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Leadership Productivity Model – Evaluation of Operationalisation

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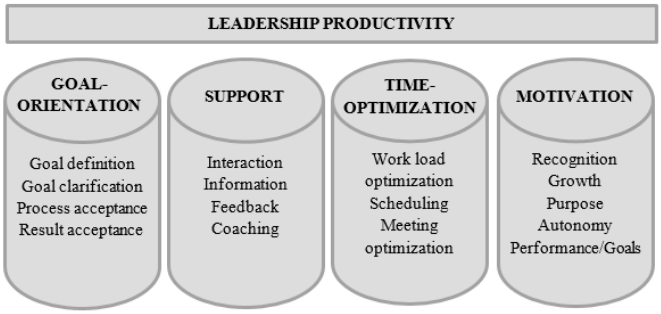
Summary

Research questions:	To what extent does the operationalisation of the Leadership Productivity Model fulfill the approved scientific quality criteria?
Methods:	After identifying suitable quality criteria, they were evaluated based on 1,267 questionnaires following the Leadership Productivity Survey (LPS). Dimensions as well as their criteria evaluated by applying e.g. Cronbach's Alpha, item difficulty index, correlation and factor analysis.
Results:	Apart from very few limitations objectivity is good. Reliability for the entire LPS is excellent; the reliability coefficients for each dimension are good. Criterion validity is confirmed, construct validity cannot be confirmed by Pearson's correlation coefficients, but partly by factor analysis. Summing up the LPS is an objective, completely reliable and partially valid instrument.
Structure of the article:	Introduction; Literature Review; Research questions & methods; Empirical results; Conclusions; About the author; Bibliography

Introduction

Secure and target measures require solid and reliable information. That also refers to leadership and leadership quality. Desjardins (2012) and Desjardins & Baker (2013) developed the Leadership Productivity Model (LPM, Figure 1).

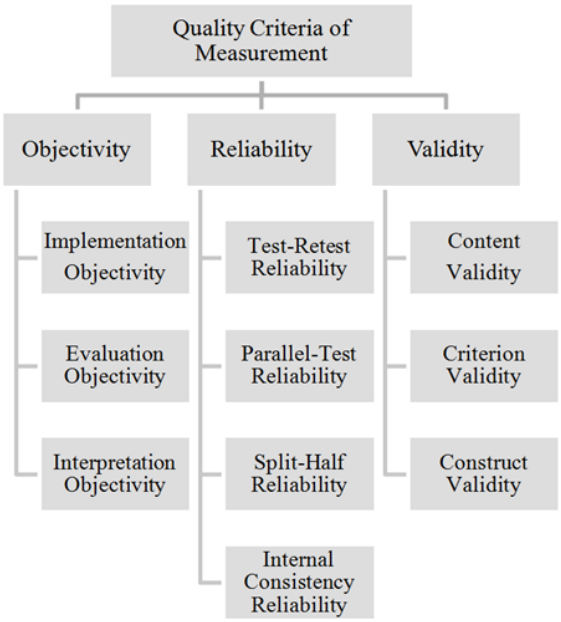
Figure 1: *Leadership Productivity Model (LPM)*



To make qualified management decisions it is not only necessary to have a correct and validated model, it is also necessary to measure the elements of a model cor-

rectly. Desjardins (2014, 2014a) also developed a corresponding Leadership Productivity Survey (LPS) to measure leadership productivity. The most important quality criteria to evaluate measurement are objectivity, reliability and validity (Lienert and Raatz, 1998, p. 7.). These main quality criteria are further subdivided as shown in figure 1 (Lienert & Raatz, 1998, p. 7).

Figure 2: *Quality Criteria of Measurement*



The objective of the paper is to evaluate the quality criteria for the LPS questionnaire of the LPM.

Literature Review

LPM and LPS

The LPM has the aim to define leaderships tasks, which directly create productive leadership performance. The LPM describes the construct "Leadership Productivity", which is defined as the "Total Productivity of all Subordinates" of a leader (Desjardins, 2012, p. 21). According to Desjardins (2012) the "Productivity of a Leader" consists of his/her "Individual Productivity" plus the "Total Productivity of all his/her Subordinates". Therefore, increasing the productivity of employees by performing crucial leadership tasks lead to a better productivity of a leader. The LPM describes basic leadership tasks a leader needs to focus on to increase the productivity of his/her employees. The fundamental responsibility of a leader is creating working conditions and eliminating obstacles in order that followers can develop their full productivity. In total 16 leadership tasks to increase leadership productivity are defined, which are categorized in four dimensions called *Goal Orientation, Support, Time Optimization and Motivation* and as shown in Figure 1 (Desjardins, 2012; Desjardins & Baker, 2013).

In order to fulfill the dimension *Goal-Orientation* a leader should continuously define clear goals, explain to his/her subordinates when objectives change and accept their individual work process and work results. The dimension *Support* includes that a leader should interact regularly with his/her subordinates; preferably face-to-face. A leader should give all necessary information, provide positive and constructive feedback regarding the subordinates' work and coach them to develop their skills. The third dimension, *Time Optimization* requires that a leader organizes new tasks and meetings; thereby taking into account the availability and work load of subordinates. Moreover, a leader should effectively plan and conduct meetings to reach a high time optimization (Desjardins, 2012). By developing LPM Desjardins & Baker (2013) defined *Motivation* as fourth dimension of leadership productivity and its leadership subtasks recognition, growth, purpose, autonomy and goal achievement (performance). Therefore, a leader should recognize the work performance of his/her subordinates, support their personal and professional development, demonstrate the meaning of their work for the company and give challenging goals as well as autonomy to increase their work performance (Desjardins & Baker, 2013).

The LPM is part of a more complex theory, called the Leadership Task Model (Desjardins & Baker 2013). The Leadership Task Model consists of three levels, Me-Level, Us-Level und You-Level, which define leadership behaviors a good leader should possess and fulfill. The Me-Level includes the self-awareness and self-knowledge of a leader and is the foundation of behaviors regarding Moral Values, Inclusive Decisions, Self-Transparency and Relationship Transparency. The Us-Level describes the responsibilities of a leader in the organization and includes tasks regarding Strategy Definition, Culture Creation, Change Management as well as Interface and Conflict Management. The You-Level focuses on the interaction of a leader with subordinates in order to increase their productivity to achieve organizational goals. The You-Level represents the LPM (Desjardins & Baker, 2013).

Purpose of the LPS is to evaluate the four dimensions of the You-Level and its leaderships subtasks in order to

define strengths and weaknesses of leadership productivity. The survey is a standardized feedback sheet, which includes 19 statements regarding the superior's behavior. The 19 statements are linked with the specific leadership subtasks and the superordinate dimensions. The LPS uses a five-point Likert-like-Scale and each statement can be evaluated by following five answers: 1 = never, 2 = seldom, 3 = sometimes, 4 = often, 5 = always (Desjardins, 2014a, Likert, 1932).

Figure 3:
Leadership Productivity Survey

Dimension	Leadership subtask	Item / Statement
Goal Orientation	Goal Definition	**1.** My superior provides clear work goals from which I can perform my tasks.
	Goal Definition	**2.** The timeframes for the achievement of my tasks are clearly defined and obligatory.
	Goal Clarification	**3.** Changes in the requested tasks by my superior are made with my involvement.
	Process acceptance	**4.** I have the possibility of performing my work tasks in a self-responsible way.
	Result acceptance	**5**. My superior accepts the work results that I have achieved.
Support	Interaction	**6.** My superior reacts within a reasonable timeframe on my requests.
	Information	**7**. My superior provides in a timely manner all the information required for me to achieve my work goals.
	Feedback	**8.** I am given timely, constructive feedback about mistakes in my work.
	Feedback	**9.** I receive timely, positive feedback about successful work results.
	Coaching	**10.** My superior recognizes my personal need for work task support and supports me by active coaching to develop my competency.
Time Optimization	Scheduling	**11.** My superior plans task deadlines considering my availability and the demands of my other tasks.
	Work load optimization	**12.** My superior schedules meetings based on my availability and considers the impact on my work time.
	Meeting optimization	**13.** Meetings are planned effectively and conducted efficiently by my superior.
Motivation	Acknowledgement	**14.** My superior acknowledges my job performance.
	Growth	**15.** My superior supports the growth of my personality and of my professional skills.
	Growth	**16.** My superior assists my professional career development.
	Purpose/Sense	**17.** My superior enables me to understand the value of my work for the company, its customers, and the society.
	Autonomy	**18.** My superior empowers me with the autonomy in planning and performing my work tasks self-responsibly.
	Performance/Goals	**19.** My superior delegates work goals for me, which challenge and develop my competencies.

Quality Criteria of measurement / operationalisation

Objective, reliable and valid are the three main quality criteria a measurement has to fulfil (Lienert & Raatz 1998, p. 7, DeVellis, 2017).

Objectivity

Lienert et. al (1998, p.7) understands the objectivity of a test as "the degree to which the results of a test are independent of the examiner". The objectivity of a measurement is assumed to be given if the measurement result depends only on the characteristic to be measured and not on examiners or situation variables. A distinction is made between three types of objectivity of an instrument – the implementation objectivity, the evaluation objectivity and the interpretation objectivity (Lienert et. al., 1998, p. 7-8).

Implementation Objectivity

The goal of the implementation objectivity is to obtain test results that are independent of the person performing the test. In order to ensure high implementation objectivity, tests should be carried out under maximised standardized conditions and interactions with the examiner should be reduced to a minimum. These conditions are usually given in self-filling tests (Lienert et. al., 1998, p. 8). Implementation objectivity can be empirical verified by performing a test with an identical sample of test subjects by at least two independent investigators and by correlating both test results (Lienert et. al, 1998, p. 8-9).

Evaluation Objectivity

The evaluation objectivity states that the result of an investigation has to be independent of the evaluating person and that every evaluator has to come to the same results (Schumann, 2006, p. 29). Lienert et. al. (1998) confirm perfect evaluation objectivity for surveys where respondents have to make a clear cross in answer options, which leads to a clearly defined numerical value. The evaluation objectivity is lower, when evaluators have to convert responses to an answer into numerical values. In order to ensure the highest possible evaluation objectivity, even for closed questions it is important to have clear specifications for data input and transformation. The evaluation objectivity can be determined quantitatively by giving interviews or questionnaires to at least two different evaluators who independently carry out the coding for the individual cases. The correlation of the numerical results of the two evaluators is interpreted as a measure of the evaluation objectivity. The correlation should be very high and actually achieve 1.0 to have a satisfactory test evaluation (Lienert et. al, 1998, p. 9, Rammstedt 2004, p. 3).

Interpretation Objectivity

Interpretation objectivity refers to the extent to which the conclusions drawn from the numerical test results are comparable across different diagnosticians. Accordingly, there is a high degree of interpretation objectivity if the findings obtained in an investigation are interpreted in the same way by different researchers. Interpretation is objective if a numerical value provides a clear statement about the measured characteristic. Lienert et. al. (1998, p. 8) states that the interpretation of a scale can be very unobjectively if the test documentation does not provide a clear scale interpretation and a precise description of the measured construct. Interpretation objectivity can be verified by comparing the conclusions drawn independently by at least two researches from numerical test results (Lienert et. al., 1998, p. 9, Rammstedt, 2004, p. 4-5).

Reliability

Lienert et. al (1998, p. 9) describes reliability as the repetitive accuracy with which a test measures a particular feature. In the sense of the true score model, systematic measurement errors have no negative influence on reliability, since these measurement errors are always the same and repeatable. Reliability is negatively affected only by random errors, as they always change. Therefore, a test is perfectly reliable if $X_R = 0$ (Malhotra, 2010, p. 318). Reliability of a test can therefore be understood as the extent to which measurement results are replicable. This replicability is expressed by correlation coefficients and the ideal value is 1.0. In social research four different approximations for determining the reliability are distinguished – the test-retest-reliability, the parallel test-reliability, split-half-reliability and consistency analysis. These methods differ regarding the aspects of stability in time or stability of measurement (Lienert et. al., 1998, p. 180, Rammstedt, 2004, p. 5-6, Schnell et. al., 2008, p. 151). In the following consistency analysis, as the most often used criteria and also best fitting for the aimed analysis, is discussed.

The consistency analysis correlates all items of a test and the mean over all correlations corresponds to an average reliability of the scale. The method gives also information about the homogeneity of a test (Rammstedt, 2004, p. 12). There are different formulas for determining the internal consistency. The most

common is the alpha coefficient according to Cronbach (1951).

$$\alpha = r_{tt} = \frac{c}{c-1}\left[1 - \frac{\sum_j s_j^2}{s_x^2}\right],$$

where c is the number of items s_j^2 is the variance of each item, and s_x^2 is the variance of the test. Alpha equals the mean of all possible item correlations and the result can be a value between 0.0 and 1.0. Schnell et. al. (2008, p. 153) mentions that a reliability of over 0.8 is rated as good. However, in the practical research values lower are also accepted. Malhotra (2010, p. 319) states that values over 0.6 indicates satisfactory reliability.

Validity

The American Psychological Association (2018) defines validity as the degree to which a test measures what it intends to measure. Therefore, validity refers to what the test measures in terms of content. To determine the validity, the distinction of three complementary validation concepts is recognized in the literature - content validity, criterion validity and construct validity (Lienert et. al., 1998, p. 10-11, Malhotra, 2010, p. 317, Rammstedt, 2004, p. 16).

Content Validity

Content validity refers to the examination whether the items of an instrument actually represent the feature to be measured with sufficient accuracy and with all its assorted aspects. According to Schnell et. al. (2008, p. 155) there exists no objective criteria for assessing content validity. Lienert et. al. (1998, p. 11 & 225) and Schumann (2006, p. 42) note that content validity is checked by expert rating. Several experts independently decide to which extent the test fulfils content validity. Therefore, content validity is also called face validity, as it cannot be empirical examined, but only be assessed by "faces of experts" (Malhotra, 2010, p. 320, Schumann, 2006, p. 42).

Criterion Validity

Criterion validity is defined by the relation of the results obtained with a measurement instrument with the results of an external criterion (Schnell et. al, 2008, p. 155). Usually, criterion validity is measured by correlation analysis and is referred to by Lienert et. al. (1998, p. 220-221) as empirical validity. Depending on when the criterion was raised, a distinction is made between "predictive validity" and "concurrent validity". Predictive validity measures the extent to which results of a test coincide with an external criterion raised with another test at a later time. In the case of concurrent validity, the external criterion is measured at the same time as the actual measurement of the characteristic in question. (Lienert et. al. 1998, p. 223-224, Malhotra, 2010, p. 320, Rammstedt, 2004, p. 17-18, Schnell et. al., 2008, p. 155-156). Furthermore, Schnell et. al. (2008, p. 156) mentions the concurrent validity based on "known groups". This means that measurement instruments can divide clearly between two groups if they have differences in the characteristic to be measured.

Construct validity

Campell and Fiske (1959) distinguish construct validity in convergent and discriminant validity. There are two recognized procedures to determine construct validity in practice, the rarely performed Multitrait-Multimethod-Matrix (MTMM) and the factor analysis (Cote & Buckley, 1987, Schmitt & Stults, 1986, Schnell et. al. (2008, p. 160). Explorative factor analysis is used to calculate the number of factors and the relationships between the factors ("factor correlations") as well as between the factors and variables ("factor loadings"). Confirmatory factor analysis is used to prove hypothesis about the dimensional structure of the construct and its factor correlations and factor loadings (Schnell et. at., 2008, p. 161-163, Weede and Jagodzinski, 1977).

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Research Questions & Methods

The central question to what extent the operationalisation of the LPM fulfills the approved scientific quality criteria is specified by the following hypotheses.

Objectivity

H1: The 16 leadership subtasks of the LPS measure leadership productivity objective.

Hypothesis 1 can be divided into sub-hypothesis regarding the three types of objectivity

H1_a: The 16 leadership subtasks of the LPS measure leadership productivity objective in form of implementation objectivity.

H1_b: The 16 leadership subtasks of the LPS measure leadership productivity objective in form of evaluation objectivity.

H1_c: The 16 leadership subtasks of the LPS measure leadership productivity objective in form of interpretation objectivity.

Reliability

H2: The 16 leadership subtasks of the LPS measure leadership productivity reliable.

Hypothesis 2 can be divided into sub-hypothesis regarding the four dimensions of the LPS.

H2_a: The 4 leadership subtasks of the dimension "Goal-Orientation" measure leadership productivity reliable.

H2_b: The 4 leadership subtasks of the dimension "Support" measure leadership productivity reliable.

H2_c: The 3 leadership subtasks of the dimension "Time-Optimization" measure leadership productivity reliable.

H2_d: The 5 leadership subtasks of the dimension "Motivation" measure leadership productivity reliable.

Validity

H 3: The 16 leadership subtasks of the LPS measure leadership productivity valid.

Hypothesis 3 can be divided into sub-hypothesis regarding the two analyzed subcategories of validity.

H3_a: The 16 leadership subtasks of the LPS measure leadership productivity valid in form of criterion validity

H3_b: The 16 leadership subtasks of the LPS measure leadership productivity valid in form of construct validity.

Hypothesis 3_b can be divided into sub-hypothesis regarding the four dimensions of the LPS.

H3_b1: Leadership subtasks of a dimension measure the same aspect of the construct "leadership productivity" (convergent validity).

H3_b2: Each dimension measures a different aspect of the construct "leadership productivity" (discriminant validity).

The hypotheses are tested mainly statistically based on 1,267 LPS questionnaires. 881 surveys were provided by MBA students with an average age of 31, who were asked to apply the LPS to a minimum of three subordinates or peers. 386 surveys are from four different samples that have been collected in three companies in which the employees had been asked to rate the leadership behavior of their superiors. Table 1 shows the descriptive statistics of the sample survey.

Table 1 Sample , *N = 1,267*

	Frequency	Percentage
Year		
2012	211	16,7
2013	225	17,8
2014	317	25,0
2015	304	24,0
2016	210	16,6
Student		
Civil	511	58,0
Officer	366	41,5
Unknown	4	0,5

Empirical results

Objectivity

Since the LPS is a standardized and easy-to-understand self-filling test, the implementation objectivity is generally high. This also proves the gained high data quality. There were only four surveys with response values over 5. Thus, only four records of a total of 1271 records had to be deleted. The MBA study is a good framework for gathering data, but some of the data may not be entirely objective as it was based on peer ratings. The LPS exclusively uses closed response formats and provide a clear five-point Likert-like-Scale to evaluate each statement/item. Therefore, the evaluation objectivity is very high as respondents have to make a clear cross in the answer options, which leads to a clearly defined numerical value. Due to the clearly defined values of the scale (1 = never, 2 = seldom, 3 = sometimes, 4 = often, 5 = always), the individual leadership tasks as well as the total value of the scale can be clearly interpreted which is a strong indicator for interpretation objectivity. Based on that qualitative evaluation H1_a, H1_b and H1_c can be confirmed.

Reliability

The items of the LPS are considered as parallel tests to measure the construct "Leadership Productivity" (Lienert et. al., 1998, p. 182-183, Schnell et. al., 2008, p. 152). Cronbach's alpha is calculated for the total multidimensional scale as well as for each dimension, as it is assumed that they capture different aspects of the construct. Values over 0.6 are satisfactory and over 0.8 good (Malhotra, 2010, p. 319, Schnell et. al., 2008, p. 153).

Table 2: *Cronbach's alpha of the LPS and Dimensions, N = 1267*

	Cronbach's Alpha	N of Items
LPS	0,912	19
Goal Orientation	0,660	5
Support	0,761	5
Time Optimization	0,748	3
Motivation	0,816	6

Hypotheses 2 and its sub-hypotheses for the LPS are fulfilled, as the total scale as well as the individual dimensions of the LPS achieve excellent to satisfactory reliability coefficients.

Validity

Criterion Validity

The LPS does not raise external criteria. This would be a suitable way to evaluate criterion validity. Therefore, it is recommended to extend the LPS by adding indicators to evaluate leadership productivity like subordinates' productivity loss due to leadership performance and task fulfillment (Desjardins, 2012), self-assessment of leadership productivity or satisfaction with leader's performance (Yukl, 2013, p. 25). In order to evaluate the criterion validity of the LPS the external criterion "Individual Working Performance" of a study regarding "The influence of Leadership and Payment for Performance on Individual Performance, N = 86" is used (Zebral, 2018). The questionnaire raises external criteria by asking two questions about working performance of the respondents. The LPS correlates with the working performance positive with $r = .34$, $p < .05$. The highest correlations are achieved by the leadership subtask "Interaction – Support" with $r = .45$ and "Autonomy – Motivation" with $r = .37$ (Zebral, 2018). H3_a is confirmed as all leadership subtasks show positive significant correlations with the external criterion "individual working performance" (Zebral, 2018, p. 84). Furthermore, a study conducted by Rahul (2016) shows that MBA students can increase their leadership skills by focusing on individual leadership tasks. This development is reflected by the external criterion "positive feedback from employees and colleagues". The study analyzed 50 development reports of MBA students showing that 75% were able to develop and implement certain leadership subtasks to a high degree or up to a certain degree. As this research is not completely independent of the MBA study, this external criterion has a limited quality and serves only as a further indication.

Construct Validity

Pearson correlation coefficients between the 19 items show low correlations between the items of a dimension: Dimension 1 ($r_{min} = .145$; $r_{max} = .457$), Dimension 2 ($r_{min} = .269$; $r_{max} = .491$), Dimension 3 ($r_{min} = .424$; $r_{max} = .586$) and Dimension 4 ($r_{min} = .256$; $r_{max} = .750$). Only the correlation between the items Motivation – Growth 1 and Motivation – Growth 2 ($r = .750$) is higher than $r = .6$. Both items measure the leadership subtask "Growth" once with focus on personal growth and once with focus on career development. Also, the leadership subtask "Feedback" is measured with two items in form of positive and constructive feedback. The correlation of the two items Support – Feedback 1 and Support – Feedback 2 is only $r = .468$, which represents a low

correlation. In summary with one exception the correlation coefficients and therefore the relationships between the leadership subtasks of a dimension are all below r = .6. H3_b1 about convergent validity cannot be confirmed.

The correlation of the items of different dimensions are between r_{min} = .124 and r_{max} .615. Overall the correlations are low, as there are only three correlations higher r = .5. Since the correlations between the items of same dimensions are already low, it cannot be consistently confirmed that the correlations of the items of different dimension are lower. In conclusion H3_b2 cannot be confirmed.

Additionally, the construct validity is tested for alternative numbers of dimension based on factor analysis. Kaiser-Meyer-Olkin measure of sampling adequacy (.935) and Bartlett's Test of Sphericity (Approx. Chi-Square 7838,236, df 171, sig. .0) as prerequisite for factor analysis are fulfilled (Hartas, 2010, p. 413, Wentura & Pospeschill, 2015, p. 162).

For the tested LPS there are three eigenvalues over 1. Since the LPS is based on four dimensions, the number is set to four factors. The first factor explains 39.08% of the total variance, the second 6.99%, the third 6.44% and the fourth 4.82% (Table 3). In total the four factors explain 57.3% of the variance. Furthermore, the factors were varimax rotated (Table 4) to get only significant loadings with a few or even one factor. (Hair, Black, Babin & Anderson, 2010, p. 113, Malhotra, 2010, p. 645).

Table 3 *Total Variance Explained*

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7,426	39,082	39,082	3,313	17,434	17,434
2	1,328	6,988	46,070	3,166	16,664	34,098
3	1,224	6,440	52,510	2,213	11,649	45,747
4	0,916	4,822	57,332	2,201	11,584	57,332
5	0,848	4,466	61,797			
6	0,791	4,161	65,958			
7	0,740	3,897	69,855			
8	0,675	3,551	73,406			
9	0,638	3,360	76,767			
10	0,583	3,069	79,836			
11	0,539	2,839	82,675			
12	0,527	2,771	85,446			
13	0,491	2,586	88,032			
14	0,470	2,471	90,503			
15	0,424	2,232	92,736			
16	0,415	2,184	94,920			
17	0,377	1,984	96,904			
18	0,352	1,853	98,757			
19	0,236	1,243	100,000			

Table 4 *Rotated Component Matrix and Factor Loadings - 4 Factors*

		Component			
		1	2	3	4
d4_q15	Motivation - Growth 1	0,843			
d4_q16	Motivation - Growth 2	0,816			

d2_q10	Support - Coaching	0,709				
d4_q17	Motivation - Purpose/Sense	0,564				
d4_q14	Motivation - Acknowledgement	0,498				
d1_q1	Goal Orientation - Goal Definition 1		0,665			
d2_q8	Support - Feedback 1		0,661			
d1_q2	Goal Orientation - Goal Definition 2		0,615			
d2_q7	Support - Information		0,567			
d2_q6	Support - Interaction		0,502			
d2_q9	Support - Feedback 2	0,459	0,492			
d1_q3	Goal Orientation - Goal Clarification		0,468			
d3_q12	Time Optimization - Work Load			0,714		
d3_q11	Time Optimization - Scheduling			0,684		
d3_q13	Time Optimization - Meeting		0,485	0,539		
d4_q19	Motivation - Performance/Goals	0,464		0,493		
d1_q5	Goal Orientation - Result Acceptance				0,741	
d1_q4	Goal Orientation - Process Acceptance				0,724	
d4_q18	Motivation - Autonomy				0,651	

Note: The items are described as follows: d1, d2, d3, and d4 stands for the assigned dimension and q1 seq. for the respective statement/item. For example, the first item is labeled as d1_q1.

Factor loadings below .40 are not presented. The factor loadings are to be understood as correlations coefficients between the relevant variables and the factors. Thus, the variable Motivation – Growth 1 (d4_q15) correlates highest (.843) with the factor 1. Assigning a variable to a factor in this way is unique in most cases. In a few cases, as with variable Support – Feedback 2 (d2_9), Time Optimization – Meeting (d3_q13) and Motivation – Performance/Goals (d4_q19) variables load on two factors. Within a factor, the corresponding variables are sorted by decreasing factor loads. Accordingly, the items d4_q15, d4_q16, d2_q10, d4_q17 and d4_q14 belong to the first factor, where the item d4_q15 loads the highest on the factor 1 with the value .843.

A factor analysis is considered to have failed if the assignment of numerous items to a factor is not clear and if the factors cannot be interpreted unambiguously (Malhotra, 2010, p. 645). For this reason, it is examined whether the calculated relationships reflect the established LPS scale with its four dimensions.

Factor 1 (Table 5) contains four items of the dimension “Motivation” and one item of the dimension “Support”. The item d4_q19 which also belongs to the dimension “Motivation” loads high on factor 3 (.493) and factor 1 (.464). Because of the almost equal factor loading the item d4_q19 can also be assigned to factor 1. Finally, 5 out of 6 items of the dimension “Motivation” can be attributed to factor 1, but also one item of the dimension “Support” – more accurate d2_q10 with the leadership subtask “Coaching”. Of course, coaching also has a positive effect on the motivation of followers. This could be the reason of the high correlation with the other items. The item d4_18 of the dimension “Motivation” with the leadership subtask “Autonomy” loads highest on factor 4 (.651). Consequently, the dimension “Motivation” as factor 1 cannot be unambiguously confirmed.

Factor 2 (Table 6) contains four items of the dimension “Support” and three items of the dimension “Goal Definition”. All items of the dimension “Support” are included in factor 2, expect item d2_q10, which is already in factor 1. However, also the three items regarding goal definition and clarification belong to factor 2, which can also be attributed a supporting function. However, the dimension “Support” as factor 2 cannot be clearly affirmed, as the leadership subtask Support – Coaching loads highest on factor 1.

Factor 3 (Table 7) includes the three items of the dimension “Time Optimization”, as the item d4_q19 is already assigned to factor 1. Therefore, the dimension “Time Optimization” can be confirmed by factor 3.

Factor 4 (Table 8) consists of two items of the dimension “Goal Orientation” and one item of the dimension

"Motivation". As mentioned, three items of the dimension "Goal Orientation" regarding the leadership subtasks goal definition and goal clarification are assigned to factor 2 and correlate highly with four items of the dimension "Support". The items regarding the leadership subtasks Process and Result Acceptance are separated in factor 4. This means, that these items do not correlate so much with the other items of the dimension "Goal Orientation". Furthermore, factor 4 includes the item d4_q18 describing autonomy of the dimension "Motivation". A high correlation between the three items is understandable as all three items measure autonomy in form of planning, execution and result outcome. However, the dimension "Goal Orientation" as factor 4 cannot be affirmed.

In summary, the dimension "Time Optimization" with its three leadership subtasks can be proved clearly with the factor analysis. The dimensions "Motivation" and "Support" can be confirmed mainly since only one item per dimension was not assigned correctly. The items of the dimension "Goal Orientation" are assigned to two different factors and are therefore not evidently definable. Therefore, the established LPS scale and LPM with is four different dimensions and assigned leadership subtasks cannot be confirmed by correlation coefficients, but partly by factor analysis.

Table 5 Factor 1:

Statement/Item	Leadership subtask	Dimension
d4_q15. My superior supports the growth of my personality and of my professional skills.	Growth	Motivation
d4_q16. My superior assists my professional career development.	Growth	Motivation
d2_q10. My superior recognizes my personal need for work task support and supports me by active coaching to develop my competency.	Coaching	Support
d4_q17. My superior enables me to understand the value of my work for the company, its customers, and the society.	Purpose/Sense	Motivation
d4_q14. My superior acknowledges my job performance.	Acknowledgement	Motivation
d4_q19. *My superior delegates work goals for me, which challenge and develop my competencies.*	*Performance/Goals*	*Motivation*

Table 6 Factor 2:

Statement/Item	Leadership subtask	Dimension
d1_q1. My superior provides clear work goals from which I can perform my tasks.	Goal Orientation	Goal Definition
d2_q8. I am given timely, constructive feedback about mistakes in my work.	Feedback	Support
d1_q2. The timeframes for the achievement of my tasks are clearly defined and obligatory.	Goal Orientation	Goal Definition
d2_q7. My superior provides in a timely manner all the information required for me to achieve my work goals.	Information	Support
d2_q6. My superior reacts within a reasonable timeframe on my requests.	Interaction	Support
d2_q9. I receive timely, positive feedback about successful work results.	Feedback	Support
d1_q3. Changes in the requested tasks by my superior are made with my involvement.	Goal Clarification	Goal Definition

Table 7 Factor 3:

Statement/Item	Leadership subtask	Dimension
d3_q12. My superior schedules meetings based on my availability and considers the impact on my work time.	Work load optimization	Time Optimization
d3_q11. My superior plans task deadlines considering my availability and the demands of my other tasks.	Scheduling	

d3_q13. Meetings are planned effectively and conducted efficiently by my superior.	Meeting optimization

Table 8 Factor 4:

Statement/Item	Leadership subtask	Dimension
d1_q5. My superior accepts the work results that I have achieved.	Result acceptance	Goal Orientation
d1_q4. I have the possibility of performing my work tasks in a self-responsible way.	Process acceptance	Goal Orientation
d4_q18. My superior empowers me with the autonomy in planning and performing my work tasks self-responsibly.	Autonomy	Motivation

Alternatively, the validity of the LPM as theoretical concept of a one factor productive leadership performance is tested (Desjardins 2012, Schrade 2018). According to Desjardins (2012) LPM is not a multidimensional leadership model but a model with only one dimension for "Leadership Productivity" and the described 16 leadership subtasks are measured with one item, except goal definition, feedback and growth, which are measured with two items each. Goal definition is differentiated according to task and timeframe, feedback according to positive and constructive and growth according to personal growth and career development. Figure 4 shows the eigenvalues against the number of components. The screen plot has a distinct break at one factor and therefore only one factor is determined. All measured items load on one single factor, which explains 39.082% of the total variance (factor 2: 6.988%, factor 3: 6.440%).

Figure 4 eigenvalue vs number of components

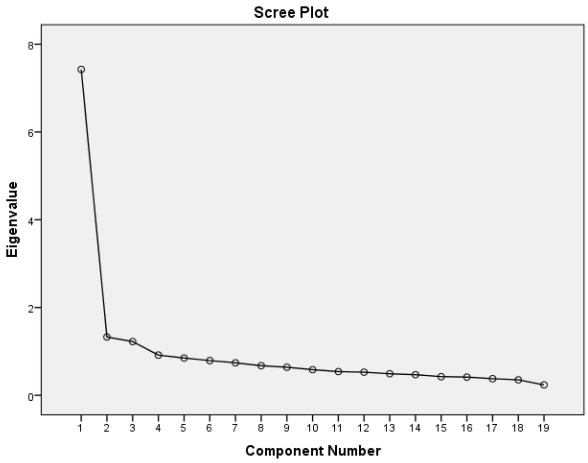

Table 9 shows the communalities as well as the component matrix and factors loadings gained for a one factor model. Initial communalists for a principal component analysis are always 1.0. Extraction communalities are estimations of the variance in each variable accounted for the component. Therefore, the values of the extraction should be relatively high, so that the component extracted represents the variables well (Malhotra, 2010, p. 643). Especially, for the items Goal Orientation – Process Acceptance (.209) and Goal Orientation – Result Acceptance (.218) only very low values for extraction communalities were achieved, which indicates that another component should be extracted to represent the variables better. The factor loadings for the component 1 are all greater than 0.4 and represent satisfactory results.

If one factor is used, only 39.082% of the total variance of the construct Leadership Productivity is described. However, according to Malhotra (2010, p. 644) the number of factors should at least explain 60% of the cumulative variance to reach a satisfactory level. This would lead to an extraction of even five factors. The

percentage of cumulative variance as well as the extraction values are indicators which may recommend a model with more than one factor to describe "Leadership Productivity".

Table 9 *Communalities, Component Matrix and Factor loadings for a one factor model*

		Communalities		Component
		Initial	Extraction	1
1	Goal Orientation - Goal Definition 1	1,000	0,404	0,636
2	Goal Orientation - Goal Definition 2	1,000	0,256	0,506
3	Goal Orientation - Goal Clarification	1,000	0,400	0,632
4	Goal Orientation - Process Acceptance	1,000	0,209	0,457
5	Goal Orientation - Result Acceptance	1,000	0,218	0,467
6	Support - Interaction	1,000	0,337	0,580
7	Support - Information	1,000	0,463	0,680
8	Support - Feedback 1	1,000	0,326	0,571
9	Support - Feedback 2	1,000	0,518	0,719
10	Support - Coaching	1,000	0,485	0,697
11	Time Optimization - Scheduling	1,000	0,445	0,667
12	Time Optimization - Work Load	1,000	0,435	0,660
13	Time Optimization - Meeting	1,000	0,424	0,651
14	Motivation - Acknowledgement	1,000	0,515	0,718
15	Motivation - Growth 1	1,000	0,481	0,694
16	Motivation - Growth 2	1,000	0,491	0,701
17	Motivation - Purpose/Sense	1,000	0,478	0,691
18	Motivation - Autonomy	1,000	0,257	0,507
19	Motivation - Performance/Goals	1,000	0,283	0,532

Extraction Method. Principal Component Analysis

Conclusions

Objectivity and H1_a – H1_c can be confirmed. In order to achieve perfect implementation objectivity a completely independent sample should be chosen to avoid influences due to the MBA study. The interpretation objectivity is seen as fulfilled, when important information regarding sample composition is raised. Reliability exists and H2_a – H2_d are confirmed. Criterion validity (H3_a) is also verified. Convergent validity (H3_b1) and discriminant validity (H3_b2) as elements of construct validity cannot be confirmed by Pearson's correlation coefficients, but partly by factor analysis. The dimension "Time Optimization" with its three leadership subtasks can be proven clearly with the factor analysis. The dimensions "Motivation" and "Support" can be confirmed mainly since only one item per dimension was not assigned correctly. The items of the dimension "Goal Orientation" are assigned to two different factors and therefore are not evidently definable. If the LPM is seen as a theoretical concept of a one factor productive leadership performance and not as a multidimensional leadership model the construct validity is mainly given with some limitations regarding "goal definition" and "feedback". To stronger confirm a one factor model the leadership subtasks should be operationalized by at least two items.

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