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Achieving business excellence through self-assessment for personal and professional excellence

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The purpose of the paper is to provide a novel personal excellence reference model that simultaneously integrates an individual's personal and professional development in private life and work life as well as professional competence development in lean logistics. To support the methodical evaluation and continuous progress of personal excellence and lifelong learning of shop-floor workers in industry, major research efforts were undertaken which involved the transfer of the European Foundation for Quality Management approach for business excellence into a model and self-assessment methodology for personal excellence. To verify the developed reference model, a pilot application was implemented and reviewed at 12 organisations in Europe. The results find that continuous personal improvement of shop-floor workers leads to production optimisation and, thus, business excellence.

Keywords: business excellence; personal excellence; lifelong learning; self-assessment; lean logistics

1. Introduction

Today, manufacturing is radically challenged by complex economic, sociopolitical and technological dynamics worldwide. Industries have to persistently improve their competitiveness through new products, materials and technologies under high cost pressure and a constant focus on maintaining sustainability (Shee & Pathak, 2006). Increasing global competition forces organisations to continuously improve their processes and identify areas for improvement. This in turn has led to implementation trends of lean manufacturing methods, which have been adapted in the field of logistics in recent years (Meißner & Günthner, 2009).

The organisation's competitiveness level and the qualifications of its personnel are closely related, especially in manufacturing (Zülch, Rottinger, & Vollstedt, 2004). For the successful implementation of lean methods, the use of distinct capabilities of all possible employees will be a crucial advantage to all organisations (Jovane, Westkämper, & Williams, 2009). Designing efficient processes challenges employees at all levels of the industrial hierarchy to respond and react to problems and to contribute to the continuous improvement of processes, especially on the shop floor (Jovane, 2009). However, there is a progressively increasing lack of skilled workers (Borghans & Grip, 2000). In addition, skilled workers' mindset towards lifelong learning must be established (Europe, 2020, 2010). A skilled labour force has a much higher capability for understanding and implementing innovative processes, which is essential for achieving business excellence in manufacturing (Deloitte and US Business Council on Competitiveness, 2013). Additionally, personal and personnel development needs to be considered to attain business excellence

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(Walther & Toledo Munoz, 2012). Personal excellence of employees does not only foster professional competence development, for example, by improving or learning new skills, but also encourages self-development and self-management in their work life to empower themselves. Considering that the human factor will play a decisive role in the ongoing industrial era and an organisation's business excellence, it is necessary to have new approaches for enhancing personal excellence to sustain personnel for the production of the future.

2. Need for education and self-assessment towards professional and personal excellence

2.1 *Challenges*

Business excellence is considered to be a long-term process, related to key strategic issues such as developing core functional processes, to be the best, to get people performing better and to develop a quality framework in order to provide excellent customer service. Its end goal is to instil best practice within an organisation in order to support its values and strategic objectives, meet stakeholders' expectations, maintain and exceed its competitive position (Ritchie & Dale, 1999) and create a culture of excellence and continuous improvement (Black, 1996; Castka, Bamber, & Sharp, 2003). Antony and Bhattacharyya (2010) explicate that organisational excellence requires an 'outstanding measure of relationship of all performance variables influencing an organisation's functioning'. Along the same lines, personal excellence requires an outstanding measure of all performance variables influencing an individual's functioning (Marques, 2012). However, the individual's functioning is relevant in and affected by not only the business or work environment but also private conditions (Figure 1). Personal excellence looks at the individual's state of affairs and the improvement of life quality and personal well-being (Tang, Chang, & Chou, 2016), which necessarily include more than just the organisation's surroundings.

Organisations aiming to increase their employees' personal excellence face the challenge of designing organisational personnel development and supporting individual personal development in a coherent and balanced way (Throop & Castellucci, 2010; Wiese, 2004). Moreover, the tight integration of working, learning and individual improvement of employees as actively responsible parts of their respective team, department and organisational cultures (Abrams & Randsley de Moura, 2001; Haslam, 2001; Haslam, Postmes, & Ellemers, 2003) is a major future challenge that

	Business Excellence	Personal Excellence
Evaluation Object	organizations	individuals
Context	business	private and work life
Evaluation Subject	managers, external assessors	oneself, supervisor
Assessment Target	organizations' enablers and performance	personal, personnel and professional development
Data Basis	reports, analysis, surveys, KPIs	inquiry, feedback, self-reflection
Stakeholders	business environment	private and occupational sphere
Model	EFQM excellence model	**need for research**
Methodology	award modus, assessments, questionnaires	**need for development**

Figure 1. Self-assessment characteristics of business and personal excellence.

needs to be addressed. A better balance of commitment at work, family and personal interests is becoming increasingly important and should be encouraged by organisations, but organisations are failing to introduce sufficient measures to ensure that their employees have a sensible work–life balance (Bloom, Kretschmer, & Van Reenan, 2009). The dilemma of balancing business, professional and private objectives and how to measure them are especially present in countries where labour plays a key role in manufacturing plants (Kalman & Liu, 2010). Some organisations find a problem in how to approach the measurement, for example, through self-assessment (Hillman, 1994; Samuelsson & Nilsson, 2002), and to start the evaluation process (Ritchie & Dale, 1999). Organisations have access to numerous self-assessment models and methodologies to evaluate themselves or business units (Grigg & Mann, 2008; Van der Wiele et al., 1996), but lack in skills, methods and mindset for assessing their employees (Garvin, Edmondson, & Gino, 2008). Existing business evaluation concepts and systems cannot be used to assess personal excellence in the context of job-related competencies and personal soft skills at the same time. There exist only a few self-assessment instruments and questionnaires for specific aspects of personal excellence (Tang et al., 2016), such as human resource development (Beausaert, Segers, & Gijselaers, 2011; Dale, Godfrey, Wilkinson, & Marchington, 1998; Taylor & Edge, 1997) or self-leadership and growth behaviour measurement (Anderson & Prussia, 1997; Manz & Sims, 1991; Sanghi, 2007), but they are not based on valid, business-proven models or frameworks. Furthermore, they are not suitable for monitoring the lifelong learning path towards expert knowledge in a professional field, such as lean logistics, in coherence with personal excellence. The assessment also has to address professional development and personal management simultaneously, because 'continuous learning serves as a foundation to personal and professional excellence' (Marques, 2012).

2.2. *Objectives*

In the face of these challenges, the objective of the research presented in this paper is to develop a novel reference model whose central element is a self-assessment for personal and professional excellence in the logistics field. It aims to provide a solution to how a shop-floor worker's journey towards personal excellence in lean logistics in his or her business environment can be evaluated and continuously improved. Thus, this requires not only a model with a generic description, but also a clear and structured methodology with an operational self-assessment that supports its applicability in industry.

The article is structured as follows: following the introductory Section 1 and the declaration of the need for research in Section 2, an overview of the developed personal excellence reference model is presented in Section 3. The model contains three major components, whereby each component is described individually (Sections 3.1–3.3). Section 4 summarises the pilot application for validating the developed reference model. Finally, conclusions (Section 5) are drawn with a view towards potential future research.

3. Framework of the personal excellence reference model

Based on these objectives, a novel reference model for personal excellence in lean logistics (Figure 2) was developed that fosters personal and professional excellence through a systematic self-assessment in terms of an individual's

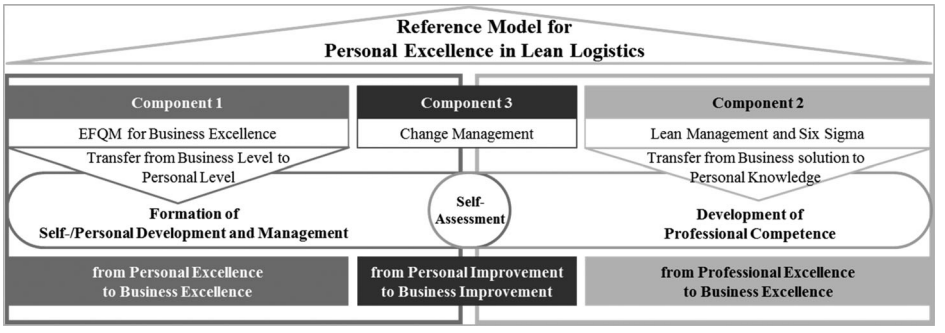

Figure 2. Reference model for personal excellence in lean logistics.

- personal and personnel management and development, as well as
- professional competence development in lean logistics.

Consequently, the reference model meets the need to integrate professional as well as personal development in one framework and considers the following components simultaneously:

- Component 1 considers the design of a model for personal excellence and a set of methodologies for the operationalisation of the individual's personal and personnel development, including aspects of his or her work–life balance. Personal development is realised by applying the model of the European Foundation for Quality Management (EFQM) for business excellence (2012) on the personal level. From an organisation's perspective in considering collective-acting individuals, a higher level of individual personal excellence enhances the positive synergy effects on the level of business excellence (Jacobs & Washington, 2003).
- Component 2 includes the design of a learning environment model for lean logistics and a methodology for knowledge transfer to enable the individual's professional competence development in the organisational framework of personal and business improvements. Seo, Lee, and Moon (2016) summarise that organisational learning expands the process of knowledge creation, transfer, distribution and accumulation from the individual level to the group level and thus has a positive effect on both individual and organisational performance. Business excellence is gained through the education and application of operational excellence methods, comprising relevant philosophies and strategies from lean production (Byrne, Lubowe, & Blitz, 2007) and six sigma (Gowen, 2002; Grima, Marco-Almagro, Santiago, & Tort-Martorell, 2014; Yang, 2004) with a focus on the production logistics environment and processes. Both approaches foster process innovation and innovation capability (Antony, Setijono, & Dahlgaard, 2016), which in turn support to improve business excellence results such as competitiveness, efficiency and profitability (Klefsjö, Bergquist, & Garvare, 2008; Ritchie & Dale, 1999).
- Component 3 links Component 1 (personal and personnel development) and Component 2 (professional competence development in lean logistics) through a self-assessment methodology. Self-assessment enables employees to evaluate themselves independently and identify their lacking areas that need improvement in both their work and private lives. The introduction to and application of self-assessment foster change management and a continuous improvement, and the changeability of organisations can be significantly driven by their employees' abilities and qualifications (Abele, Nyhuis, & Reinhart, 2008). Self-assessment is seen as providing a tool

that supports change management and total quality management (TQM) (Hellsten & Klefsjö, 2000; Kujala & Lillrank, 2004), facilitating changing and quality initiatives for business excellence. In turn, the self-assessment process is based on TQM and change management principles (Ritchie & Dale, 1999).

Thus, the reference model effectively integrates three approaches for personal excellence into a single framework, by enabling a transfer to and from business excellence.

The three components are independent but support each other to establish and sustain business excellence. Simultaneously through education and training, they foster the development of human resources and individual employability (Edgeman, 2000). Employability is a set of personal attributes and the ability to fulfil work through the optimal use of competences, enabling individuals to be more likely to succeed in their chosen occupations (De Vos, De Hauw, & Van der Heijden, 2011; Yorke & Knight, 2004).

3.1. *Component 1: Design of the personal excellence model*

A wide range of personal excellence interpretations exists in scientific discourse. The interpretation in this present research focuses on, but is not limited to, a combination of two essential aspects (Rothstein & Burke, 2010; Tomlinson, 2004):

(1) Self-management: dealing with methods, skills and strategies towards the achievement of personal and business objectives, as well as
(2) Self-development: dealing with developing a personality via activities, for example, improving self-knowledge, self-awareness or social abilities, and growing strengths and talents.

Thus, the term 'personal excellence in lean logistics' primarily indicates the participation and empowerment of shop-floor workers in developing more ability and requesting for more capacity to act on their logistics-related tasks in their extended work environment now and in future. Therefore, both aspects of (1) self-management and (2) self-development indicate and are supported by self-monitoring and self-evaluation through self-assessment.

According to Ritchie and Dale (1999), 'self-assessment implies the use of a model on which to base the evaluation and diagnostics'. Therefore, the EFQM model for business excellence (2012) was used as a fundamental basis, as its application has been empirically verified to have a positive effect on corporate performance (Eskildsen, Kristensen, & Juhl, 2006). In recent years, it has been successfully propagated as a diagnostic instrument (Doelemana, Have, & Ahaus, 2014) aiming at defining and implementing excellence in an organisation (Akyuz, 2015). The EFQM model distinguishes the two main groups of 'enablers' and 'results', which consist of corresponding sub-criteria. The model fosters continuous organisational as well as individual learning, creativity and innovation, which shows the dynamic nature of the model helping to improve the enablers that in turn leads to improved results. Emphasis is given to crucial relationships within the categories that have to be recognised for improving targeted result criteria through facilitating related enabler criteria (Heras-Saizarbitoria, Marimon, & Casadesus, 2012). Personal enablers can be used to create desired results and can take many forms, including mechanisms, behaviour, procedures, policies, practices, systems and structures. By a novel adaptation of the business excellence approach on the organisational level to a personal excellence approach on the individual level, a personal excellence model was developed (Figure 3).

The transformation of the EFQM model of business excellence into a personal excellence model (Figure 3) required substantial substitution of the organisational criteria and sub-criteria with those from an individual's perspective (Table 1). The definitions rely on the original EFQM criterion definitions (2012).

Besides the individual person himself or herself, stakeholders capture a key role in the context of personal excellence. Stakeholders are any identifiable groups or persons in both professional and private life who can affect the achievement of an individual's objectives or who is influenced by the action of an individual and its impact. Stakeholders of an individual can provide necessary means to the individual. Otherwise, they withdraw their support if their expectations are not met (Klefsjö et al., 2008). For example, stakeholders consist of the private community, such as family and friends; the close social and natural environment, such as the society or associations; and partners, such as educational organisations and business partners. Major stakeholders evolve from the individual's workplace, especially the management, colleagues, external business customers and internal customers that rely on the individual's tasks and work results (Jaeger, Bauer, Hummel, & Sihn, 2014).

3.2. *Component 2: Design of the lean logistics learning environment model*

Lean logistics is the 'logistics dimension of lean manufacturing' (Baudin, 2004) in production facilities. With the support of lean methods and tools, logistics structures and processes are analysed and optimised to provide the right quantities of goods most efficiently at the right place in the right order within the right time (Gudehus & Kotzab, 2012). To support the learning progress of the shop-floor worker and to build knowledge in a structured way, a learning path for excellence in lean logistics is divided into five training levels representing a performance improvement sequence for users (Figure 4). Each level contains standardised learning modules for lean logistics. To strengthen the educational objectives towards business excellence, selected tools from TQM and Six Sigma were integrated into the five training levels and their lean logistics learning modules.

The learning modules are integrated in a web-based learning management system (LMS) according to the defined training levels, and are linked with the self-assessment for excellence in lean logistics (Section 3.3) to provide a platform for continuous lifelong

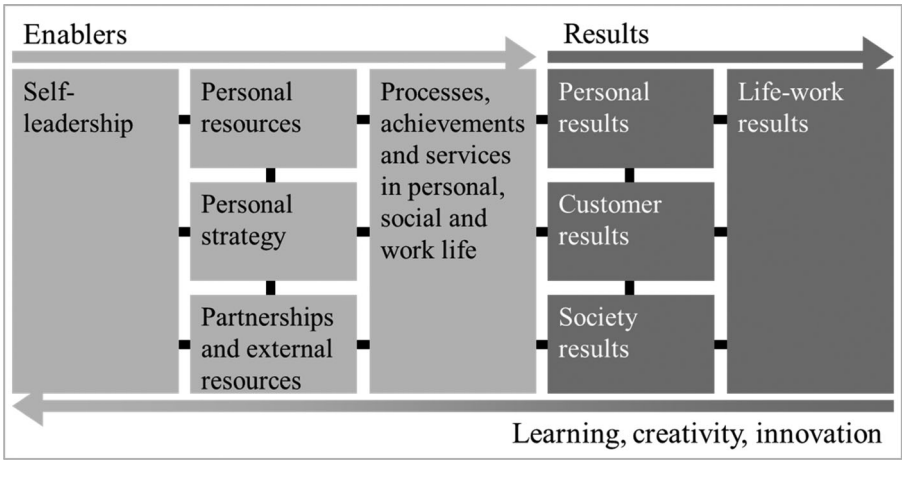

Figure 3. Personal excellence model based on EFQM (Jaeger et al., 2014).

Table 1. Personal excellence model criteria.

Criterion 1	Self-leadership
Definition	Excellent people shape their future and make it happen, inspiring trust at all times. They are flexible, enabling themselves to anticipate and react in a timely manner to ensure the ongoing achievement of their goals in life and work
Context	Self-leadership is defined as a process by which people lead and motivate themselves in order to behave on a desired route and perform their tasks. Self-leaders are more likely to behave innovatively in the workplace. Individuals who use self-leadership strategies enhance their personal effectiveness through focused behaviour, and natural and constructive thought strategies
Characteristics and examples	Self-influence; self-direction; self-motivation; self-awareness; self-observation; self-reward; self-punishment; self-cueing; self-talk; mental imagery, beliefs and assumptions
References	Carmeli, Meitar, and Weisberg (2006), DiLiello and Houghton (2006), Neck and Manz (2006) and Norris (2008)
Criterion 2	**Personal strategy**
Definition	Excellent people implement their own mission, vision and values by developing a stakeholder-focused strategy. Objectives and processes are developed and deployed to deliver the strategy
Context	Goals are important in the self-regulation process for decisions on the strategy, monitoring the performance and evaluating the achieved progress. Personal excellence requires setting goals not only for work life, but also in the whole-life context that affects the individual's lifestyle outside work. Goals help people focus on the task, select and apply appropriate strategies and monitor goal progress. Self-evaluation of progress strengthens self-efficacy and sustains motivation. Based on this foundation of self-assessment, the individual can effectively set personal goals that may lead to improved performance
Characteristics and examples	Self-goal setting; self-focus; congruence; self-observation of goal achievement; self-satisfaction of planned objectives and their fulfilment
References	Houghton and Neck (2002), Schunk (1990), Tang et al. (2016)
Criterion 3	**Personal resources**
Definition	Excellent people value their life, their family and their co-workers and strive for the mutually beneficial achievement of personal, family and organisational goals. They develop their physical, psychological and intellectual capabilities and promote fairness and equality. They care for, communicate, reward and recognise, build commitment and use their skills and knowledge for the benefit of themselves, their family and the organisation to which they belong
Context	Personal resources are functional in achieving goals, protect from threats and the associated physiological and psychological costs and stimulate personal growth and development. Resources support personal capabilities to produce a desired effect by individual action. Access to internal and external resources can be increased through self-leadership and related intuitive and strategic performance towards self-development
Characteristics and examples	Personal characteristics; self-esteem; self-regulation through internal standards; self-control; autonomy; work-related skills; personal capabilities; social resources; mental conditions; involvement; responsibility
References	Topper (2009), Xanthopoulou, Bakker, Demerouti, and Schaufeli (2009)

(*Continued*)

Table 1. Continued.

Criterion 1	Self-leadership
Criterion 4	**Partnerships and external resources**
Definition	Excellent people plan and manage partnerships, suppliers and other external resources in order to support their strategy, policies and the effective operation of processes. They ensure that they effectively manage their environmental and societal impact
Context	External resources, such as organisational and social resources, can be important determinants of how individuals adapt to their work environments and social life. The job-related resources are assumed to be highly relevant for the achievement of work-related goals. They have positive or negative effects on an individual's physical and emotional well-being and are particularly important for job-related demands
Characteristics and examples	Professional relationships with externals; team spirit; personal relationships; financial resources; personal living conditions; occupational settings; natural resources; technology; equipment
References	Bauer (2009) and Rappaport and Seidman (2000)
Criterion 5	**Processes, achievements and services in personal, social and working life**
Definition	Excellent people design, manage and improve processes, achievements and services to generate increasing value for themselves and their stakeholders
Context	The design and management of personal processes aim to optimise the individual's value as well as the value for the individual's stakeholders of his or her personal, social and work environment. Thus, business and private processes are evaluated separately in accordance with related stakeholders. High levels of task-specific and efficient process implementation lead to higher performance and greater quality of achievements and services
Characteristics and examples	Own achievements and services; personal relationships; process design and management; stakeholder value
References	Bandura (1991)
Criterion 6	**Customer results**
Definition	Excellent people achieve and sustain outstanding results that meet or exceed the needs and expectations of their customers
Characteristics and examples	Team motivation; team spirit; cooperation; parenting; financial support for family, relatives and friends; group activities; conflict resolution skills; motivation; responsibility; leadership; effective communication; customer loyalty; personal productivity
References	Throop and Castellucci (2010)
Criterion 7	**Personal results**
Definition	Excellent people achieve and sustain outstanding results that meet or exceed their own needs and expectations
Characteristics and examples	Decision-making ability; self-realisation; self-appreciation; career development; time management; health and vitality; sporting success; position and role; identification with individual tasks; wage satisfaction; independence; international experience; ability to work; personal responsibility; strengthening of talents
References	Marques (2012) and Tang et al. (2016)
Criterion 8	**Society results**
Definition	Excellent people achieve and sustain outstanding results that meet or exceed the needs and expectations of relevant stakeholders within society
	Helpfulness; empathy; image, prestige and reputation; reliability;

(*Continued*)

Table 1. Continued.

Criterion 1	Self-leadership
Characteristics and examples	commitment; perception of one's ethics and values, social networking; workplace impact; safety performance
References	Throop and Castellucci (2005)
Criterion 9	**Life–work results**
Definition	Excellent people achieve and sustain outstanding results that meet or exceed their own needs and expectations as well as those of their stakeholders
Characteristics and examples	Life quality; zest for life; financial stability and security; acceptance of own goals by stakeholders; working and living conditions; mind and mood; sense of self; well-being
References	Burkitt (2001) and Schieferdecker and Lembke (2007)

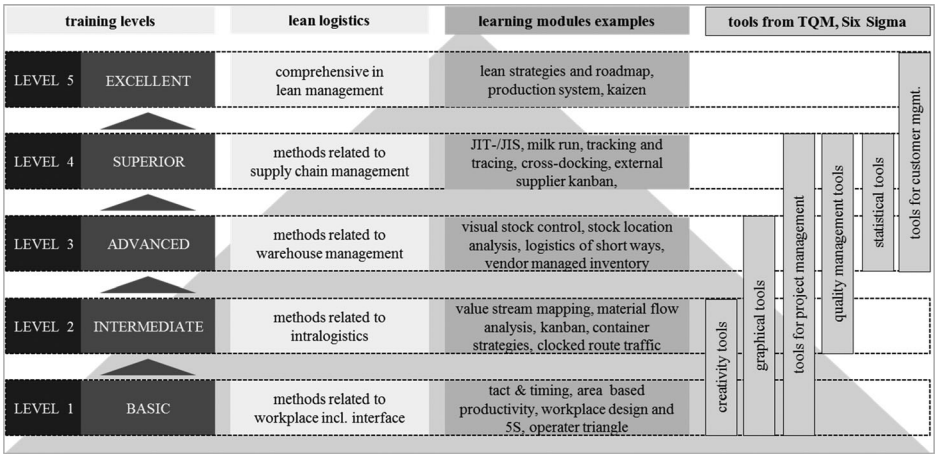

Figure 4. Lean logistics model criteria.

learning. Further, selected learning modules are trained in learning factories (Jaeger, Mayrhofer, Kuhlang, Matyas, & Sihn, 2013). Through hands-on training, shop-floor workers increase their competence of practical method application. Thus, a blended learning environment for lifelong learning in lean logistics operationalises Component 2 of the reference model.

3.3. *Component 3: Methodology for continuous self-assessment*

This component links Component 1 for personal and personnel excellence (PEX) and Component 2 for professional excellence in lean logistics (LOPEX) through a self-assessment methodology. The operationalisation of the PEX and LOPEX self-assessment tools was affected by their design being based on a maturity model. Maturity grades explain that process improvement comes in a series of steps rather than simultaneously (Neuhauser, 2004), and they highlight the improvement activities needed to reach the next grade. Through the maturity grades rating, both PEX and LOPEX self-assessment tools provide a realistic evaluation of how an individual's personal and competence development can be implemented practically.

3.3.1. *Tool for assessing PEX*

A major part of the research focused on the transfer of the personal excellence model (Figure 3) to an operationalised assessment that is easily applied by users without detailed knowledge and experience of EFQM. For each enabler and result criterion (Table 2), a set of questions in the form of statements have been developed and proofed by an interdisciplinary panel of experts from the engineering, economic and social sciences domains as well as by human resources specialists. In order to ensure that all 76 questions are understood and interpreted in a targeted way, each statement is supported by a written context explaining details which includes practical examples.

Each of the questions of the PEX self-assessment has to be evaluated by the respondent on two predefined maturity scales from 0% to 100%, with five personal maturity grades (PMaG). Maturity scale 1 is used for the evaluation of the present situation: PMaG 0 (0%) – I am not active in this field/I have no information or very anecdotal; PMaG 1 (20%) – I have a plan to do this; PMaG 2 (40%) – I am implementing/doing this; PMaG 3 (60%) – I check/review if I do the right things in the right way; PMaG 4 (80%) – On the basis of checking/reviews I adjust if necessary; PMaG 5 (100%) – Everything I do, I plan, implement, check and adjust regularly and I learn from others. I am in a continuous improvement cycle on this issue. If a rating of PMaG 3 (60%) or higher has been provided, the respondent has to note evidence for his or her rating.

Maturity scale 2 relates to the evaluation of the urgency for improvement: PMaG 0 (0%) – no action needed; PMaG 1 (25%) – low need for action; PMaG 2 (50%) – need for action; PMaG 3 (75%) – high need for action; PMaG 4 (100%) – very high need for action.

If a rating of PMaG 2 (50%) or higher has been provided, the respondent has to declare his or her first ideas of potential improvement. This request serves the main value of the assessment because the user has already thought about first optimisation ideas.

The user can recall the evaluation results of each criterion and related potential improvements in the final report. A final spider's diagram visualises the average assessment score and the average urgency for improvement of each criterion.

The PEX self-assessment software tool is anchored on the 'Group Opinion Analyzer' online assessment tool that was developed by a European research project known as 'SAETO' (Self-Assessment for Educational and Training Organisations) (Dalluege, 2012; Dalluege & Franz, 2011). It is consistent with and recognised by EFQM.

3.3.2. *Tool for assessing LOPEX*

Further, established logistics knowledge and skills have to be assessed. The research of maturity models led to the development of a self-assessment for LOPEX with six logistics maturity grades (LoMaG). The grades of the maturity scale are based on the PDCA-Circle by William Edwards Deming (Kiran, 2017): LoMaG 0 – Not relevant/aware; LoMaG 1 – Aware; LoMaG 2 – Identified; LoMaG 3 – Managed; LoMaG 4 – Measured; LoMaG 5 – Optimised.

LoMaG 1 and 2 indicate that the user theoretically knows the learning content and that he or she can decide if the individual method or tool is relevant for his or her workplace or production environment. LoMaG 3–5 measure the ability to apply and continuously optimise relevant methods by quantifying gained results in comparison to the previous ad hoc procedure. The tool asks the user to evaluate the extent to which each learning module is understood and implemented in one's own working environment. The user has to classify

Table 2. Excerpts of PEX self-assessment questions.

Question/statement	Context
Criterion 1: Self-leadership	
I have identified all relevant stakeholders.	You know the people that have an interest in your development and performance and potentially have an influence on your working life.
I know my own limitations and reduce them.	You know what you are good and not so good at and you try to find a balance. Continuous improvement of your weaknesses is daily routine for you.
Criterion 2: Personal strategy	
My strategy is based on the needs and expectations of my stakeholders and the external environment.	You have a clear and structured view about what you are going to do in order to meet your own expectations as well as those of your stakeholders in the personal and professional areas.
I improve and develop my strategy and supporting activities based on review observations.	You draw information by regularly checking leads to adapt and improve your plans. Sometimes it may be helpful to reduce goals or stretch achievements. There may also be times when you come across unexpected opportunities and quick decisions are necessary, leading to more significant changes. In doing so, you keep an eye on the progress of achieving your original objectives and goals.
Criterion 3: Personal resources	
I take advantage of the opportunities that arise in my personal and professional environment for developing my knowledge and capabilities.	You take advantage of the opportunities that arise in your job, for example, training and career development. You have a plan for further training and establishing personal goals during a defined time span. You have a plan of where or in which position you want to be in five years' time.
I communicate effectively with all those who are relevant for achieving my personal and professional goals.	You don't establish your plans without discussing them with your family and/or best friends. You inform and, where necessary, discuss your plans with all those who are relevant for achieving your professional goals.
Criterion 4: Partnerships and external resources	
I manage the relationships with partners in a mutually sustainable way.	You have a clear view, for example from your stakeholder analysis, who your partners are and what they can do for you just as well as what you can do for them to maintain a balanced relationship.
I manage information and knowledge in a way that supports the development of my team capability.	Your team wants you to be a reliable performer. It also wants to be kept up to date about how you think you manage, feel, succeed or fail. You know how to earn their respect and support. Your decisions are taken seriously and your knowledge is essential for your team's success.
Criterion 5: Processes, achievements and services in personal, social and working life	
I manage my processes with the aim of optimising stakeholder value in and outside the organisation.	If repeating procedures need adaptations or even changes, you discuss them with those who are affected by them. They might have good ideas of how to improve the state of affairs. You

(*Continued*)

Table 2. Continued.

Question/statement	Context
	make sure that your stakeholders receive full value.
I promote and market my achievements and services effectively to the organisation.	You act responsibly and make sure that those who are relevant for your advancement know about your achievements. Understatement does not always work in organisations. On the other hand, you avoid boasting.
Criterion 6: Customer results	
I monitor my personal targets for customer loyalty and engagement.	People you have worked for or with, come back to you for your opinion, advice or support, in the professional as well as personal environments.
I monitor my personal targets for complaints handling.	You are known for dealing fairly with criticism, in public as well as in private.
Criterion 7: Personal results	
I monitor my personal targets for health, living and working conditions.	You check how you reach your personal objectives for your physical and psychological health and fitness, in the personal and social context as well as in your job context concerning your own and your colleagues' health and safety.
I monitor my personal targets for training and career development activities.	You check how you reach your personal objectives for the development of your learning, training and advancement in your job or in your personal context. For example, you have achieved your target grades of a study programme or the target pay grade in your job since your last self-assessment.
Criterion 8: Society results	
I monitor my personal targets for image and reputation.	Your image and reputation is in line with your objectives. There is no distinction between your public and private image. For example, you have been proposed for some function in your team or department; your name or your team's name has been mentioned in your organisation's internal news board; your name has been mentioned in the local or company press for your social activities.
I monitor my personal targets for environmental impact.	You have established measures for your environmental, economic and societal activities and achieved them. You are well known for a clear commitment to the sustainable use and management of resources such as water, air, electricity and chemicals in your professional as well as in your personal environments.
Criterion 9: Life–work results	
I observe trends and clearly understand the impact on my personal goals and related outcomes.	You know whether something has happened or developed that influences your own activities. Observing changes may lead to ideas or opportunities that you could use for yourself.
I understand how my key personal results compare to similar individuals and I use this data for target setting.	You benchmark your personal objectives with others who do/did similar things to identify your relative performance. The purpose of such comparisons is not necessarily to become as good as the other person, but to learn from and be inspired by them.

his or her knowledge and application ability within the six LoMaG. For each of the 150 learning modules, 6 maturity grades were individually defined (Table 3).

After choosing one LoMaG, the assessment tool requires an argument, reference or source of data on which their evaluation is based to validate the given answer. This encourages users of the tool to be as objective as possible and to determine their ratings based on facts rather than feelings.

Furthermore, to increase awareness of the link between self-assessment and continuous improvement, users are asked to record his or her future actions to increase the maturity grade within the learning content in each question.

The LOPEX self-assessment tool is technically integrated in the web-based LMS (Section 3.2) to enable a user-friendly and efficient learning and evaluation process.

4. Pilot application and validation

During a 6-month period, the reference model for personal excellence in lean logistics was tested at 12 production facilities in 4 countries (Germany (D), Austria (AUT), Croatia (CRO) and Latvia (LV)), to validate its industrial applicability and impact. Organisations of different sizes (ranging from 60 to 1150 employees) from various producing branches, especially machinery, metalwork, electronics and plastics technology, were selected for this pilot application. All organisations specialise in the multivariant serial manufacturing and assembly of parts, components and products in batch sizes from 1 to 10,000 and operate with high expenses in internal and external logistics.

Each participating organisation defined a project team consisting of three invited learners and selected one to two trainers who supported the learners within the piloting organisation. In total, 36 learners and 20 trainers from 12 organisations participated in the pilot application. 'Trainers' were responsible persons from human resource management or from production or logistics management with high leadership skills, who acted as mentors and supervisors. 'Learners' were volunteer skilled shop-floor workers with the know-how of major production and logistics processes and structures of their enclosed working environment. The project and its educational activities supported individuals who acquired technical skills through professional training or apprenticeship and who had the need to gain leadership skills and methods competence to promote improvements and changes within their workgroup. This implied that the person was already a team leader or at least had the potential to become a team leader, who worked well with others in a group setting and makes productive contributions through talent, knowledge and good work habits.

During the pilot application, logistics improvement activities were continuously observed and evaluated directly at the organisations' production sites. Specific potentials for improvement were recognised and realised by the shop-floor workers themselves, without permanent instructions from the management level. Learners selected learning modules by themselves in agreement with their trainers (phase 1). Together, a pilot area was defined (phase 2) and the learners independently implemented their learning modules (phase 3). The learners themselves set up the self-assessments and deduction of measures. This bottom-up direction led to a significantly higher acceptance of the emerging ideas and optimisation projects in contrast to the traditional top-down management approaches in organisations.

4.1. *Review of trainers' and learners' appreciations*

A questionnaire was used to measure the shop-floor workers' level of lean logistics knowledge and his or her ability of method application. Through the execution and comparison

Table 3. Excerpt of LOPEX self-assessment questions for lean logistics learning modules.

LoMaG		Example from Level 1: Workplace design	Validation per grade
0	Not aware	I have not yet considered this principle.	–
1	Aware	I know why I need to keep my workplace clean, controlled, ergonomic and safe.	Explain three reasons!
2	Identified	I realise that by redesigning my workplace I can work on a higher efficiency level.	What are potential improvements?
3	Managed	I restructured and organised my work bearing in mind new aspects.	Which aspects did you consider?
4	Measured	I can argue on the advantages of my improved workplace in comparison to its previous state.	Specify the advantages!
5	Optimised	I seek perfection at my workplace using additional methods.	Which methods or tools do you apply?
LoMaG		**Example from Level 2: Kanban**	**Validation per grade**
0	Not aware	I do not know this methodology yet.	–
1	Aware	I recognise that it is not always the best manufacturing practice to produce items on un-dimensioned stock.	Why? What are potential risks?
2	Identified	I can evaluate under which circumstances it makes sense to change from push to pull production.	What are the advantages of pull production?
3	Managed	I have already implemented Kanban as the production scheduling method, or have at least already optimised an existing Kanban cycle by redefining critical parameters.	Which parameters did you inspect?
4	Measured	With the realised or optimised Kanban solution I have achieved several improvements.	Which improvements? Quantify them!
5	Optimised	I am able to evaluate how a Kanban system performs and I can set optimisation activities.	Describe your systematic procedure!
LoMaG		**Example from Level 3: C-part management**	**Validation per grade**
0	Not aware	I do not know what are c-parts.	–
1	Aware	I know what c-parts are and how to recognise them within my workplace.	Give 5 examples!
2	Identified	I can identify c-parts and their resulting logistic costs.	What cost types are relevant?
3	Managed	I have designed a concept for c-part management and realised it.	Did you consider variant management or third party delivery?
4	Measured	I can count the reduced costs through my measures.	How much cost did you cut?
5	Optimised	I am working on further improvement activities to optimise c-part management.	What are your ideas?

of the same questionnaire before and after the pilot application, the identification of the shop-floor workers' increase in lean logistics expertise was possible. The ex-ante questionnaire was answered after the pre-project phase 0 and the ex-post questionnaire after phase 5 (Figure 5). The questionnaire was structured in two superior dimensions: from the trainers' perspectives and from the learners' impressions. This differentiation aimed to

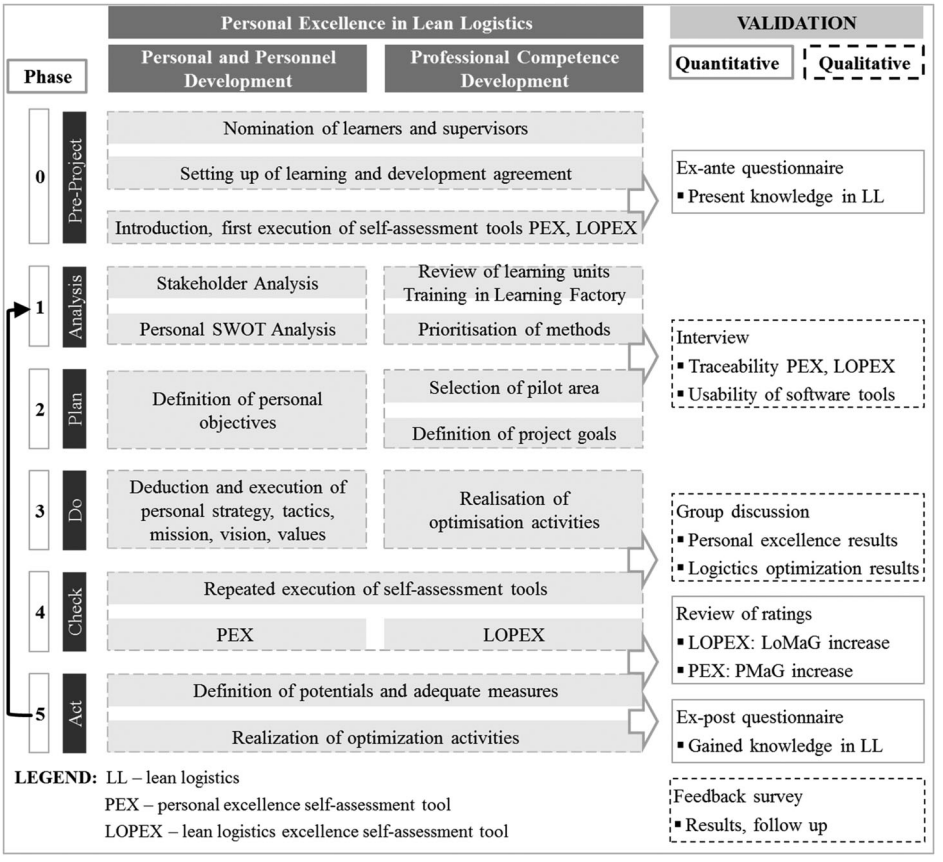

Figure 5. Pilot procedure for the application of the reference model.

guarantee the visualisation of both groups of participants and to enable comparability of the collected data. Thus, participants subjectively revealed the learners' level of knowledge and ability to apply lean logistics methods before and after they received training and realised optimisation projects (Figure 6). The results showed that the group of trainers classified the lean logistics expertise of the learners almost similarly to but a little lower than the learners' own classifications. More precisely, in total, 27% of learners in

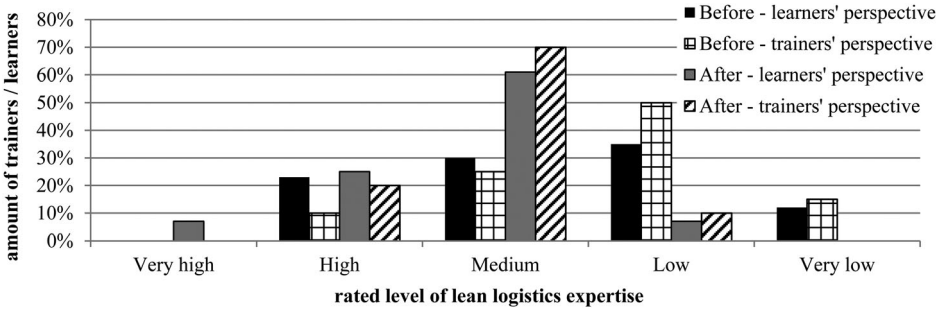

Figure 6. Level of lean logistics expertise before and after the pilot application.

comparison to 20% of trainers rated the learners' expertise very high or high after the training. The positive result was that the learners increased their level of lean logistics expertise, with most of them up to a medium or high level of knowledge; only a few remained at a low level. In all, 10% of trainers and 7% of learners had the perception that the learners still had low expertise afterwards. Comparing the ratings of learners and trainers, both came to an identical judgement, indicating positive self-reflection on the part of the learners and the trainers' positive impression about the learners' growth in lean logistics expertise. This subjective evaluation was complemented by an objective analysis through the measurement of increased LOPEX maturity grades of learners (Section 4.2).

4.2. *Measurement of increase in LOPEX and PEX maturity grades*

Important milestones achieved during the pilot application include the application of both PEX and LOPEX self-assessments by the learners themselves, who individually repeated the self-assessments in phases 0 and 4 (Figure 5) by rating their maturity grade. Each maturity grade is a plateau in which one or more actions have been transformed from a lower level to achieve a new level of capability. Each maturity grade provides a new foundation of practices on which subsequent grades are built.

A review of the shop-floor workers' answers from the online LOPEX self-assessment showed that after its repeated execution in phase 4, learners were able to improve their ability to apply lean logistics methods on average up to two LoMaG of their individually selected learning modules (examples of questions are shown in Table 3). For example, learners who evaluated their learning modules before the pilot application with LoMaG 0 or 1 rated the same learning modules with LoMaG 2 or 3 afterwards because they had at least begun to implement the learning module's method or tool in the defined pilot area.

The online reports of the PEX self-assessment executions from phase 0 and phase 4 (Figure 5) were analysed to identify personal excellence growth. Learners from the best participating organisation improved on average by 2 PMaG in 14 of the 76 questions on maturity scale 1 which is used for evaluating the present situation (examples of questions are shown in Table 2). While performing the PEX self-assessment, the learners also identified further personal requirements and needs for improvement on maturity scale 2 and deduced concrete measures to improve their self-management in both their private and working life.

4.3. *Feedback survey from participating organisations*

Finally, upon completion of the pilot application, participating organisations completed a six-page feedback form. Trainers summarised that the PEX self-assessment tool allows easy application of the generic and complex EFQM business model on a personal level. By using a maturity model, the LOPEX self-assessment tool compels the evaluation of the practical application of lean logistics methods and not just theoretical knowledge. Thus, the learners' personal and professional development can be simultaneously quantified through increased maturity levels. The combination of PEX and LOPEX represents an adequate methodology to instil leadership skills in lean logistics experts.

Learners experienced their managements' contribution to their individual work–life balance by providing personnel development and advanced training activities within the lean logistics reference model application. The end result is that individuals' personal

and professional development leads to improved behaviour and performance of logistics processes and structures in their work environment.

After the 6-month pilot phase, all 12 organisations reached the goal defined at the start of the project: to initiate and implement noticeable improvements in logistics with the help of employee development and empowerment. The result was the efficient design and realisation of workflows and processes in predefined pilot areas. This had a positive impact on productivity and cost reduction, and helped increase the service level of logistics.

To evaluate the long-term applicability of the reference model for personal excellence in lean logistics, participating organisations were contacted one year after the pilot application. Feedback indicated that 4 of the 12 organisations have already extended the use of the reference model to a wider group of shop-floor workers. One organisation has started to integrate identified fields of action and derived measures into their employees' annual appraisal interview and objective agreement and review.

5. Conclusion

Business excellence research encompasses an impressive body of knowledge, both theoretically and empirically, as evidenced by a large number of journal articles. In contrast, the personal excellence approach has considerable popularity only in practitioner-oriented guidebooks. In the field of organisational personnel development including self-assessment however, there has been very little academic discussion and investigation on personal excellence research; there exist only in-depth conceptual research and few empirical studies. In practice, organisations have to be convinced that 'excellence is required on all levels, which means that organisational excellence should promote personal and societal excellence' (Garvare & Isaksson, 2001). Personal excellence could be seen as an ongoing paradigm renewal. It is not a one-time achievement, but a continuous effort in which multiple aspects need to be addressed at the same time (Marques, 2012). The full spectrum of personal excellence has not been fully explored to date. Thus, future research should reflect on personal excellence in an organisational setting from multidisciplinary academic views, *inter alia* engineering sciences, human and social sciences as well as economic sciences. Further, the usefulness and applicability of personal excellence self-assessment should be examined across a variety of industry branches and settings.

The developed personal excellence reference model provides an approach on how to link personal and personnel development with professional competence development through self-assessment. Therefore, it refers to well-established excellence philosophies from the business context, especially TQM and business excellence, lean management and Six Sigma, as well as change management. Especially the use of the EFQM model on the individual's personal level opens a totally new way of excellence movement. Within the pilot application, a representative number of organisations with adequate contingencies have actually tested the given reference model over a period of six months. Further investigations should address its long-lasting application to evaluate its impact on lifelong learning in order to improve its methodology. A significantly increased number of applying organisations and individuals would then allow a statistical examination of the functionality and effectiveness of the developed personal excellence approach to reveal a further need for their adaption.

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