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Experimental evidence for the effects of a continuous improvement environment versus a mechanical environment on routines based on conscientiousness

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This research states that a continuous improvement environment (CIE), unlike a mechanical one, may help workers to voluntarily incorporate new routines based on conscientiousness. Moreover, these routines could help humans to improve themselves in some key character traits related to worker performance. A laboratory experiment in a simulated pen factory was carried out. Participants were categorised into two treatments: a CIE and a mechanical work environment. The results show that new routines based on conscientiousness were incorporated by all participants, both with low and high conscientiousness levels. Therefore, important implications about the effect of a CIE in the improvement of personality traits could be deduced. The result is relevant for explaining a cross-interaction between a CIE and personal habits based on conscientiousness. Therefore, firms have to think about job designs with conscientiousness requirements, namely competence, order, dutifulness, achievement-striving, self-discipline and deliberation using CIE as a means.

Keywords: conscientiousness; continuous improvement environment; habits

1. Introduction

The interaction between work environment and personal characteristics is a topic of interest to the person–organisation (PO) fit theory, which is defined as the compatibility between person and organisation (Kristof, 1996). Although a set of studies have been developed for conceptualising and empirical validation of PO fit (Cable & Edwards, 2004; Kristof-Brown, Zimmerman, & Johnson, 2005; Lauver & Kristof-Brown, 2001; Resick, Baltes, & Shantz, 2007), little has been done to analyse the capability of the organisational environment to alter personal characteristics (Kristof-Brown et al., 2005). In particular, no empirical research has been conducted to determine what effects a continuous improvement environment (CIE) may generate in personal habits based on conscientiousness. Accordingly, the present study focuses on the effect that a work environment described as continuous improvement oriented could produce on the personal habits of people versus one described as mechanical oriented. This article aims to study whether a CIE can contribute to the improvement of some personal habits. To study this, a laboratory experiment was conducted, having participants perform a task in a highly controlled environment. Two different environments were tested, i.e. a continuous improvement and a mechanical one. To the best of our knowledge, there has been no study providing empirical evidence on this topic. Therefore, the contribution of this article is the novelty of studying the relationships between a CIE and new personal habits of participants based on

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conscientiousness. The importance of the topic consists of understanding how a CIE can change the behavioural response of people. In addition, a better comprehension of the PO fit will be generated. The results suggest that a CIE positively incorporates new habits in everyone, thus we would conclude that this policy is a key measure for reaching excellence in any organisation or in any person.

The remaining part of this article is organised as follows: First, we provide a general literature review to build up a theoretical foundation to explain the fundamentals of the relationship between conscientiousness, CIE and personal habits based on conscientiousness. Second, we provide hypotheses on how a CIE can affect this interaction. Third, we describe a laboratory experiment that is employed to test these propositions. Fourth, the main empirical results are summarised. Finally, implications of these results, main conclusions and suggestions for future research are discussed.

2. Literature review

2.1. Theoretical foundations of conscientiousness and the five-factor model of personality

Costa and McCrae et al. published a Revised NEO manual which included the five-factor model of personality. This questionnaire is known as Revised NEO Personality Inventory (NEO-PI-R) and has a 240-item measure of the five-factor model (Costa, & McCrae, 1992; Costa, McCrae, & Dye, 1991a, 1991b). As stated by Kaplan and Saccuzzo (2006), the NEO-PI-R questionnaire has been a vanguard in the evaluation of positive characteristics of the personality and it has become one of the most researched tests of personality during the last two decades.

Personality, understood as a set of facets that distinguish one person from another, is considered relevant in management (Hermelin & Robertson, 2001; Salgado, Viswesvaran, & Ones, 2001). Several studies have managed to identify five groups of factors that may explain differences in the behaviour of individuals (Barrick & Mount, 1991, 1993; Barrick, Mount, & Judge, 2001; Barrick, Mount, & Strauss, 1993; Gellatly, 1996; Mount & Barrick, 1998; Mount, Barrick, & Stewart, 1998; Mount, Barrick, & Strauss, 1999; Ones & Viswesvaran, 2001; Robertson & Kinder, 1993; Salgado, 1997, 2002). According to Costa and McCrae (1992) and (Costa et al., 1991b), the factors are extraversion, agreeableness, conscientiousness, neuroticism and openness to experience. Within these groups, conscientiousness stands out as the one which best explains differences in professional performance for any job. People identified with conscientiousness are those who work hard, are organised, reliable, self-disciplined and persistent. Conscientious people set goals, are more committed to those goals and exert more effort (Barrick et al., 1993; Gellatly, 1996). Thus, they are more motivated at work and strive to achieve; therefore they have better dispositions to be productive. This dominant personality trait drives them to be more socially competent, and therefore to grow in terms of self-esteem and aspire to achieve success and social recognition. According to these studies, organisations should essentially take notice of the degree of someone's conscientiousness to predict their performance in the workplace. In this article, the capacity of a CIE to alter personal behaviour based on conscientiousness has been analysed. For this purpose, a continuous improvement work environment has been simulated and the way people have reacted to it has been analysed. In our study, we have analysed the behaviour and performance of different levels of conscientiousness. We have observed how people behave when the organisation changes the work environment from mechanical to a continuous improvement.

2.2. CIE and personal habits

Conscientiousness in the NEO-PI-R questionnaire is evaluated in six facets which are: *order*, *dutifulness*, *achievement-striving*, *self-discipline*, *competence* and *deliberation*. Each of these facets is widely developed in the test. *Order* is the tendency to maintain a well-organised work environment; *dutifulness* refers to the need for individuals to abide by the established rules; *achievement-striving* is striving for excellence; *self-discipline* refers to perseverance or the ability to continue with a task without being distracted; *competence* is associated with the ability or suitability to carry out tasks well and *deliberation* refers to the ability to think things through before acting (Costa et al., 1991b). These facets may be recognised and practised better in a CIE versus a mechanical one. A CIE may be defined as an ongoing effort to improve products, services, processes and systems in order to look for, find and implement incremental or breakthrough improvements over time (Bessant, Caffyn, & Gallagher, 2001; Dahlgaard-Park, Chen, Jang, & Dahlgaard, 2013; Tanco, Mateo, Santos, Jaca, & Viles, 2012). This environment affects all workers in all activities of the firm, including cost reduction, delivery time, safety management, product improvement or product design. In this environment, all workers can freely participate and are able to develop new habits and behaviours associated with the improvement activities. In contrast, workers in a mechanical environment (ME) cannot participate in the improvement activities and their time is only for production. Thus, we have used two treatments in our research: CIE and ME.

CIE: It is an environment where workers do some tasks associated with production and in addition are able to freely participate in intellectual tasks, such as looking for, finding and implementing improvements in the product, process and system.

ME: It is an environment in which workers only do mechanical tasks associated with production.

There are at least six different activities associated with a CIE, which are

- (1) analyse potential causes of problems,
- (2) find the root cause of each problem,
- (3) propose alternatives for solving,
- (4) select the right solution,
- (5) implement and control the solution and
- (6) check the solution and finish.

These activities are intellectual and generate new routines in the work day. For instance, if you need to analyse causes and find the root cause of a problem you will need to use your abilities of *deliberation*, *order* and *achievement-striving*. In addition, if you need to implement measures on time and control solution, you will need to apply *competence*, *self-discipline*, *order* and *deliberation*. A link between activities associated with a CIE and facets of personality based on conscientiousness is presented below.

- (1) analyse potential causes of problems – *order* and *deliberation*;
- (2) find the root cause of each problem – *achievement-striving*;
- (3) propose alternatives for solving it – *order* and *deliberation*;
- (4) select the right solution – *achievement-striving*;
- (5) implement and control the solution – *competence*, *self-discipline* and *order* and
- (6) check the solution and finish – *deliberation*, *self-discipline* and *competence*.

A CIE can enrich jobs, giving workers more tasks that facilitate the development of *competence*, *order*, *dutifulness*, *achievement-striving*, *self-discipline* and *deliberation*.

For example, jobs with mechanical work, without any intellectual input and high monitoring, may be defined as jobs with low requirement of conscientiousness. On the contrary, the same jobs but with self-evaluations, different tasks to look for improvements and self-discipline may be defined as having a high requirement of conscientiousness. When organisations design the work environment as a mechanical one, i.e. ‘no CIE’, the worker may be impoverished as such because of the limitation of the activities. On the other hand, if there is a ‘continuous improvement work environment’ in the organisation, the worker may thus be enriched because of the variety of activities. In this case, people can apply new habits which can therefore strengthen their personality. Based on the above, the following propositions are presented:

P1: A CIE preserves personal habits based on conscientiousness for high-conscientious participants

P2: A CIE enhances personal habits based on conscientiousness for low-conscientious participants

P3: A ME harms personal habits based on conscientiousness for high-conscientious participants

P4: A ME preserves personal habits based on conscientiousness for low-conscientious participants

When the level of a worker’s conscientiousness is low and you are in a CIE, i.e. high requirement of conscientiousness in the job, the worker may be enriched as a result, if the worker freely accepts this environment. Notwithstanding, in this case, the worker could reject this proposal due to a lack of fit between the person and environment. As this is an option, it is too difficult for organisations to evaluate and control improvements and low-conscientious workers in a high-conscientiousness job requirement may react in order to accept or reject new habits based on conscientiousness. Thus, the work environment may affect worker behaviour by limiting or enhancing daily habits or routines.

A company should ensure in the long term that its work environment enables workers to improve, or at least preserve, their habits based on conscientiousness. There is a positive correlation between conscientiousness and worker performance. Therefore, job design must take into account how to develop new habits based on conscientiousness. If we prove propositions 1 and 2, i.e. that a CIE can help some people to improve their personality traits based on conscientiousness and will not harm anyone, then this environment could be positive for everyone. In addition, if we prove propositions 3 and 4, i.e. that an ME harms personal habits based on conscientiousness for high-conscientious participants and just preserve for low-conscientious participants, then it is better to avoid this environment.

3. Method

Laboratory experiments to evaluate the propositions were performed. The first part of the experiment was to select the right candidates; those presenting extreme values on the conscientiousness scale. Only individuals with extreme levels of conscientiousness, ‘high’ and ‘low’, were selected. The reason being that the fit, or lack of fit, between the person and environment will be clearer if only high and low levels participate in the experiment. As we have defined, the CIE is a high-conscientious job requirement, thus high-conscientious people clearly fit with the CIE, and low-conscientious people present a clear lack of fit with the CIE. The same logic applies to the ME as having a low-conscientiousness job requirement, i.e. high-conscientious people clearly present a lack of fit with the ME and low-conscientious people present a clear fit with the ME.

Initial selection was carried out using a short question test for 175 participants. In total, 20 people belonging to profile type HC and LC (HC: highest quartile of conscientiousness and LC: lowest quartile of conscientiousness) were selected. NEO PI-R was used to measure the personalities of participants.

A laboratory experiment with two treatments working in a pen factory laboratory was designed. All participants participated first in a ME and then in a CIE. The total number of participants was 20. Each individual participated only once in a pen factory experiment. They were divided into the following eight different ways for running the experiments.

- (1) Four high-conscientious participants work together in the pen factory.
- (2) Four low-conscientious participants work together in the pen factory.
- (3) Three high-conscientious participants work together in the pen factory.
- (4) Three low-conscientious participants work together in the pen factory.
- (5) Two high-conscientious participants work together in the pen factory.
- (6) Two low-conscientious participants work together in the pen factory.
- (7) One high-conscientious participant works alone in the pen factory.
- (8) One low-conscientious participant works alone in the pen factory.

The division was used for control of size effect in the individual behaviour. The pen factory was real and participants had to produce as many pens as they could. All participants started with the same configuration of the factory.

3.1. Research variables

The following research variables were used:

WPRi: Workers performance response describes the level of performance that individual *i* attained in the laboratory experiment measured as a mean of perfect pens produced per minute and per person.

WCBi: Workers conscientiousness base describes the level of conscientiousness that the NEO-PI-R test grants an individual *i*. Individuals were classified as HC or LC.

BR1i: Behaviour response 1 describes the level of activity attained by worker *i* in reporting incidents (from 1: very poor to 5: very intensive).

BR2i: Behaviour response 2 describes the level of discipline in the implementation of new routines for improvements done for worker *i* in the process (from 1: very poor to 5: very intensive).

BR3i: Behaviour response 3 describes the level of activity attained by worker *i* in the proposal for improvements (from 1: very poor to 5: very intensive).

For this research, two treatments of environment design were analysed:

ME: ME with no participation of workers in any continuous improvement process. Workers cannot use their initiative to change activities and improve quality and productivity. They work as a mechanical part of the organisation.

CIE: CIE which enables active worker participation. Workers may participate in a continuous improvement process using their initiative to detect problems, think of alternatives to solve and implement them and participate in the decision process to improve quality and productivity. They work as a mechanical and intellectual part of the organisation.

Our goal is to verify whether people voluntarily and freely modify their behaviour because of changes in the work environment associated with a continuous improvement. The model is presented in a schematic fashion in [Figure 1](#).

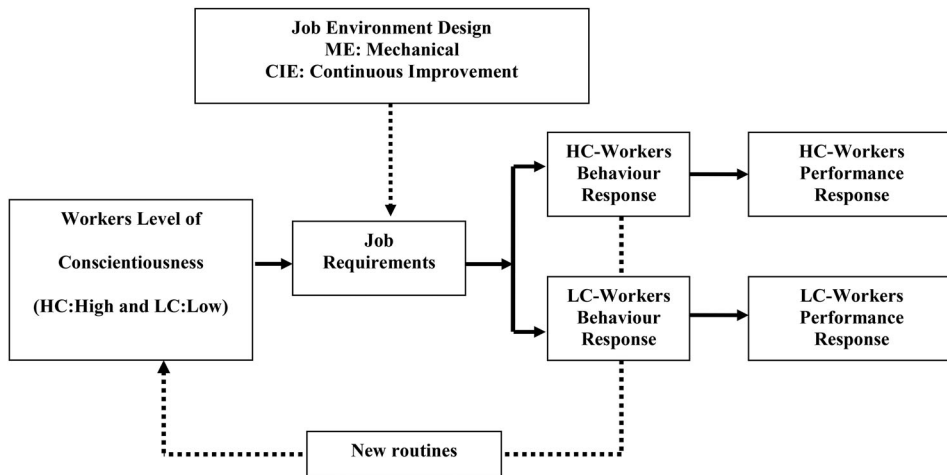


Figure 1. Job environment design. The influence of continuous improvement on the performance and behaviour of workers with a high and low level of conscientiousness. When organisations define the job environment implicitly, they are defining the options for a worker behaviour response. If the response is positive, workers will incorporate new routines that might influence conscientiousness and improve quality and productivity substantially.

No group was aware of the existence of other groups, nor did any know what the work of the others was.

Each work group was given the same information. First, the activity they were to carry out was explained. They had to produce pens in two work environments, first a mechanical activity, and then a mechanical with continuous improvement activities. Second, a leader was randomly assigned and his/her functions were explained to him/her. Each sheet that would be required during the laboratory experiment was shown to them. Third, operator tasks were explained to them. Finally, they were given time to assemble a pen before the start of the experiment so as to be familiar with the different parts and how to combine them.

The pen factory was built as a real factory. Supplier deliveries of parts and customer orders were used in the process. There were some defective parts intentionally introduced in the process by the suppliers to trigger a continuous improvement cycle. In addition, multiple orders from customers were introduced at the same time to generate the need for efficiency.

Assigning tasks to the group: The mission of each group was to produce as many perfect pens as possible. Factory results were assessed on productivity and quality. To this end, participants had to produce pens in the two different work environments. The work environment of continuous improvement has been defined as follows: the groups are self-governed by the participants with one coordinator as a leader. They make their own decisions and supervise themselves. Orders are constantly arriving from customers, and suppliers always deliver with uniform quality. They have time to think and manage improvements, and they can use this time as they wish in any way. The payment was fixed for all participants in both treatments and no incentive was given to them for any productivity or quality improvements.

4. Results

The main results indicate that they all improved their productivity because of the participation of workers in the improvement process in the assembly line. All individuals, high

and low conscientiousness, participated in the continuous improvement activities. Table 3 reports the results of variation percentage of productivity improvement between CIE and ME environments for each experiment. Individuals type HC achieve greater productivity improvements, from 88% to 144% when exposed to a CIE. Individuals type LC achieve greater productivity improvements too from 61% to 95% when exposed to a CIE.

In addition, new routines based on conscientiousness were incorporated. HC workers participated freely and voluntarily in the problem detection (4.8/5.0). Problem detection was an activity where participants freely thought about the opportunities for improvements that they had about their own job and also in its supplier and customer relations. In the case of proposal for improvements (4.4/5.0) and implementation of solutions (5.0/5.0), participants worked looking for alternatives for solving problems detected and they chose the best and implemented them. LC workers also participated freely and voluntarily in problem detection (4.3/5.0), improvements proposition (4.5/5.0) and implementation of solutions (4.5/5.0). In both cases, facets of conscientiousness were used.

CIE helped all of them to freely accept these new routines in the job, regardless of their personality traits.

We can state that type HC individuals have accepted the proposal of a CIE as a result of a clear fit between their personality and the new environment.

Nevertheless, we cannot state the same for LC individuals even though they adapted their behaviour response to CIE despite the clear lack of fit between their personality and the situation proposed. This observation could be explained as the reaction of these participants to collaborate with the organisation because they understood that CIE is the expected and desired situation in any organisation. In any case, more research is needed to understand this observation.

Therefore, every HC and LC group adapted their behaviour response to the CIE and we can accept propositions 1 and 2, i.e: CIE enhances (for low conscientiousness) and preserves (for high conscientiousness) routines associated with personal habits based on conscientiousness.

P1: A CIE preserves personal habits based on conscientiousness for high-conscientious participants

P2: A CIE enhances personal habits based on conscientiousness for low-conscientious participants

Nonetheless, the ME did not help all of them.

We cannot state that type HC individuals accepted the proposal of a ME because the practice of new routines associated with personality traits based on conscientiousness is not permitted in this type of environment. Thus, although they might have wanted to do it, they were not allowed to.

In the case of LC individuals, they accepted the ME because of the clear fit between their personality and the situation proposed.

Therefore, HC and LC individuals have adapted their behaviour response to the ME and we can accept propositions 3 and 4, i.e: ME maintains (for low conscientiousness) and could harm (for high conscientiousness) routines associated with personal habits based on conscientiousness (Tables 1–4).

P3: ME could harm personal habits based on conscientiousness for high-conscientious participants

P4: ME preserves personal habits based on conscientiousness for low-conscientious participants

Table 1. Means of productivity for individual and groups: pens per minute per person.

Conscientiousness level	Type of environment	Number of people			
		1 <i>M</i>	2 <i>M</i>	3 <i>M</i>	4 <i>M</i>
HC	ME	0.58	0.53	0.45	0.46
	CIE	1.09	1.04	1.10	1.02
LC	ME	0.58	0.41	0.41	0.46
	CIE	1.08	0.69	0.80	0.74

Notes: HC is the people with high conscientiousness level; LC is the people with low conscientiousness level; *M* is the arithmetic mean of productivity (pens per minute per person). ME refers to the work environment that does not consider continuous improvement. CIE refers to the work environment that considers continuous improvement.

Table 2. Differences in productivity between CIE and ME.

Conscientiousness level	Number of people			
	1 <i>M</i> ¹	2 <i>M</i> ¹	3 <i>M</i> ¹	4 <i>M</i> ¹
HC/(High)	0.51	0.51	0.65	0.56
LC	0.50	0.28	0.39	0.28

Notes: HC is the people with high conscientiousness level; LC is the people with low conscientiousness level; *M*¹ is the difference of the arithmetic mean of productivity (pens per minute per person) between CIE and ME.

Table 3. Variation percentage of productivity improvement between ME and CIE.

Conscientiousness level	Number of people	Productivity ^a improvement
HC	1	88%
	2	96%
	3	144%
	4	122%
LC	1	86%
	2	68%
	3	95%
	4	61%

^aData to calculate the productivity improvement are given in Table 1. For example the result to 1 High person (88%) is the variation of productivity between 0.58 (ME) and 1.09 (CIE); HC is the people with high conscientiousness level; LC is the people with low conscientiousness level.

Table 4. Worker behaviour response for high and low conscientiousness participants.

Worker behaviour response CIE	High-conscientiousness workers		Low-conscientiousness workers	
	Mean	Variance	Mean	Variance
BR1: Have you reported incidents and defects to your partners?	4.80	0.20	4.33	0.67
BR2: Have you been disciplined in implementation of new routines?	5.00	0.80	4.50	0.70
BR3: Have you proposed improvements?	4.40	0.80	4.50	0.70

5. Discussion

These experiments show us that HC individuals will adapt their behaviour, as they are a better fit with the organisation in the case of a CIE, and LC individuals can voluntarily and freely adapt their behaviour as a result of a CIE despite not fitting with the organisation. LC introduced new routines and practiced new personal habits based on conscientiousness despite their personality. It is necessary to note that the groups had no incentive related to productivity growth. Although some of improvements could be attributed to the repetition of work, differences cannot be attributable to this factor alone because repetition cannot produce important variations in a short time period.

Our explanation of behaviour from LC is the result of the interaction between the personality and the situation. Despite the lack of fit, people can perceive new opportunities in the situation and can accept this challenge, voluntarily and freely. They prefer to change their behaviour response and to learn new personal habits associated with these practices. In this context, freedom is especially important; they cannot improve themselves if they do not freely decide to accept this new challenge. Reflection and personal decision are necessary for improvements in personality. Organisations can implement a continuous improvement situation as compulsory. In this case, however, improvements in personality will be null because there will be no reflection or decision. In these experiments, the continuous improvement situation was proposed as an option and they decided to participate in and to learn from it (Balbastre & Moreno-Luzon, 2003). This behaviour of the low-conscientious individuals may also be due to the fact that people try to improve when they are faced with a personal challenge that will be evaluated, as they will be responsible for the outcome of their actions.

As mentioned earlier, the concept of conscientiousness has been largely researched as a stable personality trait. In this study, the behaviour of low-conscientious people cannot be explained because they chose to practice in CIE. Hence, conscientiousness could be more of a state rather than a trait for low-conscientious participants. This is consistent with the interactionism stream. Endler and Magnusson studied human behaviour as an interaction between person and situation. One feature is the meaning of the situation for the individual in order to explain human behaviour (Endler, 1983; Endler & Magnusson, 1976; Endler & Parker, 1992). In a firm, people are in a situation where the expression of personality could be modified.

In addition, Hernandez and Mateo analysed the literature on the content of character traits and personal habits within conscientiousness. They have suggested that conscientiousness is flexible and could change in adults. The introduction of personal habits and new routines in a CIE may generate a change in character facets based on conscientiousness for everyone (Hernández & Mateo, 2012). Therefore, low-conscientious workers could freely start to practice new routines as a response to the situation and could improve their conscientiousness trait in the future as a result of the practice of new habits.

A CIE could enhance personal habits based on conscientiousness. The effect on worker conscientiousness is not well understood. Our research suggests that a CIE helps workers improve the exercise of will positively and modifies certain acquired behaviours, introducing new habits that enable improvements and increase conscientiousness levels. People, in a CIE, are given the opportunity to work hard. They need organisation and reliability. They are self-disciplined and persistent in finding improvements and solving problems, such as defects, wastes, accidents, etc. Thus, they have more opportunities to be productive and use their skills to solve problems.

One of the most important implications for managers is highlighting the role that organisations and managers have in influencing workers' decisions in regard to the

requirements of continuous improvements in their jobs. An atmosphere of continuous improvement will help both, low- and high-conscientiousness people. Low-conscientiousness workers can decide to increase their commitment and enrich their behaviour at work, introducing personal habits based on conscientiousness. In addition, workers with a high level of conscientiousness will introduce personal habits as a response to this work environment and organisations will avoid a lack of fit between personality and environment for these individuals.

The challenge is to improve the response of workers and the behaviour, regardless of the level of conscientiousness. In a CIE, workers will increase productivity and quality, but the most important thing is the introduction of new personal habits based on conscientiousness.

According to the quasi-experiments, we can confirm the following: the participants comprising type LC individuals with low conscientiousness have substantially improved their behaviour as a result of a continuous improvement work environment. The LC participants have improved their productivity and performance quality and introduced new personal routines based on conscientiousness with no more supervision other than themselves, obtaining significant improvements, although minor in comparison with high-conscientious individuals.

Therefore, firms have to consider job designs with requirements of conscientiousness, namely competence, order, dutifulness, achievement-striving, self-discipline and deliberation using a CIE as a means.

6. Limitations and directions for future research

One important limitation of this research is the sample size. This limitation is justified if one keeps in mind that we preferred to select candidates presenting extreme values in the conscientiousness level (the first and the last quartiles). We were interested in choosing only extremes ('high' and 'low') because with these two groups it was clearer who possessed and who lacked conscientiousness and, therefore, it was easier to measure their fit between person and environment. Here lies an opportunity for future research in this field. Moreover, a better understanding of a continuous improvement requirement in terms of personality is needed.

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References

- Balbastre, F., & Moreno-Luzon, M. (2003). Self-assessment application and learning in organizations: A special reference to the ontological dimension. *Total Quality Management & Business Excellence*, *14*(3), 367–388. doi:10.1080/1478336032000046661
- Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job-performance: A meta-analysis. *Personnel Psychology*, *44*(1), 1–26.
- Barrick, M. R., & Mount, M. K. (1993). Autonomy as a moderator of the relationships between the big five personality dimensions and job-performance. *Journal of Applied Psychology*, *78*(1), 111–118.
- Barrick, M. R., Mount, M. K., & Judge, T. A. (2001). Personality and performance at the beginning of the new millennium: What do we know and where do we go next? *International Journal of Selection and Assessment*, *9*(1–2), 9–30.

- Barrick, M. R., Mount, M. K., & Strauss, J. P. (1993). Conscientiousness and performance of sales representatives: Test of the mediating effects of goal setting. *Journal of Applied Psychology*, 78(5), 715–722.
- Bessant, J., Caffyn, S., & Gallagher, M. (2001). An evolutionary model of continuous improvement behaviour. *Technovation*, 21(2), 67–77. doi:10.1016/s0166-4972(00)00023-7
- Cable, D. M., & Edwards, J. R. (2004). Complementary and supplementary fit: A theoretical and empirical integration. *Journal of Applied Psychology*, 89(5), 822–834. doi:10.1037/0021-9010.89.5.822
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., McCrae, R. R., & Dye, D. A. (1991a, March 7–9). *Facet scales for agreeableness and conscientiousness – A revision of the neo personality-inventory*. Paper presented at the 1991 Midwinter Meeting of the Society for Personality Assessment, New Orleans, LA.
- Costa, P. T., McCrae, R. R., & Dye, D. A. (1991b). Facet scales for agreeableness and conscientiousness: A revision of the NEO personality-inventory. *Personality and Individual Differences*, 12(9), 887–898.
- Dahlgaard-Park, S. M., Chen, C. K., Jang, J. Y., & Dahlgaard, J. J. (2013). Diagnosing and prognosticating the quality movement – A review on the 25 years quality literature (1987–2011). *Total Quality Management & Business Excellence*, 24(1–2), 1–18. doi:10.1080/14783363.2012.756749
- Endler, N. S. (1983). Interactionism: A personality model, but not yet a theory. In M. M. Page (Ed.), *Nebraska Symposium on Motivation*. *Nebraska Symposium on Motivation* (155–200). Lincoln III: University of Nebraska Press.
- Endler, N. S., & Magnusson, D. (1976). Toward an interactional psychology of personality. *Psychological Bulletin*, 83(5), 956–974. doi:10.1037//0033-2909.83.5.956
- Endler, N. S., & Parker, J. D. A. (1992). Interactionism revisited:– Reflections on the continuing crisis in the personality area. *European Journal of Personality*, 6(3), 177–198. doi:10.1002/per.2410060302
- Gellatly, I. R. (1996, May). *Conscientiousness and task performance: Test of a cognitive process model*. Paper presented at the Annual Meeting of the Administrative-Sciences-Association-of-Canada, Montreal, Canada.
- Hermelin, E., & Robertson, I. T. (2001, March 30). *A critique and standardization of meta-analytic validity coefficients in personnel selection*. Paper presented at the British Psychological Society Centenary Conference, Glasgow, Scotland.
- Hernández, J., & Mateo, R. (2012). Indications of virtues in conscientiousness and its practice through continuous improvement. *Business Ethics: A European Review*, 21(2), 140–153. doi:10.1111/j.1467-8608.2011.01650.x
- Kaplan, R. M., & Saccuzzo, D. (2006). *Psychological testing: Principles, applications and issues* (6th ed.). Mexico: Thomson.
- Kristof, A. L. (1996). Person-organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology*, 49(1), 1–49. doi:10.1111/j.1744-6570.1996.tb01790.x
- Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of individuals' fit at work: A meta-analysis of person-job, person-organization, person-group, and person-supervisor fit. *Personnel Psychology*, 58(2), 281–342. doi:10.1111/j.1744-6570.2005.00672.x
- Lauver, K. J., & Kristof-Brown, A. (2001). Distinguishing between employees' perceptions of person-job and person-organization fit. *Journal of Vocational Behavior*, 59(3), 454–470. doi:10.1006/jvbe.2001.1807
- Mount, M. K., & Barrick, M. R. (1998). Five reasons why the 'big five' article has been frequently cited. *Personnel Psychology*, 51(4), 849–857.
- Mount, M. K., Barrick, M. R., & Stewart, G. L. (1998). Five-factor model of personality and performance in jobs involving interpersonal interactions. *Human Performance*, 11(2–3), 145–165.
- Mount, M. K., Barrick, M. R., & Strauss, J. P. (1999). The joint relationship of conscientiousness and ability with performance: Test of the interaction hypothesis. *Journal of Management*, 25(5), 707–721.

- Ones, D. S., & Viswesvaran, C. (2001). Integrity tests and other criterion-focused occupational personality scales (COPS) used in personnel selection. *International Journal of Selection and Assessment*, 9(1–2), 31–39.
- Resick, C. J., Baltes, B. B., & Shantz, C. W. (2007). Person-organization fit and work-related attitudes and decisions: Examining interactive effects with job fit and conscientiousness. *Journal of Applied Psychology*, 92(5), 1446–1455. doi:10.1037/0021-9010.92.5.1446
- Robertson, I. T., & Kinder, A. (1993). Personality and job competences: The criterion related validity of some personality variables. *Journal of Occupational and Organizational Psychology*, 66, 225–244.
- Salgado, J. F. (1997). The five factor model of personality and job performance in the European Community. *Journal of Applied Psychology*, 82(1), 30–43.
- Salgado, J. F. (2002). The big five personality dimensions and counterproductive behaviors. *International Journal of Selection and Assessment*, 10(1–2), 117–125.
- Salgado, J. F., Viswesvaran, C., & Ones, D. S. (2001). Predictors used for personnel selection: An overview of constructs, methods, and techniques. In N. Anderson, D. S. Ones, H. K. Sinangil, & C. Viswesvaran (Eds.), *International handbook of work and organizational psychology* (pp. 165–199). London: Sage.
- Tanco, M., Mateo, R., Santos, J., Jaca, C., & Viles, E. (2012). On the relationship between continuous improvement programmes and their effect on quality defects: An automotive case study. *Total Quality Management & Business Excellence*, 23(3–4), 277–290. doi:10.1080/14783363.2011.637779