



Assisting Professional Development of Subordinate Engineers; Evidence from Owner/Manager Entrepreneurial Engineers in Sri Lanka

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ABSTRACT

Many innovative-minded engineers have stepped towards the business domain as entrepreneurs in the international context and in the Sri Lankan context. Most entrepreneurial engineers have exploited technology-related business opportunities and succeeded in their entrepreneurial journey while contributing immensely to the economic development of the country. Although these engineers play the role of a business leader, they are professionally qualified engineers. Hence, they cannot neglect Engineering Ethics and perform as pure business managers in their entrepreneurial firms. The Code of Engineering Ethics applicable to Sri Lanka advises local engineers to actively assist and encourage the subordinate engineers to advance knowledge and experience. Therefore, Sri Lankan entrepreneurial engineers have an ethical responsibility to support the professional development of subordinate engineers. Both fields of entrepreneurship and ethics of engineers lack systematic studies in Sri Lanka. Thus, the authors were involved in an ongoing grounded theory-based qualitative study on entrepreneurial engineers' ethical practices in Sri Lanka. Based on the findings of that study, this paper investigates the strategies followed by Sri Lankan owner/manager entrepreneurial engineers on the professional development of their subordinate engineers. A purposively and theoretically selected sample of twelve entrepreneurial engineers was interviewed face to face to collect data. Interviews were voice recorded and transcribed verbatim. Interview transcripts were analyzed employing grounded theory techniques to achieve this study's objective with the NVivo software's support. The study reveals that Engineering Ethics' influence has compelled entrepreneurial engineers to follow various employee development strategies. As highlighted in their interviews, training, teaching, coaching & mentoring are the major categories of procedures followed by entrepreneurial engineers in Sri Lanka. This study's findings can be considered as guidance for emerging and future entrepreneurial engineers to create a mutually beneficial sustainable work environment for entrepreneurial engineers and their employees while achieving business success.

KEYWORDS: *Entrepreneurial Engineers, Professional Development, Sri Lanka, Subordinates*

1 INTRODUCTION

Human capital is a crucial factor that determines the success of any business entity (Dagdeviren 2018). In today's competitive world, every business-person struggles to achieve that success by following various strategies. Entrepreneurs occupy a considerable space in the business domain, contributing immensely to the country's economic development (Moustaghfir, El Fatihi and Benouarrek 2020). It can be observed that a significant number of professionally qualified engineers have started up business ventures, becoming entrepreneurial engineers (Pech 2016). As ethical behavior has become a prime focus in the current scenario (Ahsan 2020), they have an additional obligation to behave and run their entrepreneurial firms ethically. Engineering ethics expect senior engineers' assistance for subordinate engineers' professional development (The Institution of Engineers Sri Lanka - Code of Ethics 2013). Hence, this study wishes to enrich the scholarly understanding in assisting the professional development of subordinate engineers, focusing on Sri Lankan entrepreneurial engineers.

1.1 Entrepreneur Engineers

Entrepreneurship has become a widely discussed topic for a few decades yet it is still not entirely investigated due to its complexity (Baker and Welter 2018). As a result, the term entrepreneurship has been defined in numerous ways. Global Entrepreneurship Monitor (GEM) reports entrepreneurship as "any attempt at new business or new venture creation, such as

self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business" (Brenkert 2002). Moreover, eminent scholars have developed theories after observing the entrepreneurial phenomenon in various contexts to describe entrepreneurial behavior and operations. Schumpeter's innovation theory, achievement theory of McClelland, and Knight's risk-bearing theory are foremost among entrepreneurial theories (Ricketts 2006; Chepurensko 2015). A considerable number of innovative minded engineers have exploited various business opportunities and become successful entrepreneurs worldwide. The current entrepreneurial education trend has positively supported new venture startups by engineers (Pretheeba 2014; Barba-Sánchez and Atienza-Sahuquillo 2018). There is a higher tendency among entrepreneurial engineers to exploit business opportunities in technology-related domains than other professionals in local and international contexts (Thiranagama 2015).

1.2 Engineering Ethics

Professional engineers are expected to demonstrate ethical behaviours according to their respective professional associations (Engineering ethics in practice: a guide for engineers 2011). In Sri Lanka, the code of ethics issued by the Institution of Engineers Sri Lanka (IESL) is the primary guideline referred by engineers to make ethical judgments (The Institution of Engineers Sri Lanka - Code of Ethics 2013). Since most

entrepreneurial engineers use their professional qualifications as engineers, they cannot neglect the respective code of conduct when managing their techno-entrepreneurial ventures. According to the IESL code of ethics, engineers shall actively assist and encourage engineers under their direction to advance their knowledge and experience. Several international engineering professional bodies have included this clause in their codes of conduct for engineering professionals (IEEE 2004; Starrett, Lara and Bertha 2017).

1.3 Employee development

Training, mentoring and coaching are significant functions in employee development coming under human resource management (HRM) (Cardon and Stevens 2004; Zust 2017). Since human capital is an essential asset in any organization that contributes to its success, employee development should not be neglected (Rajendran and Dharan 2018). Baron & Armstrong (2007) also highlighted that investing on the human capital adds value to any firm. Large-scale organizations have established supporting procedures, including allocation of funds for employee development. However, small and medium scale entrepreneurial firms (SMEs) lack such established procedures (Cardon and Stevens 2004; Gamage and Sadoi 2008; Rajendran and Dharan 2018). Jones (2004) has identified that an increase in training leads to increased firm performance based on a study conducted with Australian manufacturing SMEs. According to a survey conducted by

Gamage & Sadoi (2008), focusing SMEs in the manufacturing sector in Japan has identified that the owner/manager's attitude towards training is the most influential factor in deciding the amount of training & development for the employees. Mangaleswaran (2015) has identified, based on a study conducted in the Hambanthota district in Sri Lanka, that SME holders provide on-the-job training for their employees once they are recruited. However, they do not have established policies for various HRM practices. Even though there are few studies conducted on HRM practices of SMEs in Sri Lanka, it is very challenging to find any study conducted to investigate various aspects of operations carried out by owner/manager entrepreneurial engineers in Sri Lanka with respect to Engineering Ethics. As entrepreneurial engineers perform professional activities in engineering and technology domains through their firms, they have to recruit several engineers as their subordinates. Hence, their entrepreneurial firms inherit a significant difference with respect to other typical entrepreneurial firms in SME category. This suggests the requirement of conducting studies specifically on entrepreneurial engineers (Thiranagama 2015). Hence, the objective of this study was to investigate how owner/manager engineers fulfill their ethical obligations towards assisting the professional development of subordinate engineers, working at their technology related entrepreneurial engineering firms in Sri Lanka.

2 RESEARCH METHODOLOGY

Research domains that lack former systematic studies and empirical theories need to be investigated qualitatively to identify hidden insights within the sample (Cresswell 2014). The shortage of studies focusing on owner/manager engineers in engineering-related SMEs in Sri Lanka and in the international context has motivated the authors to design the research qualitatively (Thiranagama 2015). Senadheera & Karunarathne (2016) have also recommended future researchers to extend their qualitative methodology to various entrepreneurs in Sri Lanka in different sectors, disciplines, or professions to examine how they deal with ethical dilemmas. Hence, the authors have adopted the grounded theory methodology for the preliminary study to investigate the social processes associated with entrepreneurial engineers' practice of Engineering Ethics. The grounded theory approach considers research findings as evolving, and the data collected aids in developing new insights, results, and eventually, theories (Charmaz 2006). Hence, the objective of this research paper is achieved from the data collected so far for the preliminary research, although it is still ongoing.

Data collected from purposively and theoretically selected 12 owners/manager chartered engineers, who manage technology related entrepreneurial engineering firms all over Sri Lanka by conducting face-to-face interviews guided with semi-structured questionnaires, were utilized to achieve the objective. Since majority of entrepreneurial engineers in Sri Lanka are running technology related

business firms (Thiranagama, 2015), authors have decided to choose techno-entrepreneurial engineers. Interviews were voice recorded and transcribed verbatim for the analysis purpose, assuring the confidentiality of the interviewees. Data collection and analysis were done simultaneously with NVivo software's support as per grounded theory, by the first author of this paper (Willig 2013). Coding was done to identify significant categories of importance, while employing memo writing and comparing & contrasting techniques to move from initial purposive sampling to theoretical sampling, as per grounded theory techniques (Charmaz 2006). Interview transcripts were sent to the interviewees for their feedback as participant checking, and interviewees were contacted wherever necessary to get accurate interpretations on findings (Charmaz 2006; Cresswell 2014). Results were further discussed with the other two authors of this paper and few industry experts to enhance this study's trustworthiness and credibility (Braun and Clarke 2013). Further, all interviewees' company websites were checked to find more evidence relevant to the analysis findings.

3 RESULTS & DISCUSSION

3.1 Demographic Information

Pseudonyms from the English alphabet as A, B, C, D, E, F, G, H, J, K, L & M were given to each interviewee to ensure confidentiality. Six civil engineers, three electrical engineers, two chemical engineers, and one mechanical engineer shared their experiences. The average

number of employees working in those firms was 26. Additionally, they have employed some part-time employees also. The startup years of their firms range from the year 1998 to 2015.

3.2 Assistance to Professional Development of Subordinate Engineers

Analysis of the interview transcripts revealed that all the interviewees demonstrate their commitment to assist subordinate engineers' professional development. It is impossible to implement training and development programs for employees if the firm's owner/manager is not committed to that, as Gamage & Sadoi (2008) highlighted. In such a situation, the Engineering Ethics' influence has positively enhanced the entrepreneurial engineers' commitment to assist the subordinate engineers' professional development, irrespective of their adopted HRM functions within their firms. Even though most interviewees do not have established HRM functions on employee development, they follow various strategies to give their subordinate engineers significant professional development opportunities. The grounded theory-based analysis revealed significant strategies on this matter as training, teaching, coaching and mentoring.

3.2.1. Training

As revealed from the interviews, all the interviewees have taken various steps to arrange multiple training programs for their subordinate engineers. They have conducted various training programs within their firms and sent the subordinate

engineers for external training programs as well. Engineer C emphasized his practice as “We are giving them some kind of training always for their technical development, that is AutoCAD and some other things”. As his firm deals with civil engineering consultancy works, it is required that the subordinate engineers have sufficient competencies in relevant technologies (Carthy, Gaughan and Bowe 2018). Engineer C has mentioned during the interview that he is proficient in Computer-Aided Design (CAD) software ever since he was an undergraduate. Therefore, he spends time giving training to his subordinates for their development. Engineer G has stated, “Now actually this company has become one of the best places to get the training”. Engineer G's company is a leading entrepreneurial firm in cyber security, which works predominantly with leading organizations as per the company web site. Because of that formidably built reputation, engineers who work for this firm have received significant demand from the industry due to the excellent training they receive from engineer G's firm.

Additionally, owner/manager engineers send their subordinate engineers to outside-training programs to assist their professional development while fulfilling organizational requirements. Engineer F proclaimed, “I have more than twenty engineers and other staff. For each and every category, we do this Continuing Professional Development, IESL CPD courses like. We send the people for training”. As the apex body for professional engineers in Sri Lanka, IESL organizes various Continuing Professional

Development (CPD) courses in technical and non-technical areas, beneficial for professional engineers (Professional Review Rules 2018). Subordinate engineers working at Engineer F's firm receive opportunities to attend CPD programs as their employer is an engineer and has a clear understanding of the ethical responsibility of assisting the professional development of the subordinates as a senior engineer in the society (The Institution of Engineers Sri Lanka - Code of Ethics 2013; Engineering Council Sri Lanka - ECSL code of ethics 2020). However, at the organizational level, subordinate engineers face various professional practice difficulties when their employer is a non-engineer (Poel and Royackers 2011). Since non-engineer employers do not know about engineers' professional development requirements, engineering employees face various obstacles when they need to participate in outside training programs. Only a few owner/manager engineers have the capabilities to send their subordinates to foreign training too. Engineer C mentioned, "Sometimes they are given foreign exposure, we are sending them to foreign countries to work, like Kuwait". Professional engineers need foreign exposure to utilize technologies effectively and work competently in the engineering field while expanding their education (Godfrey 2014). Engineer C's practice to send subordinate engineers to foreign countries is an excellent opportunity for young engineers' professional development (Reich et al. 2015).

Getting the chartered engineer status is an essential milestone in the career ladder of any professional engineer. Since all the interviewees have chartered engineer status in Sri Lanka, they can train their subordinate engineers to get the charter qualification (Professional Review Rules 2018). Few of the interviewees have focused on that aspect also. Engineer F has mentioned, "We are also having people for the charter also. We are recognized for the charter training as well". Although they are businessmen with busy schedules, they spend their valuable time to train subordinate engineers. According to Jones (2004), medium and high-growth firms have adopted formally structured training programs for their employee development, while low-growth firms have adopted informal training programs. In such a situation, training young engineers for charter qualification can positively affect entrepreneurial firms' growth.

3.2.2 Teaching

It was revealed from the interview transcripts that few owner/manager engineers spend their time in teaching some technical matters directly to subordinate engineers to fill the knowledge gaps, utilizing their expertise. Learning from senior engineers is a better way for any young engineer to achieve professional development as an engineer (Godfrey 2014). Engineer C stated, "As a lecturer, I am having some sessions once a month and once in two weeks, two hours three hours we are working on them". Engineer C is working as a visiting lecturer for a leading university in Sri

Lanka. Hence, he lectures on various critical technical matters as teaching sessions for subordinate engineers in his firm. A teacher-student relationship can be observed in his firm rather than an employer-employee relationship. Engineer L has shared his experience as “I have employed a graduate who came from a newly established engineering faculty. Compared with the engineering graduates coming from other state universities, his knowledge is a little bit low. We teach him a lot of things”. Proper teaching efforts can fill knowledge gaps (Reich et al. 2015). Engineer L’s effort to teach the particular subordinate engineer is an excellent support for achieving the required level of technical knowledge and competence on par with the industrial requirements. According to Starrett et al. (2017), a professional grasps credibility, reputation, training, and support from the profession. In response, the professional must be obliged to symbolize it and offer support and training to fellow professionals. Engineer M also conducts similar teaching sessions by himself and even by inviting outside experts. He highlighted it as follows: “So time to time I invite special people and deliver lectures for them”. According to Starrett et al. (2017), improving technical knowledge is only one aspect of professional development. Hence, this is the right approach for every superior to adopt to develop their younger generation.

3.2.3 Coaching & Mentoring

Coaching and mentoring are two types of HRM tools for employee development (Truitt 2011). However, both terms create confusion among the general public due

to the slight difference in the meanings. According to Zust (2017), the two terms’ differences can be identified as coaching is more performance-driven, designed to improve the professionals’ on-the-job performance. Mentoring is more development-driven: it does not simply consider the functions of the professionals’ current job, but beyond, by taking a more holistic approach to career development. Interviewees have adopted both methods to assist their subordinate engineers’ professional development since soft skills, management skills, and ethics are considered components in professional development (Starrett, Lara and Bertha 2017).

Interviewees have given the full responsibilities of most of the works to their subordinate engineers to enhance job performance. However, owner/manager engineers guide subordinates in critical situations without letting them make wrong decisions. Engineer M has stated, “I give them the total responsibility for designs while guiding them. Basically, they should have hands-on experience for those things, and after that, I review them”. Engineer C also emphasized the same as “So, we make them independent, we allow them to take decisions”. Moreover, owner/manager engineers have concerns regarding the professional attires of their subordinate engineers also. Engineer G emphasized, “Mostly the engineers working in the IT field, mainly they like to wear slippers, t-shirts and all those things. But, I never allow them to go public with such dresses”. This restriction supports young engineers to dress appropriately, as a professional

engineer representing a dignified profession in society (Molen, Schmidt and Kruisman 2007).

As mentoring approaches, owner/manager engineers share their valuable experiences with subordinates expecting their professional development beyond the current job role. Engineer M highlighted, “We should improve ourselves continuously and let the youngsters to improve as well”. Further to that, they encourage subordinates to learn many things. Engineer M has stated, “Always I pushed them to learn. And also I am pushing them to obtain the charter in the shortest period of time”. Since owner/manager engineers play the mentor's role simultaneously, engineer M proves his mentoring approach by motivating the subordinates to obtain the charter qualification. Engineer C guides subordinate engineers to expand their knowledge bases by doing research. He explained it as “Apart from that, we are doing a lot of research. Every year you can see that there are two papers at that conference”. Unlike other superiors in the business operations, subordinate engineers are getting better development opportunities when their superior is also a senior engineer since they know what engineers require (Starrett, Lara and Bertha 2017). That benefit is there for subordinates working at C’s firm. Involving research and publishing them in conferences and journals will benefit the subordinate in grabbing better postgraduate studies. Besides, owner/manager engineers try to guide subordinates to seize better job opportunities in the future. Engineer F has narrated his concern as “They knew that

the day they leave here, there will be many opportunities for them because they have built the career and have built the network and the reputation in the industry also”. According to the above excerpt, working for F’s firm has benefitted the subordinates in many ways. Other organizations are willing to recruit staff members from that firm as they are appropriately trained, mentored, and groomed as competent engineers. Hence the market value of those engineers is continuously getting increased, leading to financial success as well (Carthy, Gaughan and Bowe 2018).

3.3 Practical Implications

Fulfilling the ethical obligation of assisting the professional development of subordinate engineers has created majorly positive implications on the entrepreneurial behavior and performance of owner/manager engineers. According to McClelland's achievement theory, entrepreneurs are highly achievement-oriented (Chepurenko 2015). Owner/manager engineers, also as entrepreneurs, expect their business to be successful. Assisting the professional development of subordinate engineers in compliance with Engineering Ethics supports the achievement theory. Engineer F highlighted it as “So we know that when they train only we will get something and they will get something”. Most of the time, any business entity's success depends on human capital, and startup ventures also grow with human capital development (Dagdeviren 2018). Hence, engineer G could secure many business opportunities as his subordinates are highly qualified and skillful with

many training and development opportunities. Engineer G stated that as “We strictly depend on our people, so they have done many certifications, I ask my clients if other companies have such experts, go ahead with them, but they always come to me”. As Truitt (2011) highlighted, work proficiency and effectiveness of delivering works enhance with the proper training and development approaches, paving the way for a business success, which is the prime target of any entrepreneur in society.

According to Knight's risk-bearing theory, entrepreneurs take various means of risks during their entrepreneurial journey. Without taking risks, entrepreneurs cannot be successful profit-wise, etc. (Chell 2008; Chepurensko 2015). Assisting the professional development of subordinate engineers also creates a significant risk. There is a tendency of starting up new engineering firms elsewhere in the same field by subordinate engineers, after getting considerable training and experiences. However, most of them do not consider that trend as it is a business threat or risk for themselves. Engineer M mentioned, “If I have provided good service to my clients actually, I do not think any one of my juniors can take my client. I do not have fear about that thing”. Engineer M knows that there is no threat from anybody in the industry as far as he provides a better service to the clients. Taking that risk has not negatively affected his firm's performance as an entrepreneur. Jones (2004) has confirmed that providing proper training opportunities for employees in the SME

sector is positively correlated with the organizational growth. Engineer J is satisfied with not only with profits gained, but also with what he was doing in the engineering field as a businessman. He narrated his feeling as “We have a self-satisfaction that we have helped them lot. We have helped him as well as engineering field”. No interviewee has expressed their dissatisfaction with subordinate engineers for starting up similar firms, creating a rivalry among them. Most of them have neutral attitudes towards that, considering it as a natural thing. That mindset supports them to carry out their entrepreneurial function without any mental burden.

However, owner/manager engineers encounter difficulties during this process since some of the subordinate engineers do not like to learn new things. Engineer G highlighted, “We have seen that now many people do not want to learn new things”. Engineer H mentioned, “They are not the hard workers (Laughing). They just want to come to my level within two-three years”. As highlighted, interviewees are dissatisfied with that aspect. Such habits of subordinate engineers as employees may demotivate owner/manager engineers' supportive behavior (Emmott 2015).

Owner/manager engineers spend a considerable amount of money on staff development. Engineer G emphasized that “Actually we are spending a lot of money on our staff because we are entirely running on our staff”. Since engineer G is running a knowledge-driven entrepreneurial firm, staff development is

a must (Dagdeviren 2018). As G is spending a considerable amount of money for that purpose, retention of the firm's employees is also crucial to reap staff development benefits. According to Wijesiri et al. (2018), there is no significant positive relationship between employee retention and training & development in Sri Lankan firms. Hence, owner/manager engineers have to consider strategies to retain their trained engineers within their firm for a particular period, to gain the maximum out of expenditure on staff development as entrepreneurs (Guardia 2016; Osborne and Hammoud 2017). Engineer C has stressed that "Consultancy is not a very profit-making industry, but still we are trying to give them whatever we can." The above excerpt clarifies that engineer C is committed to training the subordinate engineers amidst the tight constraints as it affects the short-term profit margins.

4 CONCLUSIONS

The grounded theory-based qualitative study has revealed that owner/manager engineers have widely focused on training, teaching, coaching, and mentoring activities to fulfill their ethical obligations towards subordinate engineers' professional development. It has majorly created positive implications on owner/manager engineers' entrepreneurial behavior in the Sri Lankan context. It was identified that in entrepreneurial firms, where HRM functions have not been established well, the code of Engineering Ethics has motivated owner/manager engineers to operationalize the training and development HRM functions within their

firms to some extent. This study further enriches the scholarly understanding of entrepreneurial engineers' ethical obligations towards their subordinate engineers' professional development. Emerging entrepreneurial engineers can incorporate the above findings in their business operations to create a win-win situation for themselves and the subordinate staff to achieve long-term business success as ethical entrepreneurs.

This study, of course, has several limitations. The authors could interview male participants only for this study, as there were fewer female entrepreneurial engineers in Sri Lanka. Hence, gender bias can be observed in the findings. As this study was conducted qualitatively, outcomes cannot be generalized to other contexts. Quantitative studies can be designed by using the outcomes of this study to obtain a generalizable result to describe various aspects of Sri Lankan entrepreneurial engineers' ethical behaviors as a whole.

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