

Industrial Leadership Requirements

- qualifications promoting organizational competitiveness

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INTRODUCTION

European higher engineering education has a solid tradition in imparting an education that equips engineering graduates with a broad base of knowledge, skills and attitudes pivotal to success in industrial processes. And yet, despite the changing global conditions calling for new approaches to industrial leadership, leadership training as part of higher education, especially in technical fields, has remained underappreciated. To better meet industrial competence requirements in engineering education, the Accreditation Board of Engineering and Technology has recently extended its accreditation criteria to leadership, “function effectively as leader of a team that may be composed of different disciplines and levels” [1, p.7]. Unfortunately concrete investments to conceptualize effective leadership and define leader competences still remain modest, hindering the related curriculum development.

This paper briefly reviews literature attesting the connection between leadership and organizational competitiveness. It then sheds light on industrial leadership requirements from the viewpoint of personal qualifications. Finally, the paper proposes teaching foci promoting the integration of leadership skills and competences into higher engineering education.

1 HUMAN RESOURCES AS A SOURCE OF COMPETITIVE EDGE

In the contemporary world of hyper-competition, human capital constitutes one of the key factors explaining for variance in organizational productivity. [2] More specifically, management researchers have documented that the practices through which organizations manage their human resources bear impact on their competitiveness, and that employees as a collective resource potentially mediate organizational outcomes. Studies corroborating these intuitive assumptions are scarce, but they manage to show that such organizational features as the quality of leadership and wellbeing at work correlate with organizational outcomes. [3] The efforts to understand the sources, constituents and impacts of human resources have embraced, among others, studies of motivation, employee ability, commitment, participation, management practices, work security and reward mechanisms. [4], [5]

The value of human resources depends on their potential to contribute to organizational performance. Encouraged by the increasing awareness that these intangible assets compose the prime agent in organizational outcomes, industries strive to strengthen their employees’ psychological connection with work. To better understand inspirational factors at work, organization studies have examined the motivational role of job resources as facilitators of task accomplishment, including aspects such as autonomy and social support available at the work community, inviting examination also of the supervisor role. [6], [7]

1.1 Impact of leadership on organizations

Even though the direction of causality between investments in intangible assets and organizational performance still remains partly unclear, the connection has been evidenced between investments in human resources and organizational outcomes. [8] For instance, studies of leader-follower relationships and leader impact on employees corroborate the importance of managerial output to organizational results. Further, poorly cooperating management teams are known to associate with low corporate returns [9] and leadership practices in general are known to affect corporate stock performance, profitability [10], and return-on-investment. [11]

HR outcomes of satisfaction, organizational citizenship behavior and turnover, then, explain for variance in profitability. [12] Also the intervening role of motivation, satisfaction, commitment, participation and immediate supervisors has been confirmed. [13] Effective working time contributes to human capital productivity [14] and reduced levels of managerial authority and increased levels of autonomy have been shown to boost innovation and success. [15] Specifically, management studies have revealed that successful employee outcomes are associated with the social or relational abilities of the leader and his or her inspirational communication strategies. [16], [17]

Eventually, studies of leadership have unanimously recognized the significance of the professional, transferrable leader skills, yet a systematic definition and conceptualization of leaders' generalist abilities critical to their work communities has not been achieved. [18] Generally, the research has centered on charisma and the transactional principles of exchange in the leader-follower interaction, directing only scant attention to the personal capabilities of the leader. [19], [20]

As there is increasing acceptance that leader qualities and practices mediate organizational performance, this paper attempts to operationalize effective industrial leadership. It also argues that leadership training be inculcated into higher engineering education and therefore identifies possible teaching foci for higher engineering education.

2. CATEGORIES OF LEADER COMPETENCES

Acquisition of substantive expertise alone seldom guarantees effective contextual behavior, which is known to turn field-related knowledge into productivity and profitability. [21] Such professional competences or process skills address lifelong learning, learning to learn, critical thinking, cooperation, communication, teamwork, intercultural cooperation, organizational understanding and project management. These represent the socio-cultural dimensions that are becoming increasingly important as globalization intensifies the demands for flexible, socially adept and communicative work communities. [22]

The emerging requirements extend leaders' competence requirements from mere technical, substantive expertise to a configuration of personal qualifications, advocating strategic, practical, theoretical and relational competences [23]. Some claim today's leaders need to be technically, relationally and conceptually adept [24], where others [25] offers a more detailed listing, calling for surgency, sociability, receptivity, agreeableness, dependability, analytical intelligence, and emotional intelligence. Further, recent examples manifesting abuses of industrial power and authority have revived interest in ethics, setting requirements on conduct that is in line with organizational values. [26]

The following literature review constitutes an effort to categorize leader requirements into a listing of the key leader competence areas.

2.1 Substantive expertise

Functional Job Analysis allows examining leader activities broadly through behaviours regarded as universal in the managerial setup. The foundation of effective leadership has traditionally been laid on first-rate substantive expertise but is increasingly expected to extend beyond domain-specific capabilities. This expertise is a prerequisite in the five main managerial functions, comprising 1) planning and problem solving, 2) viewing, and the three functions of action, that is, 3) independent action, 4) leadership and 5) cooperation. [27]

Present membership of many simultaneous teams, networks and communities requires not only subject-related technological expertise, but also so-called soft skills enabling employees to integrate thinking, feeling and behavior, while pursuing their professional goals. [28] It should be underlined, though, that substantive expertise, be it theoretical, practical or strategic, takes an undeniable role in the build-up of professional expertise and managerial credibility. As technical expertise is domain-specific, this study addresses it only narrowly and superficially through theoretical knowledge, practical experience, insight, and ability to argue academically in writing for one's claims and ideas.

2.2 Personality

Personality is currently viewed as an antecedent of leadership that drives leader behavior. [29] Some advocate that information regarding personality could be harnessed in recruitment to select future leaders. [30] In addition to observable personality traits that have traditionally enjoyed a dominant position as descriptors of personality, other variables such as motives and cognitive styles deserve attention, especially in the context of organizational life. [31]

This study subsequently addresses bipolar personality dimensions that moderate the five universal leadership functions.

2.3 Socio-emotional skills

This study takes as its starting point that socio-emotional competence can be operationalized as learnable social, emotional, cognitive, and self-system attributes. Such competence deserves closer examination in the context of industrial leadership as it is known to promote effectiveness in workplace interaction. [32]

Emotional intelligence or socio-emotional intelligence comprises five sub-categories: self-awareness, self-management, self-motivation, social awareness and social skills. These personal intelligences can be grouped into intrapersonal or emotional, and interpersonal or social intelligences. A fundamental aspect of socio-emotional intelligence is the reflection and understanding of one's own emotions, and self-reflection and self-awareness are by many recognized as the most important and effective managerial tool. Effective self-awareness facilitates self-motivation and emotional regulation, which helps prevent emotions from rising to a level that causes stress and problematic behavior. [33]

Healthy intrapersonal, or self-leadership, skills form the foundation for social fluency. Social awareness allows the individual to read, interpret and tolerate others' emotions, and those capable of capitalizing on this knowledge by attuning their conduct to the moods of others are regarded as socially skilled. [34] In the context of leadership, for example leaders' emotional perception correlates with employees' job performance. [35] We therefore included question items that address socio-emotive competence through both intrapersonal and interpersonal skills.

2.4 Communication skills

One of the most intriguing and complex organizational processes is interpersonal communication. Despite the recent paradigm in communication studies discriminating between traditional linear views of communication as one-way information transmission [36], and more recent understanding of communication as a social process involving emotional exchange, culture formation and relationship build-up [37], this study underlines the importance of one-way information transfer as a crucial managerial communication channel.

Industrial needs analyses have identified several competence gaps involving communication skills, calling for emphasis on interpersonal, communication and teamwork skills. [38] The interpersonal communication competence is found to comprise three levels: motivation, knowledge, and skills. Ideally, they materialize as an individual's knowledge about effective and appropriate communication, skilfulness in applying the knowledge in practice, and willingness to self-critically examine and adjust one's communication to meet contextual needs. [39] Furthermore, active listening deserves to be raised as a pertinent element of communicational exchange.

The present research consequently includes question items that represent both the one-way information dissemination process and the two-way meaning creation and relationship build-up process.

2.5 Cultural skills

Changes stemming from globalization cause disengagement in engineering teams that stems from the cultural boundaries characterizing the professional work settings and impeding the build-up of social connections and trust. [40] The increase in workforce diversity also complicates managerial work, requiring cross-cultural skills such as cultural empathy and adaptability of them. [41] Further, cultural understanding and international orientation have turned pivotal in global markets, which also require mental flexibility of their operators. [42]

These trends accentuate socio-cultural aspects in engineering education to accommodate to the needs of individuals representing increasingly different educational backgrounds, cultures, and nationalities in the workplace. [43] (Lehmann et al. 2008) Global markets and value networks necessitate both scientific-technical and economic competences that bolster production, but also socio-cultural awareness bridging the gaps between the growingly multi-cultural staff. Simultaneously, cultural knowledge facilitating the functioning of multicultural corporate teams is called for. [44]

For these reasons, skills and traits crucial in multi-cultural set-ups such as empathy, flexibility, tolerance for diversity and openness are included as question items in the present study.

2.6 Ethics and values

Recent examples manifesting abuses of industrial power and authority have revived interest in ethics, setting requirements for conduct that is in line with organizational values. [45] More than ever, employees need to be ethically oriented and socially responsible, capable of constructing a just, equitable and sustainable world. [46], [47] What is more, they are expected to master ethical thinking and implementation both on the macro-ethical level related to their profession and the micro-ethical level of the individual. [48]

Consequently, the present survey in question includes question items addressing sustainability, values thinking, integrity and responsibility.

3. EMPIRICAL STUDY

3.1 Method

The survey was devised with the Webropol tool. An online questionnaire link was emailed to corporate HR managers operating in Finnish organizations, who then forwarded the invitation email to their staff. Responding took approximately 15 minutes and demanded rating of 81 question items describing leader abilities, skills and traits on a Likert scale of 1 (not important) – 6 (highly important).

The survey item contents drew on a validated work personality index [49], our previous research on socio-emotional skills prevalent in working life [50] and findings on today's working life competences [51]. The question statements to be assessed are listed in Table 1 below.

SUBSTANTIVE KNOWLEDGE	41. is competitive
1. has theoretical domain expertise	42. makes decisions based on fact
2. has practical, hands-on experience	43. is optimistic and hopeful
3. has insight and visionariness	44. is realistic and considers facts
4. has academic writing skills	45. believes in him/herself
SOCIO-EMOTIONAL SKILLS	46. is self-aware and realistic about him/herself
5. communicates clearly and unambiguously	47. recognizes his/her flaws and weaknesses
6. communicates in an original and personal	48. is assertive and decisive
7. expresses empathy	49. likes to help others
8. discusses issues outside work	50. relies on others
9. is good at summarizing	51. willingly leads others
10. expresses emotions	52. is compliant, follows advice and rules
11. gives positive feedback	53. is flexible, capable of compromising
12. gives critical feedback	54. is not impulsive or easily provoked
13. accepts critical feedback	55. is goal-oriented and determined
14. is an enthusiastic public performer	56. is efficient and a high achiever
15. inspires and motivates others	57. carefully considers every decision
16. hugs or touches in emotional situations	58. makes decisions in a speedy manner
17. takes responsibility for the atmosphere	59. is systematic and organized
18. has a sense of humor	60. solves problems analytically
19. expresses opinions boldly	61. is intuitive and relies on instinct
20. doesn't avoid emotional situations	62. remains calm and collected even in crises
21. is collegial and expresses solidarity	63. tolerates failure and disappointments
22. communicates negative issues face-to-face	64. is punctual and a good time-manager
23. makes sure his/her messages are understood	65. tolerates routines
24. is sensitive to other people's moods	66. is intelligent
25. negotiates skillfully	67. thinks critically
26. keeps others up-to-date and shares	68. is good at motivating him/herself
27. networks and participates actively	69. seems content and happy
28. masters small-talk	70. is entrepreneurial
29. admits his/her mistakes	71. wants to develop as a human being
30. apologizes when necessary	72. adapts easily to change
31. is emotionally intelligent	73. is warm and agreeable
32. is credible and convincing	74. is balanced and at peace with him/herself
33. is energetic and enthusiastic	ETHICS, VALUES AND MORALE
PERSONALITY	75. does not compromise his/her values
34. is inspired by new ideas and change	76. is absolutely honest in every situation
35. focuses on detail	77. takes responsibility for his/her wellbeing and self
36. focuses on the bigger picture	78. takes responsibility for others and their wellbeing
37. is extraverted and sociable	79. is concerned for the environment and sustainability
38. is a good listener	80. tolerates and respects diversity
39. is creative and innovate	81. is reliable
40. is willing to experiment with new ideas	

Table 1. Survey question items.

3.2 Sample

Anonymous responses were collected from 443 respondents, out of which 237 were male and 206 female. 270 of them were 40 years or above, and 173 under. 273 had managerial experience and 170 not. Table 2 shows that the respondents of the present survey represented both the private sector (engineering, commerce, finance), and the public sector (education institutions, health care, city administration).

Field of operation	n
Engineering	99
Finance	74
Commerce	61
Education, research	65
Health care	7
Other: city administration	137

Table 2. Respondent fields.

3.3 Results

In the sample of 443 respondents, the top ten item averages emerged as shown in Table 3.

QUESTION ITEM	AVERAGE	CATEGORY
1. is balanced and at peace with him/herself	5,54	personality
2. gives positive feedback	5,44	socio-emotional
3. accepts critical feedback	5,41	socio-emotional
4. keeps others up-to-date and shares information	5,41	communication
5. communicates negative issues face-to-face	5,39	socio-emotional
6. admits his/her mistakes	5,32	socio-emotional
7. communicates clearly and unambiguously	5,32	communication
8. inspires and motivates others	5,30	socio-emotional
9. expresses opinions boldly	5,28	socio-emotional
10. is absolutely honest in every situation	5,25	values and ethics

Table 3. Top ten item averages in the sample.

These findings apply to all respondents groups, to both genders, to those with or without managerial experience, to younger and older participants. What is noteworthy about the top ten items is that none of them represent substantive knowledge or field-related expertise. Another interesting finding is the presence of only one personality dimension, one that manifests itself strongly in interaction with others. Balanced individuals are not impulsive or neurotic but instead can be flexible and patient. From the category of values and ethics emerged one question item, absolute honesty, which is an all-embracing, fundamental requirement that allows no compromise. The rest of the items in the top ten group involve socio-emotional skills. Many of them pose huge demands on the individual's intrapersonal skills, particularly self-awareness and self-control.

What was regarded as least important for managers in all the fields was "hugging or touching in emotional situations", which could be a cultural trait in the Finnish society. Similarly, competitiveness, an original or personal communication style, and reliance on others were not deemed important, nor were academic writing skills or small-talk. Subordinates apparently do not wish to serve leaders that are driven by a strong competition motive but rather appreciate social motives in them. On the other hand, they want their managers to be strong, without need to rely on others or to look for others' acceptance. Workplace interaction should be focused on work and the substance matter, as small-talk

is not valued. A common, ordinary communication style suffices that needs not to be academically sophisticated.

4. IMPLICATIONS FOR HIGHER ENGINEERING EDUCATION

The central question in the revision of higher engineering education is whether leadership skills can be taught. This discussion is colored by three different leadership approaches. The first treats leadership behavior as dependent on certain innate leader **traits**, such as extraversion. The second views leader conduct as associated with certain leader **competences**, e.g. social competence, and the third approaches managerial interaction through teachable and learnable leader **skills**. [52]

Myriad studies have demonstrated that the axiom *Leaders are born, not made* no longer holds true. We currently believe that *Leaders are made, not born*, placing expectations on higher engineering education that also supports the build-up of leadership skills. Leader skilling implies the development of qualities that modern research views as learnable and teachable. [53]

This research urges for the deployment of educational and training contexts as venues for learning self-regulatory mechanisms. Encouragingly, scores on the emotional intelligence quotient are found to increase as a result of the individual's psychological maturity, as a result of the experiences he is confronted with, or as a result of the training attended. [54] What is more, some [55] believe even personality-driven attributes can be learned.

This paper proposes that higher engineering education incorporate themes and topics supporting leader skilling and effective leadership behavior in engineering graduates' future tasks. The proposed themes include 1) **socio-emotional competences** such as self-regulation, self-motivation, empathy and social fluency needed especially in feedback reception and provision; 2) **personality-related qualities** such as tolerance for failure and optimism (or positive talk in interaction with others); and 3) **ethics and values** both on the personal and professional levels that could be promoted by awareness raising, self-analyses, personal values statements and authentic case studies.

Even though many of these topics touch on very personal phenomena and pose a more long-term and demanding challenge for educators, they should be ventured with: self-analysis and realism targeting at raising self-awareness support personal development, balance and satisfaction with life in general. The communication skills traditionally taught within the engineering syllabi and involving information dissemination following the process model, e.g. presentation and negotiation skills, are deemed less important for managers.

5. DISCUSSION

Maximum leadership effectiveness can be reached when the leader is concerned both for production and people, simultaneously meeting the human and task requirements. Leadership is largely emotional labour, directly correlating with organizational outcomes. Investments in the physical, mental and social aspects of work pay off and become visible on the bottom line, with the leaders mediating positive results if only they possess qualities that inspire their subordinates to go that extra mile.

All that it requires is for managers to demonstrate self-leadership, have a solid value base, be skilled in active listening, and spread positive energy and passion contagiously infecting the work community with joy of work and dedication. These day-to-day challenges open up inspiring new avenues for higher engineering education, ones that will impact not only the quality of life of the individuals but also entire corporate cultures and industrial ways of working.

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