>
<th>HRM</th>
<th>SC</th>
<th>TI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>0.9123</td>
<td>0.9349</td>
<td>0.5472</td>
</tr>
<tr>
<td>Factor 2</td>
<td>0.8066</td>
<td>0.8413</td>
<td>0.5704</td>
</tr>
<tr>
<td>Factor 3</td>
<td>0.8953</td>
<td>0.9393</td>
<td>0.7564</td>
</tr>
</tbody>
</table>

157
Table 4. 16. Model 3 (Parsimonious) Reliability and Validity Metrics

<table>
<thead>
<tr>
<th>Name</th>
<th>Cronbach’s $\alpha$</th>
<th>CR</th>
<th>AVE</th>
<th>HRM</th>
<th>SC</th>
<th>TI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>HRM</td>
<td>0.7685</td>
<td>0.8256</td>
<td>0.4907</td>
<td>0.701</td>
<td></td>
</tr>
<tr>
<td>Male/Female</td>
<td>Factor 2</td>
<td>SC</td>
<td>0.8066</td>
<td>0.8454</td>
<td>0.5783</td>
<td>0.5869</td>
</tr>
<tr>
<td></td>
<td>Factor 3</td>
<td>TI</td>
<td>0.8953</td>
<td>0.9268</td>
<td>0.7178</td>
<td>-0.3854</td>
</tr>
<tr>
<td></td>
<td>Factor 1</td>
<td>HRM</td>
<td>0.7514</td>
<td>0.8203</td>
<td>0.4836</td>
<td>0.695</td>
</tr>
<tr>
<td>Female</td>
<td>Factor 2</td>
<td>SC</td>
<td>0.8130</td>
<td>0.8492</td>
<td>0.5879</td>
<td>0.5919</td>
</tr>
<tr>
<td></td>
<td>Factor 3</td>
<td>TI</td>
<td>0.8842</td>
<td>0.9209</td>
<td>0.7004</td>
<td>-0.4614</td>
</tr>
<tr>
<td></td>
<td>Factor 1</td>
<td>HRM</td>
<td>0.7995</td>
<td>0.8432</td>
<td>0.5758</td>
<td>0.759</td>
</tr>
<tr>
<td>Male</td>
<td>Factor 2</td>
<td>SC</td>
<td>0.7920</td>
<td>0.8397</td>
<td>0.5157</td>
<td>0.5832</td>
</tr>
<tr>
<td></td>
<td>Factor 3</td>
<td>TI</td>
<td>0.9147</td>
<td>0.9387</td>
<td>0.7547</td>
<td>-0.3181</td>
</tr>
</tbody>
</table>
Structural Equation Modeling (SEM)

SEM comprises two components: a measurement model, estimated using confirmatory factor analysis (CFA), and a structural model that adds the interrelationship among the latent constructs and indicators in the study model. The structural model is the mediation model described in Chapter 3. JASP allows the researcher to estimate the measurement model and full SEM in two stages. It is important to do so because the trustworthiness of the SEM results depends on having a good measurement model.

In this part of the study, modification indices were evaluated to adjust the measurement models for error covariances between items making up a construct. These adjustments were made to improve overall fit, using indices previously described in the EFA section. Four software setting options were chosen to estimate the measurement models and SEMs. Error calculation was set to robust; the estimation technique was diagonally weighted least squares (DWLS), Satorra-Bentler was selected for the model test, and listwise deletion was selected for missing data. These selections were all made because the variables are Likert scale data that violate the normality assumption. For instance, the Satorra-Bentler model test provides a more accurate estimate of the chi-square measure of fit than maximum likelihood where normality assumptions are violated (Bentler P. M., 2006).
As previously noted, mediation was not assessed for Model 1 because the combined male/female engineer, female engineer, and male engineer nested models did not establish discriminant validity. Model 2 was revised to measure social capital using the four NWT items. These were the items that loaded highly on Factor 2 during the EFA. Discriminant validity holds for ALL and FEMALE but not for MALE. Consequently, Model 2 is estimated for ALL and FEMALE sub-groups. In Model 3, HRM practices utilize the items making up Factor 2 in the EFA: the four items related to NWT and TD4. Discriminant validity holds for all three sub-groups for Model 3, the parsimonious factor model. In summary, five models were estimated, two each for the ALL and FEMALE sub-groups and one model for MALE.

Goodness-of-Fit Measures

Table 4.15 reports the five models’ goodness-of-fit measures for the CFA and SEMs. Chi-square was not reported because all estimates show a significant p-value. The problem with using chi-square as a measure of fit was discussed in Chapter 3 and the EFA section. The other goodness-of-fit measures meet the required standards previously described, indicating that the measurement and structural model fit well. There is little deterioration when adding the structural mediation model to the analysis. Model fit is marginally better for Model 3, MALE, when adding the structural component.
Table 4. 17. CFA and SEM Goodness-of-Fit Measures

<table>
<thead>
<tr>
<th>Index</th>
<th>Model 2, ALL</th>
<th>Model 3, ALL</th>
<th>Model 2, FEMALE</th>
<th>Model 3, FEMALE</th>
<th>Model 3, MALE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CFA</td>
<td>SEM</td>
<td>CFA</td>
<td>SEM</td>
<td>CFA</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>0.9977</td>
<td>0.9948</td>
<td>0.9977</td>
<td>0.9959</td>
<td>0.9989</td>
</tr>
<tr>
<td>T-size CFI</td>
<td>0.96</td>
<td>0.9926</td>
<td>0.96</td>
<td>0.9928</td>
<td>0.9965</td>
</tr>
<tr>
<td>Tucker-Lewis Index (TLI)</td>
<td>0.9974</td>
<td>0.9941</td>
<td>0.9974</td>
<td>0.995</td>
<td>0.9987</td>
</tr>
<tr>
<td>Root mean square error of approximation (RMSEA)</td>
<td>0.0323</td>
<td>0.0394</td>
<td>0.0323</td>
<td>0.0352</td>
<td>0.0219</td>
</tr>
<tr>
<td>RMSEA 90% CI lower bound</td>
<td>0.0235</td>
<td>0.0332</td>
<td>0.0235</td>
<td>0.0255</td>
<td>0</td>
</tr>
<tr>
<td>RMSEA 90% CI upper bound</td>
<td>0.0404</td>
<td>0.0455</td>
<td>0.0404</td>
<td>0.0443</td>
<td>0.0356</td>
</tr>
<tr>
<td>RMSEA p-value</td>
<td>0.9999</td>
<td>0.9982</td>
<td>0.9999</td>
<td>0.9972</td>
<td>0.9999</td>
</tr>
<tr>
<td>T-size RMSEA</td>
<td>0.0404</td>
<td>0.0455</td>
<td>0.0404</td>
<td>0.0443</td>
<td>0.0356</td>
</tr>
<tr>
<td>Standardized root mean square residual (SRMR)</td>
<td>0.0408</td>
<td>0.0523</td>
<td>0.0408</td>
<td>0.0494</td>
<td>0.0466</td>
</tr>
</tbody>
</table>
Factor Loadings

Before proceeding with mediation analysis, evaluating the factor loadings of the CFA and SEM models is important. For convenience, the main tables from JASP are included in an Appendix for each of the five models. What is important to note is that the standardized coefficient values for the factor loadings are no out-of-range values such as completely standardized factor correlations that exceed 1.0, negative factor variance, or negative indicator variances (Brown, 2015.).

Theoretical Model and Hypotheses

The theoretical underpinnings of the present study led to four research hypotheses. The path diagram in Figure 4.3 details the causal chain of these hypotheses.

Hypotheses

H1: HRM practices positively influences social capital (Path A).

H2: Social capital negatively influences female mechanical engineer turnover intentions (Path B).

H3: HRM practices will negatively influence female mechanical engineer turnover intentions (Path C).

H4: Social capital mediates the influence of HRM practices on female mechanical engineer turnover intentions (Path A x Path B).
As explained in Chapter 3, mediation includes direct and indirect effects. The direct effect is given by Path C, and the indirect effect is measured by Path A x Path B. According to Baron and Kenny (1986), full mediation occurs when there is an indirect effect (Path A x Path B), but no direct effect (Path C). On the other hand, the presence of both indirect and direct effects results in partial mediation. It should also be noted that there can be no mediation if either Path A or Path B is insignificant.

This research included age (AGE), marital status (MARST_ADJ), number of children (NMCHIL), firm size (FRMSZ), and organizational tenure (TNUR) as control variables because certain demographic characteristics can influence an individual’s turnover intention in the organizational setting. Adding these variables protects against threats to internal validity, such as omitted variable bias.
Mediation Model Results

Table 4.16 summarizes the coefficient estimates and p-values for the five models. All the hypotheses are supported across the sub-groups and factor models. The full set of parameter estimates that include the control variables are in the Appendix.

The relationship between HRM practices and social capital (HRM → SC, Path A) is positive and significant (p-value < 0.001.) Path B from social capital to turnover intentions (SC → TI) is negative and significant. The combined indirect effect (Paths A x B) is also negative and significant, indicating that SC mediates the effect of HRM practices on turnover intentions. Finally, Path C from HRM practices to turnover intentions (HRM → TI) is significant for the ALL and FEMALE sub-groups but insignificant at a 5% significance level for MALE. The indirect effect, measured as a proportion of the total effect, is significant in each model. The latter finding means that social capital partially mediates HRM practices for each population. The researcher will fully discuss these findings in Chapter 5.
Table 4.18. Mediation Model Estimates and Significance

<table>
<thead>
<tr>
<th>Name</th>
<th>Model 2, ALL</th>
<th>Model 3, ALL</th>
<th>Model 2, FEMALE</th>
<th>Model 3, FEMALE</th>
<th>Model 3, MALE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>estimate</td>
<td>p-value</td>
<td>estimate</td>
<td>p-value</td>
<td>estimate</td>
</tr>
<tr>
<td>Path A</td>
<td>0.8223</td>
<td>&lt; .001</td>
<td>0.5836</td>
<td>&lt; .001</td>
<td>0.7792</td>
</tr>
<tr>
<td>Path B</td>
<td>-0.2424</td>
<td>&lt; .001</td>
<td>-0.3722</td>
<td>&lt; .001</td>
<td>-0.2982</td>
</tr>
<tr>
<td>Direct: path C</td>
<td>-0.4376</td>
<td>&lt; .001</td>
<td>-0.1862</td>
<td>0.003</td>
<td>-0.4471</td>
</tr>
<tr>
<td>Indirect: A x B</td>
<td>-0.1993</td>
<td>&lt; .001</td>
<td>-0.2172</td>
<td>&lt; .001</td>
<td>-0.2323</td>
</tr>
<tr>
<td>Total: AxB + C</td>
<td>-0.6370</td>
<td>&lt; .001</td>
<td>-0.4034</td>
<td>&lt; .001</td>
<td>-0.6795</td>
</tr>
<tr>
<td>Indirect (% of Total)</td>
<td>0.3129</td>
<td>&lt; .001</td>
<td>0.5384</td>
<td>&lt; .001</td>
<td>0.3420</td>
</tr>
</tbody>
</table>
Chapter 5 : Implications and Recommendations

Overview

The turnover phenomenon affects virtually all organizations and is extensively studied and reported on in the literature (Zimmerman, Swider, & Boswell, 2019; Hom, Griffeth, & Sellaro, 1984) due to the detrimental effects of human capital losses (Droege & Hoobler, 2003), decreased productivity, and the overall impact of increased costs to firms when experienced and talented employees quit (Harden, Boakye, & Ryan, 2018).

This study rests on the assumption that an employee’s turnover decision is preceded by a series of behaviors (intentions) that include thoughts of quitting, followed by an intention to search, and an intention to quit, before the actual turnover decision (Hom, Griffeth, & Sellaro, 1984). Kopelman, Rovenpor, and Sellaro (1992) argued that the immediate precursor and best predictor of turnover is the intention to leave or quit decision. Furthermore, this observation aligns with the literature that turnover intention is an antecedent to the actual turnover decision (Griffeth et al.; 2000).

Restatement of the Problem

The turnover problem is more pronounced when viewed through the lens of the underrepresentation of women in the engineering field. As previously stated in Chapter 1 of this study women have achieved relative parity in medicine and the
legal profession; however, they significantly lag behind their male peers in employment in most areas of the engineering occupation (Sibley, 2016; United Nations Educational, Scientific, and Cultural Organization, 2017). Moreover, there is ample evidence in the literature that the turnover of women in engineering occupations can be as high as 52% (Fouad & Singh, 2011; Hewlett et al., 2008).

Furthermore, female mechanical engineers are a subset of the entire engineering discipline, which was the focus of this study. Specifically, this study sought to investigate the effect of human resource management practices on female mechanical engineer turnover intentions and determine the role of social capital as a mediator in the relationship between HRM practices and female mechanical engineer turnover intentions by examining the mediation model's direct and indirect paths for partial, full, or no mediation.

The researcher formulated this study's research question and hypotheses based on a review of the extant literature and other theoretical considerations related to HRM practices, social capital, and turnover intention constructs. A single research question and four hypotheses were formulated and restated for the reader as follows:

**Research Question.** To what extent does social capital mediate the effect of human resource management (HRM) practices on female mechanical engineers.

**Hypotheses**

*H1: HRM practices positively influence social capital (Path A).*
H2: Social capital negatively influences female mechanical engineer turnover intentions (Path B).

H3: HRM practices will negatively influence female mechanical engineer turnover intentions (Path C).

H4: Social capital mediates the influence of HRM practices on female mechanical engineer turnover intentions (Path A x Path B).

Table 4.16 summarized the hypothesis outcomes for two models developed using EFA and reliability and validity tests. Almost all the hypotheses listed were supported across the subgroups: H3 was not supported for males, but this does not negate the mediation effect. For each model, the results indicate that social capital mediates the effect of HRM practices on turnover intentions. What remains to answer the research question is determining the extent of the mediation.

In general, the extent of mediation is determined by computing the ratio of the indirect effect to the total effect. This ratio is often characterized as the mediation proportion (Ditlevsen, Christensen, Lynch, Dansgaard, & Keiding, 2005). In other words, the mediation proportion measures the extent to which the mediator explains the pathway through which the independent variable affects the dependent variable (Cheng, Spiegelman, & Li, 2021). In Table 4.16, the point estimates of the mediation proportion were reported as the “indirect effect” measured as a percentage of the total effect.
To better understand the extent of mediation, 95% confidence intervals were constructed around the point estimates, as reported in Table 5.1.

Table 5.1. The Extent of Mediation: Estimates and Confidence Intervals

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>p-value</th>
<th>Margin of Error</th>
<th>95% CI</th>
<th>Mediation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Model 2</td>
<td>0.3129</td>
<td>&lt; .001</td>
<td>0.1830</td>
<td>0.1300</td>
<td>0.4959</td>
</tr>
<tr>
<td>Model 3</td>
<td>0.5384</td>
<td>&lt; .001</td>
<td>0.2315</td>
<td>0.3069</td>
<td>0.7699</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEMALE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 2</td>
<td>0.3420</td>
<td>&lt; .001</td>
<td>0.1641</td>
<td>0.1780</td>
<td>0.5061</td>
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<tr>
<td>Model 3</td>
<td>0.6153</td>
<td>&lt; .001</td>
<td>0.2880</td>
<td>0.3273</td>
<td>0.9033</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MALE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 3</td>
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<td>0.0338</td>
<td>0.4295</td>
<td>0.0355</td>
<td>0.8945</td>
</tr>
</tbody>
</table>

It is important to note three important concepts in the following discussion. First, the confidence interval (CI) is essential because it provides a range of values likely to include the population parameter within a certain degree of confidence or certainty (Hazra, 2017; Khakshooy & Chiappelli, 2018). For this study, the population parameter was the true but unknown value of the mediation proportion. Second, the point estimate uses a single value to represent the true, but often unknown population parameter (Khakshooy & Chiappelli, 2018). However, a shortcoming of the point estimate is that it does not account for variability or error. Third, the margin of error overcomes the limitation of the point estimate by indicating the maximum amount of uncertainty associated with the point estimate.
Confidence intervals are derived by adding and subtracting the margin of error to the point estimate. Consequently, the CI is an indicator of precision in the observations, which implies that the narrower the CI, the more reliable the estimate of the underlying population parameter. In summation, the CI, together with the point estimate and margin of error, provides a complete picture of the uncertainty associated with the estimate.

Examination of Table 5.1 conveyed that the point estimates were strongly significant for ALL and FEMALE (less than 0.1%). However, the point estimate for MALE was significant at 3.38%, implying a less precise estimate than found in the other subgroups. The smaller precision is reflected in the large margin of error (0.4295.). It follows that there is much uncertainty about the extent of mediation for males due to the wide range of the 95% CI (lower bound = 0.0355, upper bound = 0.8945).

An examination of Table 5.1 also shows that the point estimates for Model 3 were much larger than those in Model 2 (ALL and FEMALE). For example, the Model 2, estimates were below 35%, while the Model 3 estimates were above 53% for these subgroups. Furthermore, the margin of error used to construct the confidence intervals is larger in Model 3, suggesting less precise point estimates.

The large discrepancy resulted because Model 2 consisted of a larger set of HRM practices indicators. Model 2 includes 12 indicators measuring a traditional set of employee-centric HRM practices: participation, autonomy, and job design (5
indicators); performance appraisals and rewards (4 indicators); and training and
development (3 indicators). In contrast, Model 3 uses five indicators to measure
work-life balance, a narrower or restricted representation of HRM practices. As
observed in the EFA models, all the WLB items had loaded onto Factor 2,
reinforcing the idea that WLB is different from the other HRM practices indicators.

For added context, the work-life balance (WLB) concept traces its early
beginnings to the 1930s and the work-hour laws implemented under the Fair Labor
Standards Act (FLSA) that established a 40-hour work week (Raja & Stein, 2014).
Arenofsky (2017) places the origins of WLB in the same period, crediting the W.
K. Kellogg Company, who saw an improvement in employee morale and efficiency
following a switch from four six-hour shifts to three eight-hour shifts.

The intervening period between 1900 and 1947 saw a sharp uptick (18% to
28%) of women participation in the workforce, which was another factor in the
emergence of WLB. However, the term gained popularity in the 1980s as
employers started offering WLB benefits to women in the form of flexible work
schedules, maternity leave, telework, and various employer-assisted programs that
eventually expanded to accommodate both genders (Arenofsky, 2017). At its core,
WLB is a family-friendly policy or practice organizations use to attract top talent,
enhance retention, performance, and effectiveness, while reducing work-life
conflict or work-family conflict among employees (Beauregard & Henry, 2009).
Although WLB is a component of the bundled HRM practices that comprises a
firm’s high performance work systems, it is differentiated from traditional HRM
practices in that it is provided as a benefit that employers use to help employees achieve a balance between their work and personal lives to minimize work interfering with family and vice versa (Post, DiTomaso, Farris, & Cordero, 2009).

The 95% confidence intervals reported in Table 5.1 provide a plausible range of values for the extent of mediation in each model. The extensive width of the interval for males implies that little can be said about the observed mediation. The lower bound is close to zero, suggesting no mediation, while the upper bound is close to one (full mediation). For females, the extent of mediation is low (17.8%) to moderate (50.6%) for model 2, and moderate (32.7%) to high (90%) for Model 3. The mediator in both models is social capital, which is measured narrowly using four indicators for network ties (NWT).

**Contribution of the Study**

*How Findings Relate to the Body of Knowledge*

Broadly stated, very few studies have assessed the effect of HRM practices on the turnover intentions of engineers, with social capital as a mediating variable. Moreover, no known research evaluates the mediating impact of social capital on the relationship between HRM practices and female mechanical engineer turnover intentions. This study adds to the relevant body of knowledge by demonstrating that the network ties (NWT) measure of social capital (SC) intervenes as a mediator to influence the effect of the broad and limited measurements of HRM practices on female mechanical engineer turnover intentions. This finding is important because
it highlights that organizational members' networked connections and relationships influence their stay intentions.

**How Findings Relate to the Research Question**

The single research question related to this study sought to understand the extent that social capital mediates the effect of HRM practices on female mechanical engineer turnover intentions, which was determined by examining the mediation proportion for Model 2 and Model 3 – FEMALE. The results reported in Table 5.1 revealed a mediation proportion of 34.20% and 61.53% respectively, based on a 95% confidence interval.

**How Findings Relate to Theory**

It is fitting that Lin (1999) argued that social capital is obtained from resources embedded in social networks. After all, the social composition of organizations provides ample networking opportunities. The concept of capital relates to an investment made with a future expected return (Lin, 1999) in company performance improvement, effectiveness, and a reduction in turnover intention behaviors that can lead to the turnover decision. The theory underscoring network ties emphasizes that the size and diversity of an individual's networks (contacts or ties) determine whom they can reach (Nahapiet & Ghoshal, 1998). Network ties (NWT) framed in the organizational context relate to the connections among individual employees, co-workers, and managers. Based on existing social capital
theory, an employer's creation of more NWT-enhancing practices can benefit from reduced turnover intentions among male and female mechanical engineers.

**How Findings Differ from Other Studies Reviewed**

In an empirical study of scientists and engineers based on work-family conflict, for engineers employed in research and development, Post, DiTomaso, Farris, and Cordero (2009) found no support for their intentions to leave R&D or leave their organizations due to family interfering with work or work interfering with family issues. In a study based on high turnover rates among bank employees, Aburumman, Salleh, Omar, and Abadi (2020) investigated the mediating role of career satisfaction on the relationship between HRM practices and bank employees’ turnover intentions. The results revealed that HRM practices and career satisfaction exerted a significant negative effect on the turnover intentions of employees, implying that increased HRM practices aimed at enhancing career satisfaction leads to reduced turnover intentions. Finally, in a study investigating the relationship of social networking and career advancement of women, Choi (2018) found support that a supportive mentor/supervisor relationship was positively related to critical work-role assignment. The results also revealed that important connections were positively associated with temporary promotions. Altogether, the results conveyed that social capital was influential in attaining positive outcomes for women in varied organizational settings and structures.
Discussion and Implications

The results from the analysis suggest that broadly measured HRM practices (Model 2) and a parsimonious measure of HRM practices and work-life balance (Model 3) combined with the network ties (NWT) mediating variable, significantly and partially mediates the effect of HRM practices on female mechanical engineer turnover intentions. In other words, HRM practices predicted female mechanical engineer turnover intentions directly and indirectly. The findings are consistent with previous studies that investigated the impact of HRM practices on turnover intentions in the presence of a mediating variable (Ribeiro & Semedo, 2014; Zhang & Agarwal, 2009).

Theoretical Implications

The present study drew on literature from three branches of theory to show linkages and alignment between an organization’s human resources (people) and the firm’s strategic objectives. In the first case, the SHRM to HRM practices linkage was explored. The connection of the resource-based view literature to HRM practices was also examined to establish support for the hard to copy and inimitable attributes of people that make them a strategic asset to the organization or firm was also explored. In specific terms, SHRM aligned and integrated HRM practices to the overall strategic objectives, changing the employer viewpoint from seeing workers as possessing long-run value as opposed to a short-term view that sought
to obtain the most out of employees at minimum cost to the employer (Kaufman, 2015).

Apart from changing the view of workers as a commodity, SHRM clarified that the fundamental purpose of managerial tasks is to align the firm's structure and human resource systems to drive its strategic objectives (Kaufman, 2015). The study results revealed that HRM practices, directly and indirectly, negatively influenced female mechanical engineers' turnover intentions, suggesting that the bundled (combined) practices comprising employee participation, autonomy, and influence over the design of their jobs can lead to lower turnover intentions.

Likewise, the implementation of appraisal and reward systems that are timely and fair, where clear performance expectations in conjunction with regular feedback are the norm, can lead to a reduction in turnover intentions. Similarly, the combined effect of training and development with the other practices can lead to lower turnover intentions. The finding revealed similar linkages where work-life balance was the HRM practice of interest.

In the second case, the social capital literature was examined to understand how the structural (networked relationships and ties), relational (trust and identification characteristics), and cognitive (shared values) dimensions interact to influence the pathway or relationship between HRM practices and female mechanical engineer turnover intentions. Like other forms of capital (financial capital, human capital, and intellectual capital) that have value, social capital also has value embedded in social network resources (Lin, 1999). Along similar lines,
Nahapiet and Ghoshal (1998) characterized social capital as a valuable resource residing in a network of relationships. The findings in this study confirmed that network ties directly and negatively influence female intentions to quit. As a mediator variable, network ties also influenced the effect of HRM practices on female mechanical engineer turnover intentions, suggesting that a firm's investment in social capital initiatives aimed at enhancing network ties will likely produce lower turnover intentions among female mechanical engineers.

The turnover literature was also examined to understand the theory behind the evolution of the turnover intention construct as a series of employee behaviors where an employee goes through a process of thinking of quitting their job, followed by an intention to search for job alternatives, before arriving at an intention to quit decision (Mobley, 1977). The results of this study confirmed that the intention to quit decision was the most critical factor influencing an engineer's turnover intention decision.

*Practical Implications*

Network ties underscore the structural dimension of social capital that emphasizes the networked relationships among members in a typical organization. In the organizational context, managers can capitalize on the existing formal and informal relationships between engineers by implementing targeted networked-oriented practices that leverage resources available through strong, weak, and bridging ties (Leana & Van Buren, 1999). Furthermore, organizational managers,
HR practitioners, policymakers, and academics can use the findings in this study to implement change initiatives that foster social capital-enhancing HRM practices among female mechanical engineers and their colleagues, supervisors, and managers to reduce their turnover intentions and, ultimately, their decision to quit.

Limitations

The mediation models assessed under Model 2 and Model 3 in the current study were based on a limited complement of measures of social capital indicators (items) encompassing four network ties (NWT) items. First, the researcher could not establish discriminant validity for male/female engineers combined, female engineers only, or male engineers under the comprehensive CFA measurement model that included 12 HRM practice items, nine social capital items, and five turnover intention items. Consequently, the broader social capital measure comprising trust, shared values, and identification were switched out for a limited metric of four items under the structural dimension of network ties.

Second, the survey instrument used in this study was adapted from separate survey scales across the dimensions of HRM practices, social capital, and turnover intentions. This choice was due in part to the time constraints and potential cost of developing a measurement scale according to the multi-step process outlined in the literature (DeVellis, 2017; Morgado et al., 2018). Moreover, the items in some of the adapted scales required minor language adjustments to fit the context of the study, calling into question the reliability and validity of the derived instrument.
Another area that could have improved the overall quality of the survey instrument was sensitivity to the number of items retained from the original survey due to the potential of imposing an undue burden on potential respondents, which could result in survey fatigue and a low response rate. In a Fornell & Larcker, (1981) study undertaken to examine the impact of survey design on response rates, Gargon, Crew, Burnside, and Williamson (2019) found support suggesting that a large number of survey items resulted in lower survey response rates.

Fass-Holmes (2022) took an opposing view concerning the role of survey length and fatigue as the principal cause of low survey response rates. Despite the stated positional differences in the literature, the researcher removed questions from the original instruments to limit the length of the survey over sensitivity for participant survey fatigue. It is well documented in the literature that the length of a survey influences the response rate due to survey fatigue, increasing the likelihood of survey bias (Le, Han, & Palamar, 2021; Beebe, et al., 2010), and the reliability and validity of the instrument. That awareness was a fundamental reason for the researcher’s decision to subject the instrument to further reliability and validity testing through confirmatory factor analysis.

A total of 813 respondents responded to the survey conducted in an online anonymized setting. However, some respondents answered only some of the questions on the survey. The research literature notes a risk of bias in the presence of missing data. The extent of the risk depends on whether the data were, missing at random (MAR), or missing not at random (MNAR), or missing completely at
random (MCAR) (Sterne, et al., 2009). Sterne et al. cautioned against the use of ad hoc missing data handling techniques that utilize the mean of the observed values, missing category indicators, and last value carried forward, noting that the methods were statistically invalid; however, noting that multiple imputation (MI) was a superior technique.

MI replaces missing values with a series of $m > 1$ plausible values to obtain $m$ complete data sets that are varied estimates of the missing values (Marr, Vaportzis, Niechcial, Dewar, & Gow, 2021). Other researchers assert that MI involves creating several (three or more) imputed data sets that are subsequently analyzed to obtain the parameter estimates and standard errors, which are averaged to obtain an unbiased estimate (Schlomer, Bauman, & Card, 2010). However, MI has drawbacks in that there is an assumption that the data is normal, which can lead to bias. Lastly, multiple imputation modeling is a non-trivial undertaking that should include specialist statistical assistance (2009).

Based on the complexity and shortcomings of MI, the researcher elected to eliminate all responses with any missing data; however, with the understanding that the adopted approach might bias the data and result in information loss and reduction of statistical power.

The survey instrument had additional shortcomings. For example, all variables were not measured with the recommended four to six indicators or items (Watkins, 2018). More specifically, only two items were assigned to the TRS variable under the social capital latent variable. A similar shortcoming was
identified post-survey release that only two indicators pertained to the THQT and INTS latent variables. However, it bears mentioning that the items loaded fully on its factor during the exploratory factor analysis with no observed cross-loadings. Lastly, cross-validation was not attempted, a technique that applies one-half of the sample to EFA (Izquierdo, Olea, & Abad, 2014).

Delimitations

Just as the literature defines a limitation as a systematic bias or weakness in a study design that is typically beyond the control of the researcher, a delimitation is a systematic bias directly introduced into the study design by the researcher (Price & Murnan, 2004). A pertinent example was the decision taken by the researcher to limit the scope of the research to mechanical engineers. Future research should expand the study to other engineering disciplines and other male dominated occupations.

Additionally, the present research was limited to mechanical engineers that were employed at the time of taking the survey. Opening the survey to unemployed mechanical engineers could have provided an additional model for comparison. The researcher also established a baseline education value of a Bachelor’s degree for participating engineers. However, engineers with advanced degrees likely represent a unique employee group with additional job search and job attainment options due to their assumed greater human capital compared to colleagues with undergraduate degrees only. However, this study did not make intra-group
comparisons or use education as a control variable for this study. This is an area scholars can explore in the future.

Finally, this study used previously validated scales from multiple sources. Future researchers should consider developing a scale centered on HRM practices that are likely to influence engineers, who are often regarded as high-value knowledge workers. Furthermore, subjecting a newly developed scale to the rigor of pilot testing would add to its reliability and validity.

Recommendations and Future Research Directions

Among the common reasons female engineers gave for leaving the engineering profession, organizational culture and climate featured prominently for both “leavers” and “stayers” (See Table 1.1 and Table 1.2) of this study. The female engineers who quit their jobs or left their organization or profession reported an organizational culture characterized as masculinized, unfriendly, and hostile. The words used to describe the organizational climate were similar and included poor and chilly. Along the same lines, organizational culture was the number one reason for engineers who stayed in their profession, followed by climate.

However, engineers may have used the two concepts interchangeably. Regardless, culture juxtaposed against HRM practices as a mediator latent variable would be meaningful. The same goes for organizational climate included in a study as a mediator latent variable. Additionally, this study collected data on respondents’
marital status, age range, income range, company size, organizational tenure, and
number of children to use as controls. The researcher recommends future studies
consider using some of the control variables as moderator or mediator variables
separately or together to assess the mediator/moderator relationship’s role in
influencing the effect of HRM practices on female mechanical engineer turnover
intentions. HR practitioners and managers addressing the turnover problem should
test various combinations of HRM practices to determine which combination works
best for retaining female mechanical engineers.

Based on a review of the literature for this study, some engineers who
stayed reported having a strong sense of self or having strong self-efficacy,
internally driven, optimistic, and pride in the ability to thrive in a male-dominated
environment. On the flip side, some engineers who left reported a need for
managerial support, affirmation of colleagues or supportive co-workers, and a
desire for the company’s support of professional development and mentoring
opportunities. It bears mentioning that the list of reasons for leaving or staying is
not exhaustive, so the advice for managers and HR practitioners should consider
long-term monitoring of the company culture and organizational climate to
understand if systemic problems exist that could lead to higher turnover intentions
and turnover.

Although the researcher controlled for organizational tenure, organizational
type was not a control variable in this study, but is an important factor as it relates
to the organizational climate and culture an engineer might experience. Faulkner (183
related several vignettes to describe the gendered workplace culture and interaction among engineers on an oil rig. Consequentially, researchers should consider adding a survey question to control for organizational type in future studies.

The present study also focused on turnover intentions because the literature suggests that it best predicts actual turnover (Kopelman, Rovenpor, & Millsap, 1992). The researcher recommends that future researchers consider a longitudinal study to determine if the actual turnover behavior holds for respondents who previously stated an intent to quit. Since this study focused specifically on mechanical engineers, future researchers should consider expanding the scope to include other engineering disciplines and draw comparisons on whether the study variables and model interactions were similar. Future researchers can conduct a mixed methods study that uses interviews and focus groups to understand the lived experience of engineers that quit in conjunction with quantitative analysis to understand the motivating factors of engineers who quit versus those who stayed aligned with prior stated intentions.

Furthermore, the individual employee–engineer was the level of analysis for this study. Future research exploring the turnover intention concept should consider adopting the employer perspective that relates directly to the HRM practices a given employer may implement to foster retention or, in the case of a quit decision, the practices utilized to recruit, hire (onboard), and train the new employee.
Lastly, Mobley (1977) identified nine precursors (behavior intentions) to the actual turnover (quit/stay) act; however, this study focused on three of those behaviors (thinking of quitting, choice to search, and intention to leave) that were used as observed variables to represent the turnover intention construct.

Future researchers should consider a broader or different set of variables that relate to turnover intentions. Similarly, Boon, Boselie, Hartog, and Paauwe (2011) identified 38 HRM practices that were considered the most commonly used across the HRM literature; however, this study used four HRM practices (participation, autonomy, and job design; performance appraisals and rewards; training and development; and work-life balance) as the variables to represent HRM practices. Future scholars should consider using different HRM practices from the 38 practices bundle. Researchers can also adopt a similar approach in the selected social capital and turnover intention variables.

Conclusion

The current research aimed to determine how HRM practices influence the turnover intentions of female mechanical engineers in a mediating social capital context. This study developed a hypothesized model that employed EFA, CFA, and SEM to understand the various relationships and interactions between the independent HRM practices construct and the latent turnover intention variable in the presence of a social capital mediator. The absence of discriminant validity for the latent construct in Model 1 for all combinations (male-female, female, and
male) limited the researcher to a narrow set of social capital indicators for the model assessments, which served to limit the conclusions to a narrow definition of social capital – network ties.

However, theory and the work of scholars such as Granovetter (1973; 1983) and Burt (1992) suggest that network ties may be the most impactful of the social capital variables. Network ties comprise the structural dimension of social capital (Nahapiet & Ghoshal, 1998) and hold particular significance as a resource due to the benefits individuals can obtain through the relationships and strength and diversity of connections (strong and weak ties) formed in day-to-day interaction with peers, colleagues, supervisors, friends, and family, and through the upkeep of long-term relationships. Within the stated limitations, this study empirically demonstrated that social capital intervenes by mediating the relationship between HRM practices and the turnover intentions of female engineers. This study also supported the research question, fulfilling the research objective.
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Appendices
Appendix A: SEM Output, ALL

Model 2

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<th>Model fit</th>
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<th>$\chi^2$</th>
<th>df</th>
<th>p</th>
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<td>270.4986</td>
<td>186</td>
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<tr>
<td>SEM</td>
<td>436</td>
<td>479.4991</td>
<td>286</td>
<td>&lt; .001</td>
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</tbody>
</table>

*Note.* Model tests based on Satorra-Bentler scaled test-statistic.

<table>
<thead>
<tr>
<th>Additional Fit indices</th>
<th>CFA</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative Fit Index (CFI)</td>
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<td>0.9948</td>
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<tr>
<td>T-size CFI</td>
<td>0.996</td>
<td>0.9926</td>
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<tr>
<td>Tucker-Lewis Index (TLI)</td>
<td>0.9974</td>
<td>0.9941</td>
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</table>

*Note.* T-size CFI is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor < 0.873 < fair < 0.931 < close** for model: CFA Model

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor < 0.877 < fair < 0.933 < close** for model: SEM

<table>
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<th>Other Fit Metrics</th>
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<th>SEM</th>
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<tr>
<td>Root mean square error of approximation (RMSEA)</td>
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<tr>
<td>RMSEA 90% CI lower bound</td>
<td>0.0235</td>
<td>0.0332</td>
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<tr>
<td>RMSEA 90% CI upper bound</td>
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</tr>
<tr>
<td>RMSEA p-value</td>
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<td>0.9982</td>
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<td>T-size RMSEA</td>
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<td>0.0455</td>
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<tr>
<td>Standardized root mean square residual (SRMR)</td>
<td>0.0408</td>
<td>0.0523</td>
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</table>

*Note.* T-size RMSEA is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.056 < fair < 0.086 < poor** for model: SEM

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.057 < fair < 0.087 < poor** for model: CFA Model

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## Parameter estimates (SEM)

### Factor Loadings

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<tr>
<th>Latent</th>
<th>Indicator</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>z-value</th>
<th>p</th>
<th>95% Confidence Interval</th>
<th>Standardized</th>
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<tr>
<td></td>
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<td></td>
<td></td>
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<td>Lower</td>
<td>Upper</td>
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<td>HRMPPractices</td>
<td>PAI_D1</td>
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### Regression coefficients

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### Parameter estimates (SEM)

#### Factor variances

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#### Residual covariances

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#### Defined parameters

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### Model 3

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*Note.* Model tests based on Satorra-Bentler scaled test-statistic.

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*Note.* T-size CFI is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor < 0.864 < fair < 0.925 < close** for model: CFA Model

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor < 0.872 < fair < 0.93 < close** for model: SEM

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*Note.* T-size RMSEA is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.058 < fair < 0.087 < poor** for model: SEM

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.061 < fair < 0.089 < poor** for model: CFA Model
## Parameter estimates (SEM)

### Factor Loadings

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### Regression coefficients

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<th>Outcome</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>z-value</th>
<th>p</th>
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<th>Upper</th>
<th>All</th>
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Parameter estimates (SEM)

Factor variances

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Residual covariances

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Defined parameters

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<td>indirect: a x b</td>
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<td>total: c + (a x b)</td>
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<td>proportion: indirect / total</td>
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Appendix B: SEM Output, Female

Model 2

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<td>SEM</td>
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*Note.* Model tests based on Satorra-Bentler scaled test-statistic.

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<td>Tucker-Lewis Index (TLI)</td>
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*Note.* T-size CFI is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor $< 0.90$ < fair $< 0.95$ < close) are **poor** $< 0.864$ < **fair** $< 0.923$ < **close** for model: CFA

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor $< 0.90$ < fair $< 0.95$ < close) are **poor** $< 0.867$ < **fair** $< 0.925$ < **close** for model: SEM

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<td>RMSEA 90% CI upper bound</td>
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<td>RMSEA p-value</td>
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<tr>
<td>Standardized root mean square residual (SRMR)</td>
<td>0.0466</td>
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*Note.* T-size RMSEA is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close $< 0.05$ < fair $< 0.08$ < poor) are **close** $< 0.059$ < **fair** $< 0.087$ < **poor** for model: SEM

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close $< 0.05$ < fair $< 0.08$ < poor) are **close** $< 0.059$ < **fair** $< 0.088$ < **poor** for model: CFA
### Parameter estimates (SEM)

#### Factor Loadings

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#### Regression coefficients

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Parameter estimates (SEM)

Factor variances

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</table>

AGE - NMCHIL    | 0.3731   | 0.0273     | 13.6616 | < .001| 0.3196 | 0.4266 | 0.4441|
MARST_ADJ - FRMSZ| 0.0713   | 0.0692     | 1.03    | 0.308 | -0.0644| 0.207  | 0.0713|
MARST_ADJ - TNUR | 1.7794   | 0.4597     | 3.8709  | < .001| 0.8784 | 2.6803 | 0.2916|
MARST_ADJ - NMCHIL| 0.6942   | 0.0305     | 22.7385 | < .001| 0.6343 | 0.754  | 0.8262|
FRMSZ - TNUR    | 0.0709   | 0.3442     | 0.2059  | 0.8369| -0.6037| 0.7454 | 0.0116|
FRMSZ - NMCHIL  | -0.0093  | 0.0483     | -0.193  | 0.8469| -0.1041| 0.0854 | -0.0111|
TNUR - NMCHIL   | 1.1101   | 0.2482     | 4.4719  | < .001| 0.6236 | 1.5966 | 0.2165|

Defined parameters

<table>
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<tr>
<th>Name</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>z-value</th>
<th>p</th>
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<th>Standardized</th>
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<tbody>
<tr>
<td>direct: c</td>
<td>-0.4471</td>
<td>0.0829</td>
<td>-5.3938</td>
<td>&lt; .001</td>
<td>-0.6096</td>
<td>-0.2846</td>
<td>-0.3602</td>
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<tr>
<td>indirect: a x b</td>
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<td>0.0537</td>
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<td>-0.3377</td>
<td>-0.1271</td>
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<tr>
<td>total: c + (a x b)</td>
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<tr>
<td>proportion: indirect / total</td>
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Model 3

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*Note.* Model tests based on Satorra-Bentler scaled test-statistic.

### Additional Fit Indices

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*Note.* T-size CFI is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor** < **0.852** < **fair** < **0.915** < **close** for model: CFA

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor** < **0.862** < **fair** < **0.922** < **close** for model: SEM

### Other Fit Metrics

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<tr>
<td>Standardized root mean square residual (SRMR)</td>
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*Note.* T-size RMSEA is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close** < **0.061** < **fair** < **0.089** < **poor** for model: SEM

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close** < **0.065** < **fair** < **0.092** < **poor** for model: CFA
### Parameter Estimates (SEM)

#### Factor Loadings

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<tr>
<th>Latent</th>
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<th>Estimate</th>
<th>Std. Error</th>
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<th>Upper 95%</th>
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<th>Standardized 95%</th>
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<th>Standardized 95%</th>
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## Parameter Estimates (SEM)

### Factor variances

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### Residual covariances

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### Defined parameters

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<th>Upper</th>
<th>All</th>
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</thead>
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<td>-2.1274</td>
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<td>indirect: a x b</td>
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<td>proportion: indirect / total</td>
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Appendix C: SEM Output, Male

Model 3

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*Note.* Model tests based on Satorra-Bentler scaled test-statistic.

<table>
<thead>
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<th>Additional Fit Indices</th>
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<th>SEM</th>
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*Note.* T-size CFI is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor < 0.832 < fair < 0.899 < close** for model: CFA

*Note.* The T-size equivalents of the conventional CFI cut-off values (poor < 0.90 < fair < 0.95 < close) are **poor < 0.845 < fair < 0.908 < close** for model: SEM

<table>
<thead>
<tr>
<th>Other Fit Metrics</th>
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<tr>
<td>Root mean square error of approximation (RMSEA)</td>
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*Note.* T-size RMSEA is computed for $\alpha = 0.05$

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.066 < fair < 0.092 < poor** for model: SEM

*Note.* The T-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.071 < fair < 0.098 < poor** for model: CFA
## Parameter Estimates (SEM)

### Factor Loadings

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<th>Latent</th>
<th>Indicator</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>z-value</th>
<th>p</th>
<th>Lower</th>
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<td>30.629</td>
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<td>1</td>
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### Regression coefficients

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<th>Estimate</th>
<th>Std. Error</th>
<th>z-value</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>HRMPPractices</td>
<td>IntentiontoQuit</td>
<td>-0.1842</td>
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<td>-1.8334</td>
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<tr>
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<tr>
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### Parameter Estimates (SEM)

#### Factor variances

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<tr>
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<td>HRMPractices</td>
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#### Residual covariances

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#### Defined parameters

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<th>Lower</th>
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<th>All</th>
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</thead>
<tbody>
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<td>direct: c</td>
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<td>0.1005</td>
<td>-1.8334</td>
<td>0.0667</td>
<td>-0.3811</td>
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<td>total: c + (a x b)</td>
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<td>proportion: indirect / total</td>
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<td>0.0355</td>
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## Appendix D: HRM Practices Measurement Scale

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measure/Items</th>
</tr>
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<tbody>
<tr>
<td><strong>Participation/Autonomy/Job Design</strong></td>
<td>To what extent do you perceive your organization offers the following HR practice: (5-point Likert scale: 1 = not at all, 2 = very little, 3 = somewhat, 4 = great, 5 = very great). (Boon, Boselie, Hartog, &amp; Paauwe, 2011)</td>
</tr>
<tr>
<td>Comprehensive and diverse work</td>
<td></td>
</tr>
<tr>
<td>Challenging work</td>
<td></td>
</tr>
<tr>
<td>Work that gives me the opportunity to express myself</td>
<td></td>
</tr>
<tr>
<td>The opportunity to participate in decision-making processes</td>
<td></td>
</tr>
<tr>
<td>Participation in developing (strategic) plans</td>
<td></td>
</tr>
<tr>
<td>The opportunity to do my work in my own way</td>
<td></td>
</tr>
<tr>
<td>The opportunity to make my own decisions</td>
<td></td>
</tr>
<tr>
<td>The opportunity to take the responsibility for my own tasks</td>
<td></td>
</tr>
<tr>
<td>Possibilities to present my opinion on matters</td>
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</tr>
<tr>
<td><strong>Performance Appraisal/Rewards</strong></td>
<td>Periodic evaluation of my performance</td>
</tr>
<tr>
<td>Fair appraisal of my performance</td>
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<tr>
<td>Performance-related pay</td>
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<tr>
<td>A bonus which depends on the organization’s profit</td>
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</tr>
<tr>
<td>A competitive salary</td>
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</tr>
<tr>
<td>An above average salary for this function</td>
<td></td>
</tr>
<tr>
<td>A fair compensation system</td>
<td></td>
</tr>
<tr>
<td>Attractive benefits package</td>
<td></td>
</tr>
<tr>
<td><strong>Training/Development</strong></td>
<td>The opportunity to follow training, courses and workshops</td>
</tr>
<tr>
<td>The opportunity to develop new skills and knowledge for my current job or for possible jobs in the future</td>
<td></td>
</tr>
<tr>
<td>Coaching that supports my development</td>
<td></td>
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<tr>
<td>Support in planning my future development</td>
<td></td>
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<tr>
<td>The opportunity to work for another department</td>
<td></td>
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<tr>
<td>The opportunity to do another job within this organization</td>
<td></td>
</tr>
<tr>
<td>Good career prospects</td>
<td></td>
</tr>
<tr>
<td>An increase in job responsibilities if I perform well at my current tasks</td>
<td></td>
</tr>
<tr>
<td>The possibility to occupy a higher position within the organization</td>
<td></td>
</tr>
<tr>
<td><strong>Work–Life Balance</strong></td>
<td>Flexible working hours</td>
</tr>
<tr>
<td>Policies that support working parents</td>
<td></td>
</tr>
<tr>
<td>The opportunity to work part-time if I needed to</td>
<td></td>
</tr>
<tr>
<td>The opportunity to arrange my work schedule so</td>
<td></td>
</tr>
<tr>
<td>I can meet family obligations</td>
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### Appendix E: Social Capital Measurement Scale

<table>
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<tr>
<th>Social Capital</th>
<th>Measure/Items</th>
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<tbody>
<tr>
<td><strong>Construct/Variables</strong></td>
<td><strong>Network Ties</strong></td>
</tr>
<tr>
<td></td>
<td>To what extent do you perceive your organization offers the following HR practice: (5-point Likert scale: 1 = not at all, 2 = very little, 3 = somewhat, 4 = great, 5 = very great). (Lin &amp; Lu, 2011)</td>
</tr>
<tr>
<td></td>
<td>I spend a lot of time interacting with some members of this organization.</td>
</tr>
<tr>
<td></td>
<td>I know some members of this organization on a personal level.</td>
</tr>
<tr>
<td></td>
<td>I have frequent communication with some members of this organization.</td>
</tr>
<tr>
<td><strong>Social Capital</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Construct/Variables</strong></td>
<td><strong>Network Ties</strong></td>
</tr>
<tr>
<td></td>
<td>To what extent do you perceive your organization offers the following HR practice: (5-point Likert scale: 1 = not at all, 2 = very little, 3 = somewhat, 4 = great, 5 = very great). (Lin &amp; Lu, 2011)</td>
</tr>
<tr>
<td></td>
<td>I spend a lot of time interacting with some members of this organization.</td>
</tr>
<tr>
<td></td>
<td>I know some members of this organization on a personal level.</td>
</tr>
<tr>
<td></td>
<td>I have frequent communication with some members of this organization.</td>
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## Appendix F: Turnover Intention Measurement Scale

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<tr>
<th>Construct/Variables</th>
<th>Measure/Items</th>
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<tr>
<td>Thinking of Quitting</td>
<td>Adapted from (Mobley, Horner, &amp; Hollingsworth, 1978)</td>
</tr>
<tr>
<td></td>
<td>5-point scale (never to constantly)</td>
</tr>
<tr>
<td></td>
<td>How often do you think of quitting your job?</td>
</tr>
<tr>
<td></td>
<td>How often do you think of leaving the engineering career field?</td>
</tr>
<tr>
<td>Job Search Intention</td>
<td>Adapted from (Bluedorn, 1980)</td>
</tr>
<tr>
<td></td>
<td>I have searched for alternative job since I joined this organization</td>
</tr>
<tr>
<td></td>
<td>I am actively seeking a job or role other than my present job</td>
</tr>
<tr>
<td></td>
<td>How many hours per week, on average, do you work on your job?</td>
</tr>
<tr>
<td>Turnover Intention</td>
<td>Adapted from Hom and Griffeth (1991)</td>
</tr>
<tr>
<td></td>
<td>(1 = definitely not to, 5 = definitely yes)</td>
</tr>
<tr>
<td></td>
<td>Turnover intentions were measured with a two-item scale as follows:</td>
</tr>
<tr>
<td></td>
<td>“I intend to remain in my profession but to leave my current company at or before the end of this year”</td>
</tr>
<tr>
<td></td>
<td>“I would consider taking another job”</td>
</tr>
<tr>
<td></td>
<td>Bluedorn, 1982; Hendrix, Nestor, &amp; Troxler, 1985)</td>
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<tr>
<td></td>
<td>5-point Likert scale – strongly agree – strongly disagree</td>
</tr>
<tr>
<td></td>
<td>I intend to leave my position during the next 3 months</td>
</tr>
<tr>
<td></td>
<td>I intend to leave my position during the next 9 months</td>
</tr>
<tr>
<td></td>
<td>I intend to leave my position during the next 12 months</td>
</tr>
<tr>
<td></td>
<td>I intend to quit my present job</td>
</tr>
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Appendix G: Survey Questionnaire

Consent:

I am a graduate student in the College of Business at Florida Institute of Technology (Florida Tech) Doctor of Business Administration program and am seeking the support of current or recently employed engineers for the completion of this survey that seeks data on the role of human resource management (HRM) practices on female mechanical engineer turnover intentions within a mediated social capital context. The study is being conducted under the direction of Dr. Denise Siegfeldt, Dissertation Committee Chair, and Tyrone Gorrick, student researcher and principal investigator. Your participation in the survey is voluntary. Therefore, you may choose to participate or withdraw at any time.

The eligibility for this survey is currently employed mechanical engineers that have completed at least a bachelor’s degree in engineering. It is estimated that this survey will take approximately 10 to 12 minutes. Your honest feedback will aid in the understanding of this complex and crucially important issue affecting the retention of female engineers across industry. Your participation will inform the decisions of HR practitioners, organization and industry leaders, academia, and government policy makers that contend with the problem of voluntary turnover in the engineering profession. All responses will remain anonymous. Thanks in advance for your participation.
Please indicate your consent to participating in this survey by checking the relevant block below.

☐ Yes, I consent.

☐ No, I do not consent.

**Demographics**

1. Please indicate your gender?

   ☐ Female

   ☐ Male

2. Please indicate your engineering discipline

3. Ethnic Origin: Please specify your ethnicity

   - White
   - Hispanic or Latino
   - Black or African American
   - Native American or American Indian
   - Asian / Pacific Islander
   - Other

4. Please indicate your marital status?

   ☐ Single, never married

   ☐ Married or domestic partnership

   ☐ Widowed

   ☐ Divorced
☐ Separated

5. What is your age?

6. What is your highest educational attainment?

7. What is your household income?

8. What is the number of children in your household?

9. Parent’s highest educational attainment
   - Mother
   - Father

10. In what year did you join your current organization?

11. What is the size or estimated number of employees in your organization?

12. How many companies did you work for prior to joining your current organization?

**HRM Practices**

The following questions and categories relate to your perceptions of HRM practices in your organization. Please respond to each question using the scale below. For each question, indicate the extent of your agreement. Please answer openly and honestly. There are no right or wrong answers.
Participation, Autonomy, & Job Design

Q13. To what extent do you perceive your organization offers HR practices that promote the following? (Not at all, Very little, Somewhat, Great, Very great)

- Challenging work
- Work that gives me the opportunity to express myself
- The opportunity to participate in decision-making processes
- The opportunity to take the responsibility for my own tasks
- Possibilities to present my opinion on matters

Performance Appraisals & Rewards

Q14. To what extent do you perceive your organization offers the following HR practices:

- Periodic evaluation of my performance
- Performance-related pay
- A competitive salary
- Attractive benefits package

Training & Development

Q15. To what extent do you perceive your organization offers the following HRM practices?:

- The opportunity to follow training, courses, and workshops
- The opportunity to develop new skills and knowledge for my current job or for possible jobs in the future

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• Coaching that supports my development
• Support in planning my future development
• The opportunity to work for another department
• The opportunity to do another job within this organization
• Good career prospects
• An increase in job responsibilities if I perform well at my current tasks
• The possibility to occupy a higher position within the organization

Work-life Balance

Q16. To what extent do you perceive your organization offers the following HR practices:

• Flexible working hours
• Policies that support working parents
• The opportunity to work part-time if I needed to
• The opportunity to arrange my work schedule so
• I can meet family obligations

Social Capital

The following questions and categories relate to your perceptions of Social Capital in your organization. Please respond to each question using the scale below (for each question, indicate the extent of your agreement). Please answer openly and honestly. There are no right or wrong answers:
Network Ties

Please indicate the extent of your agreement with the following statements:
(Strongly disagree, somewhat disagree, neither disagree or agree, somewhat agree, strongly agree).

- I maintain close social relationships with some members of this organization.
- I spend a lot of time interacting with some members of this organization.
- I know some members of this organization on a personal level.
- I have frequent communication with some members of this organization.

Trust

Q17. Please indicate the extent of your agreement with the following statements:

- This organization enthusiastically addresses their members’ problems.
- In general, this organization is very trustworthy.

Identification

Q18. Please indicate the extent of your agreement with the following statements:

- I feel a sense of belonging toward this organization
- I have the feeling of togetherness or closeness in this organization.
- I have a strong positive feeling toward this organization.
- I am proud to be a member of this organization.
Shared Values

Q19. Please indicate the extent of your agreement with the following statements:

- I think that this organization provides information that reflects my values.
- I agree with what this organization considers to be important.
- The activities of this organization are in line with my personal values.

Turnover Intention

The following questions and categories relate to your feelings of quitting your organization. Please respond to each question using the scale below. For each question, indicate the extent of your agreement. Please answer openly and honestly. There are no right or wrong answers:

Thinking of Quitting

Q20. Please indicate the extent of your agreement with the following statements:
(Never, sometimes, about half the time, most of the time, always)

- How often do you think of quitting your job?
- How often do you think of leaving the engineering career field?

Job Search Intention

Q21. Please indicate the extent of your agreement with the following statements (strongly disagree, somewhat disagree, neither disagree or agree, somewhat agree, strongly agree):

- I have searched for alternative job since I joined this organization
- I am actively seeking a job or role other than my present job
• How many hours per week, on average, do you work on your job?

**Turnover Intention**

Q22. Please indicate the extent of your agreement with the following statements (strongly disagree, somewhat disagree, neither disagree or agree, somewhat agree, strongly agree):

• I intend to remain in my profession but to leave my current company at or before the end of this year
• I would consider taking another job
• I intend to leave my position during the next 6-12 months
• I intend to quit my present job
Appendix H: Institutional Review Board

Request for Revision

Use this form to report any changes to a previously approved protocol or consent form. Changes must be approved by the IRB prior to their implementation.

1. Principal Investigator Name
   Tyrone Cornick

   Title of Project
   Human Resources Management Practices and Female Mechanical Engineer Turnover Intentions: The Mediating Role of Social Capital

   IRB Number
   21-086

2. Does this revision increase risks to participants enrolled in the study?
   Yes [ ]
   No [x]

3. Describe revision requested: Request to add an Incentives Survey to facilitate the addition of an E-gift card to encourage survey respondent participation rate.

   The Principal Investigator will use the Incentives Survey to collect each respondent’s personal email that elect to participate in the E-gift card award. The respondent's email will only be used to distribute the E-gift card link and will be deleted from file after the E-gift card link is mailed to the participant.

4. Attach revised protocol and/or consent (highlight all revisions): The revised main survey and incentives survey are provided in the attached files.

   Signature of PI:
   Tyrone W. Cornick
   Date: 11/8/2021

   Signature of Major Advisor:
   Date: 11/8/2021

   For IRB Use:

   Approved [x]
   Not Approved [ ]
   Approved Pending Changes [ ]

   IRB Approval
   Jignya Patel, Ph. D.
   Date: 11/12/2021
Florida Institute of Technology

RESEARCH INVOLVING HUMAN PARTICIPANTS
EXEMPT APPLICATION

This form shall be used if there is minimal risk to human subjects; one of the categories on the next page applies to the research. If there is more than minimal risk associated with the research (none of the conditions apply) or if the research utilizes a special population (children, prisoners, institutionalized individuals, etc.), please use the expedited/full application form found on the IRB website.

You should consult the university's document “Principles, Policy, and Applicability for Research Involving Human Subjects” and instructions on the IRB Committee website prior to completion of this form.
https://www.fit.edu/research/compliance-regulations/institutional-review-board

Submit via email to FIT_IRB@fit.edu.

IRB Contact Information:
Dr. Jagpreet Patel
IRB Chairperson
FIT_IRB@fit.edu
321-674-7347

INVESTIGATOR INFORMATION
Title of Project: Human Resources Management (HRM); Masculinity and Masculine Engineer Turnover Intentions: The Mediating Role of Social Capital

Date of Submission: 3 August 2021
Expected Project Start Date: 15 August 2021
Expected Project Duration: 6 months

Principal Investigator: Tyrone Gorrick
Title: Student
Academic Unit: Business
Phone: 240-577-5090
Email: tywgor@gmail.com

List all co-investigator(s). Please include name, title, academic unit/affiliation and email.

None

Florida Institute of Technology
Institutional Review Board
120 West University Boulevard, Melbourne, FL 32901-6975 • 321-674-7147 • FIT_IRB@fit.edu
CATEGORIES OF EXEMPT RESEARCH

Research must choose one:

- Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as:
  a. research on regular and special education instruction strategies, or
  b. research on the effectiveness of or the comparison among instruction techniques, curricula or classroom management methods.

- Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior unless:
  a. the subjects can be identified, directly or through identifiers linked to the subjects and
  b. any disclosure of subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability or reputation.

Note: This exception does not apply to survey procedures or interviews involving minors.

- Research involving the use of educational tests, survey or interview procedures, or observation of public behavior if:
  a. the subjects are elected or appointed public officials or candidates for public office, or
  b. the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

- Research involving the collection or study of existing data, documents, records or specimens if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, indirectly or through identifiers linked to the subjects.

- Research and demonstration projects that are conducted by or subject to the approval of department or agency heads and that are designed to study, evaluate or otherwise examine:
  a. public benefit or service programs,
  b. procedures for obtaining benefits or services under those programs,
  c. possible changes in or alternatives to those programs or procedures, or
  d. possible changes in methods or levels of payment for benefits or services under those programs.

- Taste and food quality evaluation and consumer acceptance studies if:
  a. wholesome foods without additives are consumed, or
  b. food is consumed that contains food ingredients found to be safe by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

RESEARCH FUNDING

If any part of this study will be funded by an external funding source, you must note the funding source and award/solicitation number below:

No external funding source applies.
Florida Institute of Technology

RESEARCH INVOLVING HUMAN PARTICIPANTS
EXEMPT APPLICATION

ANSWER THE FOLLOWING QUESTIONS AS THOROUGHLY AS POSSIBLE.

1. List the objectives of the proposed project.

   This dissertation study will examine whether a firm's implemented HRM practices positively influence the turnover intentions of female mechanical engineers, enhancing overall retention rates across the mechanical engineering discipline, field, and profession within a framework of mediating social capital.

2. Describe the research project design/methodology. Discuss how you will conduct your study, and what measurement instruments you are using. Attach all research materials to this application. Please describe your study in enough detail so the IRB can identify what you are doing and why.

   Research Problem: Females are significantly underrepresented and poorly retained in the engineering occupation and profession.

   Research Questions:
   1. To what extent does mediated social capital influence the effect of human resource management practices on the turnover intentions of female engineers?
   2. To what extent does the existence of supportive social capital practices positively influence female engineer turnover intentions?

   Hypotheses:
   H1: HRM practices will be negatively related to female engineer turnover intentions.
   H2: HRM practices will be positively related to social capital.
   H3: Social capital will be negatively related to female engineer turnover intentions.
   H4: Social capital will mediate the influence of HRM practices on female engineer turnover intentions.

   The researcher intends to undertake a quantitative study design that seeks information from currently employed male and female mechanical engineers. The researcher utilized the Florida Institute of Technology Qualtrics Survey software tool to develop a questionnaire based on previously validated scales and the work of scholars across the human resource management, social capital, and turnover construct areas.

   The researcher previously received research support confirmation from the Holly Frontier organization (a Texas-based energy company) to survey a sampling of its workforce. Likewise, the Society of Women Engineers (SWE) organization previously pledged research support for this dissertation study. The researcher also has tentative (unconfirmed) support from the American Society of Mechanical Engineers (ASME). The researcher intends to use the ASME data as an alternate data source in the event the Holly Frontier and SWE sources fall short of the minimum 300 respondent threshold for the sample population.

   The data collection method is a survey questionnaire of currently employed mechanical engineers from the Holly Frontier firm and SWE organization. The researcher will utilize Structural Equation Modeling to analyze the research model and related hypotheses.
3. Describe the characteristics of the participant population, including number, age, sex and recruitment strategy (attach actual recruitment email text, recruitment letters, etc.).

The target population for this research effort is currently employed mechanical engineers. The researcher hopes to obtain a sample size of at least 300 male and female survey respondents.

4. Describe any potential risks to the participants (physical, psychological, social, legal, etc.) and assess their likelihood and seriousness. Describe steps that will be taken to mitigate each risk.

The survey will be conducted in an online format and does not include any questions that will lead to the generation of personally identifiable information (PII). As a result, the researcher expects that risks to respondents will be minimal. However, the researcher understands that questions related to age, marital status, and race can cause some respondents to experience mild emotional discomfort. The respondent has the prerogative to ignore any question that generates the discomfort described.
5. Describe the procedures you will use to maintain the confidentiality and privacy of your research participants and project data. If video or audio recordings will be made, you must review the video/audio recording policy found on the IRB website and address precautions you will take in this section.

There are no physical risks associated with this study.

The survey data will reside in the Florida Tech’s Qualtrics Survey data repository. No PII information will be collected on respondents. Further, the data will be used specifically for the analysis and testing of the research model, and will not be shared with third parties.

6. Describe your plan for informed consent (attach proposed form).

The proposed informed consent is provided in the survey questionnaire introduction as follows:

Appendix D

Survey Questionnaire

Consent:
I am a graduate student in the College of Business at Florida Institute of Technology (Florida Tech) Doctor of Business Administration program and am seeking the support of currently employed mechanical engineers for the completion of this survey that seeks data on the role of human resource management (HRM) practices on female mechanical engineer turnover intentions within a mediated social capital context. The study is being conducted under the direction of Dr. Denise Siegfried, Dissertation Committee Chair, and Tyrone Gomick, student researcher and principal investigator. Your participation in the survey is voluntary. Therefore, you may choose to participate or withdraw at any time.

The eligibility for this survey is currently employed mechanical engineers that have completed at least a bachelors’s degree in engineering. It is estimated that this survey will take approximately 10 to 12 minutes. Your honest feedback will aid in the understanding of this complex and crucially important issue affecting the retention of female engineers across industry. Your participation will inform the decisions of HR practitioners, organization and industry leaders, academia, and government policy makers that contend with the problem of voluntary turnover in the engineering profession. All responses will remain anonymous. Thanks in advance for your participation. Please indicate your consent to participating in this survey by checking the relevant box below.

Yes, I consent.

No, I do not consent.
2. Discuss the importance of the knowledge that will result from your study (benefits to the field and to society) and what benefits will accrue to your participants (if any). Include information about participant compensation if appropriate.

Voluntary turnover remains a complex and costly problem that affects firms across all industries because of the impact on the organization's social fabric, effectiveness, and economic bottomline. Moreover, the scholarly research literature shows that females account for only 15 percent of the engineering workforce (NSF, 2021). Although females earn architectural, industrial manufacturing, chemical, biological and agricultural, biomedical, and environmental engineering degrees at levels ranging from the mid-30 percentile to 50 percent, the mechanical, electrical, aerospace, and computer engineering disciplines have consistently trended in the low teens (SWE, 2019).

Moreover, nearly a third of bachelor's degree engineering recipients elect to pursue a non-STEM career path at the outset and never enter the occupational field. As posited by some in academia, industry leaders, and policy experts, the additive voluntary turnover of females engineers in the occupational field exacerbates the STEM talent shortage problem. Based on the preceding argument, the results from this dissertation study can add to the understanding of why female engineers are poorly retained and underrepresented in the occupational field, and hopefully contribute to possible interventions that HR practitioners, line managers, industry leaders, and policymakers can use to stem the premature exodus of females from the engineering profession and the STEM field.

8. Explain how your proposed study meets criteria for exemption from Institutional Review Board review (as outlined on page 2 of this form).

The survey questionnaire format is anonymous, preventing traceability to a particular respondent.
Florida Institute of Technology

RESEARCH INVOLVING HUMAN PARTICIPANTS
EXEMPT APPLICATION

SIGNATURE ASSURANCES
I understand Florida Institute of Technology's policy concerning research involving human participants and I agree:
1. to accept responsibility for the scientific and ethical conduct of this research study.
2. to obtain prior approval from the Institutional Review Board before amending or altering the research protocol or implementing changes in the approved consent form.
3. to immediately report to the IRB any serious adverse reactions and/or unanticipated effects on subjects which may occur as a result of this study.
4. to complete, on request by the IRB, a Continuation Review Form if the study exceeds its estimated duration.

PI Signature __________________________ Date ______ 8/8/2021
[Signature] (print) ____________________

PI Signature __________________________ Date ______ 8/8/2021
[Signature] (print) ____________________

ADVISOR ASSURANCE: IF PRIMARY INVESTIGATOR IS A STUDENT
This is to certify that I have reviewed the research protocol and that I attest to the scientific merit of the study, the necessity for the use of human subjects in the study, the student's academic program, and the competency of the student to conduct the project.

Major Advisor Signature __________________________ Date ______ 8/8/2021
[Signature] (print) ____________________

Major Advisor Signature __________________________ Date ______ 8/8/2021
[Signature] (print) ____________________

ACADEMIC UNIT HEAD: IT IS THE PI'S RESPONSIBILITY TO OBTAIN THIS SIGNATURE
This is to certify that I have reviewed the research protocol and that I attest to the scientific merit of this study and the competency of the investigators to conduct the study.

Academic Unit Head Signature __________________________ Date ______ 8/8/2021
[Signature] (print) ____________________

FOR IRB USE ONLY
IRB Approval __________________________ Date ______
IRB # __________________________

Florida Institute of Technology - Institutional Review Board
134 West University Boulevard, Melbourne, FL 32901-4095 - 321-674-7347 - IRB@FIT.edu
Appendix I: Research Informed Consent Form

Purpose: Study

Subject: Human Resources Management Practices and Female Mechanical Engineer Turnover Intentions: The Mediating Role of Social Capital

Dissertation Committee Chair: Dr. Denise Siegfeldt
Telephone Number: (757) 887-2147

Principal Investigator: Tyrone Gorrick
Telephone Number: (240) 577-5090

Introduction

You are invited to participate in a study that seeks to examine the role of human resource (HR) management practices on engineer turnover intentions in a context of mediating social capital. I hope to learn how a firm’s HRM practices influences turnover intentions of female mechanical engineers within the context of social capital in the organization.

The study is conducted under the direction of Dr. Denise Siegfeldt, Dissertation Committee Chair at the Florida Institute of Technology (Florida Tech) College of Business, and Tyrone Gorrick, student researcher and principal investigator. Your participation in this research is voluntary. In the event you elect to participate, you may withdraw from the study at any time.
Why is this study being done?
You are being asked to take part in this study because you are an employee of __________, or a member of the _____ organization. (Company Name). Your personal experiences and perceptions of your organization and how you fit into it, and your ideas will greatly enhance this research project. You will be asked to complete a survey questionnaire that should take between 10-12 minutes. A link to the survey will be provided via email. Analysis of all data collected will be conducted at the following location: Florida Institute of Technology, Melbourne, Florida.

What is involved in this study?
If you choose to take part in this study, the process will be as follows:

• You will be provided a link to the survey.

• Final analysis will be conducted, and the results and findings will be formally written into my dissertation.

• The total amount of time you will spend in connection with this study should be approximately 10-15 minutes.

What are the risks of participating in this study?
There are no physical risks associated with this study. Additionally, the survey is anonymous, so there is no risk to loss of confidentiality. You may perceive some survey questions as sensitive, causing mild emotional discomfort. If such a situation were to occur, you may refuse to answer any of the questions.
Are there any benefits to taking part in this study?

Taking part in this research will not assist you directly; however, you may benefit from:

- The opportunity to reflect on your experiences within your organization
- The opportunity to positively contribute to the development of organizational human resources and departments of the future.
- The opportunity to provide insight into whether HRM practices in a mediating social capital context influences the turnover intentions of female engineers and their overall retention in the occupation and engineering profession.

What are my options?

Participation in this study is voluntary. You do not have to participate in this study and may withdraw from the study at any time following your initial decision to participate.

How will my privacy be protected?

The survey is anonymous, so there is no risk to loss of privacy.

Problems or Questions

The Institutional Review Board of Florida Institute of Technology, at telephone number (321) 674-8960, can provide further information about your rights as a research participant. Further information regarding this study may be obtained by contacting Dr. Denise Siegfeldt, dissertation committee chairperson, at (757)
887-2147 or Tyrone W. Gorrick, principal investigator and student researcher, at (240) 577-5090. If you agree to participate in this study, please sign below:

<table>
<thead>
<tr>
<th>Participant’s Name (printed) and Signature</th>
<th>Date</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Person Obtaining Consent’s Name (printed) &amp; Signature</th>
<th>Date</th>
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<table>
<thead>
<tr>
<th>Principal Investigator’s Name (printed) &amp; Signature</th>
<th>Date</th>
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