Corresponding Author: Dr. Mickael Géraudel, Ph.D

Corresponding Author's Institution: University of Luxembourg

First Author: Barthelemy Chollet, Associate Professor

Order of Authors: Barthelemy Chollet, Associate Professor; Mickael Géraudel, Ph.D; Anis Khedhaouria, Assistant Professor; Caroline Mothe, Full Professor

Abstract: Market knowledge (MK) has been found to favor firm performance, yet very little is known about how it develops. In small firms, MK likely depends on the personal dispositions of their CEOs. This study draws on personality research to theorize that CEOs' personality traits influence the intensity of seeking (openness and conscientiousness), the opportunity to access (extraversion), or the accuracy of processing (agreeableness and emotional stability) market information. A fuzzy set qualitative comparative analysis of 409 CEOs reveals two equifinal configurations of traits leading to high MK, both of which include traits favoring accuracy, suggesting their particular importance. The findings provide new understanding of the antecedents of MK and also have conceptual implications for the study of CEOs' personality in general.

Dear Editor,

We thank you and both reviewers for your guidance and comments, which prompted us to make substantial revisions to the enclosed manuscript.
The introduction, theoretical, and discussion sections have been restructured and rewritten from scratch; the sections dealing with the method and findings also have been revised. In the responses, we detail how we have addressed each issue raised by the review team.

For the authors,

Mickael GERAUDEL
University of Luxembourg

*Detailed Response to Reviewers

Dear Editor,

We thank you and both reviewers for your guidance and comments, which prompted us to make substantial revisions to the enclosed manuscript. The introduction, theoretical, and discussion sections have been restructured and rewritten from scratch; the sections dealing with the method and findings also have been revised. In the following responses, we detail how we have addressed each issue raised by the review team.

Reviewer #1: Dear Author(s),

it is with great interest that I read you manuscript "Rethinking personality effects with a fuzzy set approach".

The topic is interesting and relevant for the JBR readership. However, I have several major concerns.

1) Positioning
- The title is not very informative. Personality effects of whom on what?

Reflecting our clearer focus on the concept of market knowledge, we have revised the title to highlight the causal relationship we test.

- Reading the article, I was confused whether the aim is to provide new insights using fsQCA or to demonstrate that fsQCA and MRA lead to different results. The latter is, in 2015, not a very new insight, at least for JBR readers. I would hence skip the part where you compare the results of fsQCA with MRA (Table 3) and clearer indicate what the aim of this research is in the introduction.

Thanks for this recommendation. We have removed any comparison between MRA and fsQCA from the method section and instead explain more clearly why fsQCA is so well suited to make a critical theoretical contribution, namely, revealing the complementarities across traits previously studied as independent entities. Accordingly, these arguments appear in a distinct subsection in the restructured theoretical section.

2) Conceptual Issues
- You need to provide a stronger definition and elaboration on the central concepts. What exactly is the entrepreneurial process? I would assume that personality does not have "positive influence on the entrepreneurial process" but, more precisely, on different variables within this process. For example, Zhao/Seibert (2006) investigate the relationship between personality and entrepreneurial status. You need to make this clearer in your literature review what the dependent variables are and disentangle the entrepreneurial process from specific variables it includes.

In our overall attempt to strengthen our focus on the central concept of market knowledge, we have removed the entrepreneurial process concept, as well as rewritten entirely the text. For example, Section 2 starts by reviewing prior research into the two central concepts for our study: market knowledge and CEO personality. Then we offer theoretical predictions about the connections between CEO personality and market knowledge, in a separate section. Finally, we refer more explicitly to literature that links personality to some form of performance (e.g., Zhao, Seibert, & Lumpkin, 2010), distinct from the research stream that studies differences between entrepreneurs and managers (e.g., Zhao & Seibert, 2006).

- Related to this, I get confused about the choice of your dependent variable. You need to motivate better why you chose market knowledge (rather than, say, venture success) here. Is market knowledge one phase in the entrepreneurial process? Or it is just a helpful thing to make these phases more successful? Also, it is hard for me to understand why personality traits, in whichever combination, would directly cause a certain level of market knowledge in the first place. My intuition is that openness may contribute to information search behavior (as a mediating variable), but, for instance, agreeableness? I am not convinced. Your results then tell me that both sufficient combinations of antecedent conditions for market knowledge include the presence of agreeableness. Hence, a high agreeableness is necessary (right?) for market knowledge to occur. Again, I am not convinced why this would make theoretical sense.

> *There is now a specific section in the text (2.1) on the concept of market knowledge and why it matters.*
>
> *About why personality traits would cause market knowledge: this remark was of considerable help in our restructuring efforts; thank you very much. It highlighted the need for us to include a stronger theoretical argument about how individual traits condition information search and processing. We rewrote the theoretical section accordingly, introducing new references from personality research. The revised section therefore reviews how individual traits influence (a) the intensity of information search (conscientiousness, openness), (b) the opportunity to access information (extraversion), or (c) the accuracy of information processing (agreeableness, emotional stability). We examine each of these facets in a separate subsection. The revised framework therefore offers more clarity and a better theoretical grounding for our study.*
>
> *We also cite more extensive personality research, providing evidence that agreeableness and emotional stability—the two necessary conditions in our findings—relate to a lower level of interpretation and attention biases. In the revised discussion (section 5), we reflect on the unique roles of these traits as necessary conditions, and what that means for personality research. The other traits of the Big Five appear in one of the two configurations (openness and conscientiousness on the one end, extraversion on the other), which seems to suggest a dichotomy among CEOs who rely on either a "behavioral" or a "social" underpinning of information acquisition. We also reflect on this notion in the revised discussion (section 5). Thus, the discussion now focuses more clearly on the implications of our findings and how they echo prior research and/or can inspire further research.*

3) Structure
Rethink the structure of the manuscript. This can be streamlined, I think. For instance, section 2.2 reads like a repetition of the introduction and could be merged. I would suggest a short and concise introduction with a clearly defined research question (see, for example, Ordanini/Parasuraman/Rubera's 2014 JSR article). Then a literature review, more detailed than before, followed by a section in which you introduce fsQCA and explain the necessary steps in carrying out fsQCA.

> *We have followed your recommendations exactly. The shorter introduction defines the research question and contribution. The literature review provides more readable coverage of (a) what market knowledge is (2.1); (b) how CEOs' personality has been studied (2.2); (c) how traits influence information seeking, access, and processing (3.1, 3.2, 3.3.); and (d) how fsQCA improves our understanding of this influence (3.4).*

4) Methodology

- You need to be more detailed here. Where's the information regarding the operationalization of the personality traits?

> *We have added information about the operationalization of the personality traits (please see Table 1, Section 4). The personality trait measures included widely used items in prior research focused on employees (Barrick, Mount, & Judge, 2001; Ng, Eby, Sorensen, & Feldman, 2005; Ones, Dilchert, Viswesvaran, & Judge, 2007) or CEOs (Brandstätter, 2011; Hao Zhao, Seibert, & Lumpkin, 2010; H. Zhao & Seibert, 2006). They exhibit strong reliability and validity. We used a well-established instrument, featuring six items to measure each trait (Goldberg, 1999). As shown in Table 1, the measures achieved satisfactory reliability. The Cronbach's alpha values all exceeded .7 (Hair et al., 2010): agreeableness (α = .812), conscientiousness (α = .776), extraversion (α = .761), openness to experience (α = .757), and emotional stability (α = .767).*

Concerning the calibration, this is an essential step in fsQCA. Why did you choose to calibrate the date into fuzzy sets the way you did?

> *We justify the approach we used to calibrate the data into fuzzy sets more clearly in Section 4.4. This approach is similar to performing a z-scale transformation of original data (Ragin, 2008; Woodside, 2013). We applied the approach used by Ganter and Hecker (2014), which maximizes the validity of the estimates, because set membership is defined on the basis of theoretical and substantive knowledge (Fiss, 2011; Ragin, 2008).*

Maybe adding some more sentences what the membership scores are all about would also help. Also, elaborate more on Figure 1 and 2. What do we see here?

> *We adopted this recommendation and provide more detail about membership scores in Section 4.4):*
> *Drawing on the measurement scales – anchored on a six-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (6) — we used SPSS software to generate factor scores[1] with standardized values for each variable. This approach, similar to performing a z-scale transformation of the original data (Ragin, 2008; Woodside, 2013), maximizes the validity of estimates, because set membership gets defined on the basis of theoretical and substantive knowledge (Fiss, 2011; Ragin, 2008). The factor scores were sorted using the "Sort Ascending" function in fuzzy set application to specify three interval-scale values: minimum rank values corresponding to full non-membership for "strongly disagree" responses, median values corresponding to the crossover point of values, and maximum rank values corresponding to full membership for "strongly agree" responses. The conversion of the interval scale values to fuzzy set membership scores relied on a "calibration" method and the transformation of the data to a scale over the interval (0, 1) as recommended by Ragin (2008). The minimum rank values correspond to 0; the maximum rank values correspond to 1. In turn, the specified values of the interval scale variable, corresponding to the three qualitative breakpoints that structure the fuzzy set (Ganter & Hecker, 2014), were as follows: The threshold for full non-membership included first quartile values (fuzzy score = .05), the crossover point represented median values (fuzzy score = .50), and the threshold for full membership featured third quartile values (fuzzy score = .95). These benchmarks served to transform the interval scale values into fuzzy membership scores, according to the log odds of full membership (Ragin, 2008). We also chose to remove Figures 1 and 2, because the explanations now appear in the text.*

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[1] Multiple regression used to estimate factor scores.

5) Findings and Discussion.
This is a bad management of expectations. The abstract says you provide "some" equifinal configurations, on page 15 you say it's "many different combinations". In fact, it is exactly two. The results as such also seem a bit underwhelming. This is probably because you need to do much better in discussing the findings. What have we learned in contrast to extant research? How exactly do your results help to explain inconsistencies in the literature? This was, after all, your motivation to do this research in the first place. What are the implications from your research?

> *As you suggest, the multiplicity of configurations was not our main intended contribution, and we apologize that this statement was misleading on that point. We have clarified our contribution and objectives in the introduction and discussion sections.*
>
> *Specifically, we repositioned our study as focused on market knowledge and CEOs' personality, such that we make a two-fold contribution by:*
> - ***Investigating the antecedents of market knowledge.** This question remains underresearched, despite the demonstrated importance of market knowledge for firm performance. We cite a few exceptions of studies that consider some antecedents at the organizational level. We also explain why considering the personality of the CEO as a new antecedent better describes the idiosyncratic nature of market knowledge.*
> - ***Revealing interdependencies across personality traits and offering a more integrated view of the Big Five**. We review a few prior studies that investigate how traits interact to influence an outcome. We show that fsQCA can reveal the differences across traits in terms of the nature (not just the size) of their influence, as well as some interesting complementarities. This finding has implications for personality research at large, not only research on market knowledge. We therefore revise our statement to emphasize not merely that "many different combinations" exist but rather that certain traits constitute necessary conditions, whereas others exhibit substitutive or complementary relationships.*
>
> *Again, thank you for your very valuable comments.*

Reviewer #2: Review of JBR-D-15-00122

I like what you are aiming to do here. The manuscript's setup is quite clear in laying out the inconsistent relationship between CEO personality and the entrepreneurial process, making the argument that inconsistent findings of prior studies may be due to the fact that they employ a correlational approach when really a configurational approach would be appropriate here. The argument is convincing and thus the application of fuzzy set QCA to this issue seems quite appropriate. The data mostly are very appropriate as well, so in principle you have the makings of a successful contribution in place. There are several areas that I'd like you to strengthen and improve, but overall I don't see a "fatal flaw" here.

> *Thank you very much for this encouraging feedback.*

1. My first issue relates to the operationalization of your key outcome. The connection between the entrepreneurial process as your focal construct and market knowledge as your outcome of interest is not well developed. It was helpful to see that prior studies have linked market knowledge to product innovation and new product advantages, but it seems to me that you are primarily measuring the connection between CEO personality and their knowledge of the market, which is interesting but not

precisely the connection between personality and entrepreneurial process, with the latter seemingly presenting a much broader and more multifaceted *process* as opposed to mere knowledge. What I am suggesting is that you should slightly reposition your contribution to more squarely focus on market knowledge. Such knowledge is evidently important for SMEs so the puzzle in principle still remains. Alternatively, if you could shore up that prior studies cited on page 1 have primarily measured
the entrepreneurial process using market knowledge that would also be helpful, but to my mind both are not the same and thus a cleaner separation of both would be very helpful.

> *We have rewritten the introduction and theoretical sections to focus on the central concept of market knowledge. We insist on its importance for SMEs, and we point to the lack of research to date on its antecedents. We also have abandoned any reference to the entrepreneurial process, which was indeed confusing.*
>
> *Specifically, we repositioned our study as focused on market knowledge and CEOs' personality, such that we make a two-fold contribution by:*
> - ***Investigating the antecedents of market knowledge.*** *This question remains underresearched, despite the demonstrated importance of market knowledge for firm performance. We cite a few exceptions of studies that consider some antecedents at the organizational level. We also explain why considering the personality of the CEO as a new antecedent better describes the idiosyncratic nature of market knowledge.*
> - ***Revealing interdependencies across personality traits and offering a more integrated view of the Big Five***. *We review a few prior studies that investigate how traits interact to influence an outcome. We show that fsQCA can reveal the differences across traits in terms of the nature (not just the size) of their influence, as well as some interesting complementarities. This finding has implications for personality research at large, not only research on market knowledge.*

2. Next, I have a couple of methodological issues, some of them more significant while others are rather minor. I do group them together here and point out there importance as needed.

a. What was the minimum number of cases for a row to be considered in the analysis? You mention the minimum consistency level but not the number of cases in the paper. In principle three would seem likely but that's of course best chosen based on the tradeoff between # of cases and percent cases retained.

> *We provide more details about these questions in this revision. The minimum acceptable solution frequency was set to three; 32 cases fell into configurations that exceeded this minimum solution frequency (see the second paragraph of Section 4.3).*

b. Are you taking into account PRI consistency or simply raw consistency? I realize that there are no hard and fast rules regarding PRI consistency, but a minimum cutoff of .5 for PRI consistency seems not unreasonable and right now there is no information on this.

> *Following your recommendation, we have specified the consistency measure (please see the second paragraph of Section 4.3). We used raw consistency scores to measure the degree to which membership in each solution term was a subset of the outcome. The lowest acceptable raw consistency was .80, greater than the minimum recommended threshold of .75 (Ragin, 2008). We also specified that PRI consistency, an alternative measure of consistency, had a minimum cutoff of .50 to indicate overall high consistency (Ragin, 2008; Schneider & Wagemann, 2012).*

c. While the two issues above should be easy fixes, I am a bit concerned about the lack of information regarding how you chose your membership thresholds. Ragin has been quite clear that these should be based on prior theoretical or substantive knowledge and distributions are only a last resort. Is there no way to code these based e.g. on the survey questions (e.g. "I agree completely/somewhat/not at all") instead of merely the distribution? That would be very strongly preferable.

> *As suggested, we have added more detail about how we determined the membership thresholds (please see Section 4.4).*
> *Drawing on the measurement scales – anchored on a six-point Likert scale ranged from strongly disagree (1) to strongly agree (6) – we used SPSS software to generate factor scores, with standardized values, for each variable. This approach is similar to performing a z-scale transformation of original data (Ragin, 2008; Woodside, 2013). It maximizes the validity of estimates, as set membership is defined based on theoretical and substantive knowledge rather than the generation of an arbitrary numeric representation of the data (Fiss, 2011; Ragin, 2008). Factor scores were sorted using "Sort Ascending" function in fuzzy set application to specify three interval-scale values: minimum values corresponding to full non-membership for responses of "strongly disagree", median values corresponding to the crossover point of values, and maximum values corresponding to full membership for responses of "strongly agree". Interval-scale values were converted to fuzzy set membership scores using the method of "calibration" and by transforming data to a scale over the interval (0, 1) as recommended by Ragin (2008). The minimum rank values corresponding to 0 and the maximum rank values corresponding to 1 in data. We specified the values of an interval-scale variable that correspond to three qualitative breakpoints that structure a fuzzy set (Ganter & Hecker, 2014): the threshold for full non-membership representing the first quartile values (fuzzy score = 0.05), the cross-over point representing the median values (fuzzy score = 0.50), and the threshold for full membership representing the third quartile values (fuzzy score = 0.95). These three benchmarks are used to transform the original interval-scale values into fuzzy membership scores, using transformations based on the log odds of full membership (Ragin, 2008).*

d. Did you analyze the data for the presence of any necessary conditions before conducting the full truth table analysis? That is standard practice and it would be good to report the results first. Agreeableness might be a candidate but of course I can't tell from this data.

> *As recommended, we analyzed the data for the presence of any necessary conditions (please see the first paragraph of Section 5). Agreeableness and emotional stability were identified as necessary but not sufficient causes of CEOs' market knowledge. Thus, they might favor CEOs' market knowledge in combination with other traits, and they appear in all such configurations. In the discussion, we reflect further on this finding and draw several implications. For example, a particularly powerful implication is the need to reconsider the Big Five as a complex, integrated structure of traits with various, interactive roles, rather than as five unrelated factors.*

e. Please switch the rows and columns of Table 2 (i.e. transpose it) to make it more comparable to the standard presentation format currently used where causal conditions are in the rows on the left side and membership in the same configuration is shown vertically.

> *We transposed the rows and columns (it is Table 3 in the new version), as requested.*

f. Are there other control variables that prior studies on the relationship between personality and market knowledge have used? Do they need to be included here?

> *On the basis of feedback from both reviewers, we have restructured our paper to highlight the optimal combinations of personality dimensions and market knowledge. Although adding some control variables could be interesting, we believe that their integration in our model would not fit with our research purpose. Instead, we suggested that further research control for variables such as gender (Costa, Terracciano, & McCrae, 2001) or firm size (Ganter & Hecker, 2014) (please see last paragraph of section 5) .*

g. You don't seem to report the analysis for the absence of the outcome (i.e. not high market knowledge). Please do report these, even if briefly.

> *We analyzed the absence of the outcome and now include a footnote on the results in the revised paper. The table below provides more detail for your information; out of length considerations, we chose not to include it in the paper, but certainly could do so if you consider it necessary. The causes leading to the presence of high market knowledge differ somewhat from those that lead to its absence. A salient finding is that the absence of extraversion leads to the absence of market knowledge in all configurations. In addition, configuration 1, which features high market knowledge, shows some symmetry with configuration 4, which features the absence of market knowledge, such that extraversion in conjunction with emotional stability and agreeableness relates to high market knowledge, and the absence of extraversion in conjunction with the absence of emotional stability and agreeableness relates to the absence of market knowledge. No such symmetry occurs for configuration solution 2, which also relates to high market knowledge.*

Asymmetric analysis of the absence of CEO market knowledge:

Configuration	Solution					
	1	2	3	4	5	6
Openness	⊗		⊗		⊗	
Conscientiousness		⊗	⊗			⊗
Extraversion	⊗	⊗	⊗	⊗	⊗	⊗
Agreeableness				⊗	⊗	⊗
Emotional stability	⊗	⊗		⊗		
Consistency	0.856	0.875	0.883	0.852	0.862	0.875
Raw Coverage	0.457	0.430	0.439	0.434	0.445	0.438
Unique Coverage	0.033	0.014	0.017	0.011	0.015	0.016
Overall solution consistency	0.812					
Overall solution coverage	0.612					

Notes: Circles with a cross indicate an absence; blank spaces indicate a "don't care" situation, so the causal condition may be either present or absent.

h. Which solution to you report—the complex or parsimonious only? If you do report the intermediate, what were the directional assumptions you used?

> *The truth table algorithm distinguishes between parsimonious and intermediate solutions on the basis of easy and difficult counterfactuals (Ragin, 2008). The first is a parsimonious solution that includes all simplifying assumptions, regardless of whether they are based on easy or difficult counterfactuals. The second is an intermediate solution that only includes simplifying assumptions based on easy counterfactuals. A third solution is the most complex one that includes neither easy nor difficult counterfactuals. However, such a solution is usually needlessly complex and provides little real insight into the causal configurations (Fiss, 2011). In our research, causal conditions represent the core configurations, because*

> *they are part of both parsimonious and intermediate solutions (Fiss, 2011). In other words, our results show the same configuration groupings in both parsimonious and intermediate solutions (please see the second paragraph of Section 4.3).*

i. Please note that there is only one solution that can have several configurations instead of "solutions 1 and 2" as listed in your table and discussed in the paper.

> *We have revised any such instances of this mistake.*

j. Figures 1 and 2 are not very clear or helpful—I would drop them

> *We removed Figures 1 and 2; thanks.*

I do hope my comments are helpful—best of luck with an interesting study.

> *Once again, thank you for your very valuable comments.*

SME CEOs personality traits effects on market knowledge: A fuzzy set approach

Barthelemy Chollet

Associate Professor

Grenoble Ecole de Management

barthelemy.chollet@grenoble-em.com

Mickaël Géraudel

Associate Professor

University of Luxembourg

Centre for Research in Economics and Management

mickael.geraudel@uni.lu

Anis Khedhaouria

Associate Professor

Montpellier Business School

Montpellier Research in Management

a.khedhaouria@montpellier-bs.com

Caroline Mothe

Full Professor

University of Savoy

IREGE

caroline.mothe@univ-savoie.fr

Market knowledge as a function of CEOs' personality: a fuzzy set approach

1. Introduction

Information on customer needs, competitor behaviors, and market trends represents crucial inputs for crafting a firm's strategy (Li & Calantone, 1998). Such market knowledge (MK) helps firms design products that meet customer needs and exploit new opportunities (De Luca & Atuahene-Gima, 2007; Johnson, Piccolotto, & Filippini, 2009; Keh, Nguyen, & Ng, 2007; Zhou & Li, 2012). However, research on what drives increased MK and the factors that make some firms more effective in building MK than others is relatively sparse. The existing contributions tend to focus on the firm's organizational structure and processes (Ling-Yee, 2004; Luo & Hassan, 2009). To extend this line of research, the current study addresses other potential antecedents of high MK, in the specific context of small and medium-sized enterprises (SMEs).

Due to their small size and lack of marketing resources, small firms usually rely heavily on their chief executive officers (CEO) to scan the environment for market information (McGee & Sawyerr, 2003; Peters & Brush, 1996; Stewart, May, & Kalia, 2008). In this setting, MK is therefore highly idiosyncratic, depending on the personal dispositions of the CEO. In line with personality research, the current study predicts that CEO traits intervene in three facets of the process of developing MK: intensity of seeking (how persistent and motivated CEOs are in acquiring information), opportunity to access (how large is their potential access to information), and accuracy in processing (how objective and rational they are when processing information).

A second contribution of this research is to extend the understanding of the impact of CEO personality traits on key SME outcomes. Research that links personality traits to SME performance is burgeoning (Rauch & Frese, 2007; Zhao, Seibert, & Lumpkin, 2010) but has

1

not yet captured the interdependencies across traits. In particular, the "Big Five" traits (openness, conscientiousness, extraversion, agreeableness, emotional stability) traditionally appear as inherently and independently positive influences on focal outcomes (Barrick, Mount, & Judge, 2001; Ones, Dilchert, Viswesvaran, & Judge, 2007). To consider a more complex approach, this study undertakes a fuzzy set qualitative comparative analysis (fsQCA) of the Big Five personality traits. This analysis reveals discrete configurations of traits that lead to high MK, supports a more integrated view of the Big Five, and highlights differences across traits in terms of the nature of their influence.

Section 2 reviews how prior literature addresses the central concepts of this study, MK and CEO personality. Section 3 then provides theoretical predictions about the role of personality traits on MK and stresses the need for a configurational approach, supported by fsQCA. Section 4 covers the data collection and analysis. Section 5 examines the results. Finally, Section 6 includes a discussion of the findings, some limitations, and perspectives for further research.

2. Prior literature

2.1. Market knowledge

MK is defined as organized, structured information about the market, including customer needs, market trends, and competitors' behaviors (Li & Calantone, 1998; Marinova, 2004). The acquisition and use of MK benefits SME performance, as a general construct (Keh et al., 2007), as well as through product innovation, new product advantages (Bao, Chen, & Zhou, 2012; De Luca & Atuahene-Gima, 2007; Johnson et al., 2009; Li & Calantone, 1998), and export activities (Ling-Yee, 2004). Firms with more MK are in a better position to detect future market trends and adapt their strategy in the long run (Zhou & Li, 2012). They know better how to design products or services that match customer needs and how to differentiate their products (De Luca & Atuahene-Gima, 2007).

Despite this demonstrated importance, research on what favors the building of MK remains sparse. In a study of 189 firms in China, Ling-Yee (2004) determines that MK is influenced by both the internal structure and decision-making processes (e.g., extent to which top managers use briefings by field personnel) and the firm's external relationships (e.g., perceived cooperation with partners). With a focus on team dynamics at the top management level, Luo and Hassan (2009) study a sample of 271 Chinese firms. They find that MK depends on the specific composition (diversity) of the top management team and that the structure of relationships within the team can also be conducive to higher MK. Thus, MK appears not to be held by the firm at large but rather embodied in top managers.

The assertion that top managers represent a critical level of analysis for MK is particularly relevant in an SME context. These firms usually have limited resources or capabilities for conventional market research (Keh et al., 2007; Zhang, Macpherson, & Jones, 2006). Their CEOs depend on their own idiosyncratic knowledge of markets to craft strategic decisions (McGee & Sawyerr, 2003), a notion that motivates a steady stream of research describing the processes through which entrepreneurs perceive and scan their environment (Ebrahimi, 2000; Peters & Brush, 1996; Stewart et al., 2008). In line with this focus, the current study proposes that the development of MK may depend on CEOs' individual dispositions.

2.2.   *CEOs' personality*

The personality of a CEO is an important driver of meaningful outcomes at the firm level, such as profitability (Boone, Brabander, & Witteloostuijn, 1996), growth (Baum & Locke, 2004; Lee & Tsang, 2001), and survival (Ciavarella, Buchholtz, Riordan, Gatewood, & Stokes, 2004). Two meta-analyses offer integrative reviews of these relationships (Rauch & Frese, 2007; Zhao et al., 2010). The focus for the current study is on a specific set of traits, usually referred to as the Big Five: openness, conscientiousness, extraversion, agreeableness,

and emotional stability (McCrae & Costa, 1989). Openness to experiences implies intellectual curiosity and a willingness to search for new experiences and explore new ideas. People with low openness scores instead tend to be conventional, narrow in their interests, and unanalytical. Conscientiousness indicates a person's degree of organization, perseverance, and motivation at work. People with low conscientiousness are disorganized and quickly discouraged. People high on extraversion are gregarious, outgoing, warm, and friendly, whereas those who score low on extraversion prefer to spend more time alone and are characterized as reserved, quiet, and independent. Agreeableness indicates whether a person is trustworthy, altruistic, and likely to take care of others, or else is manipulative, self-centered, wary, and lacking in compassion. Emotional stability describes individuals who are self-confident, calm, even-tempered, and relaxed. Contrarily, people with low emotional stability tend to experience negative emotions, such as anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability.

The Big Five offer an appropriate framework for the current study for two main reasons. First, they are well-established predictors of multiple outcomes, including job performance (Barrick et al., 2001; Ones et al., 2007) and career success (Ng, Eby, Sorensen, & Feldman, 2005). Studies of SMEs in particular often make use of the Big Five traits, along with two other traits: need for achievement or risk propensity (Brandstätter, 2011). Second, evidence shows that the Big Five influence how people acquire and process information (DeYoung et al., 2010; Heinström, 2003; Hirsh & Inzlicht, 2008). They should therefore affect the level of MK held by CEOs.

3. Theoretical development

In line with prior personality research, traits should influence three aspects of CEOs' acquisition of MK: intensity of information seeking, opportunity for accessing information, and accuracy of information processing. "Intensity" in this context refers to persistence,

motivation, and thoroughness by CEOs in their search for information. "Opportunity" accounts for the potential access to information that CEOs have, by virtue of their social context and social connections, regardless of any deliberate information-seeking behavior on their part. Finally, "accuracy" pertains to any mechanism that affects CEOs' ability to sense their environment with clarity and limited bias. The following sections review how each Big Five trait might influence these three aspects and ultimately affect the level of MK.

3.1. *Personality and intensity of information seeking*

Managers exhibit variable levels of interest and intensity in searching for information about their environment (Ebrahimi, 2000). Two traits of the Big Five, by definition, entail a specific relationship to information search and uses: openness to experience and conscientiousness. First, curiosity is a fundamental component of openness to experience. People high on this trait have a natural attraction for novel information (McCrae, 1987), broader interests, and a tendency to be particularly active and broad in their information searches. In contrast, people low on the openness trait feel more comfortable staying with what they already know well and do not seek novel information (McCrae, 1987). As a confirmation, Shane et al. found openness to be a predictor of opportunity recognition ability among U.K. business owners (Shane, Nicolaou, Cherkas, & Spector, 2010), likely because this trait favors "broad information acquisition, critical analysis, and a willingness to examine disconfirming data" (Shane et al., 2010, p. 293).

Conscientiousness also implies active information-seeking behavior, for reasons other than inherent curiosity. Meta-analyses confirm a dominant impact of this trait, beyond all others, on job performance (Barrick et al., 2001; Ones et al., 2007) and career success (Ng et al., 2005). Conscientious persons are more committed to all aspects of their job, and they persist more in the face of difficulties (Zhao et al., 2010). For example, in a study of 245 unemployed job seekers, conscientiousness predicted the intensity of their search behaviors

(Wanberg, Watt, & Rumsey, 1996). Moreover, because they are fundamentally well-organized and prepared in advance (Barrick et al., 2001), conscientious people are better equipped to handle and integrate larger information loads.

In support for these notions, a study carried on a student population reveals that conscientiousness and openness are the only traits of the Big Five that significantly explain the level of effort devoted to information search (Heinström, 2003).

3.2. *Personality and opportunity for accessing information*

A steady stream of research shows that CEOs vary in their potential access to information, as a function of how socially connected they are (Stam, Arzlanian, & Elfring, 2014). That is, MK results from social positions within discussion networks, not just CEOs' information-seeking behavior. Recent research also confirms that CEOs are better informed about their environment and achieve better firm performance when they hold a brokerage position within discussion networks (Stam et al., 2014), i.e. when they are connected to many otherwise unrelated clusters of contacts (Burt, 1992).

Such a network position depends strongly on personality, particularly extraversion, the most interpersonal disposition (McCrae & Costa, 1989), which determines how much people seek and enjoy social interaction. In a meta-analysis of how personality predicts advantageous positions in interpersonal networks, Fang et al. (2015) find that extraverted people tend to occupy brokerage positions in advice networks. Because they are socially more engaging, they manage to connect with more people and navigate various social clusters. This benefit of brokerage is predominantly an exposure effect; brokers access a wider range of information in the natural course of their daily interactions, even in the absence of deliberate information-seeking behavior (Burt, 1992). Moreover, extraversion influences the intensity of interactions with each contact (not only the number and diversity of contacts). Thus Lee and Tsang (2001) find, in a sample of 168 SME CEOs in Singapore, that extraversion relates to communication

frequency with external partners. Such in-depth, repeated interactions increase the chances of accessing valuable information from contacts (Levin & Cross, 2004).

3.3.   Personality and accuracy of information processing

Personality influences fundamental cognitive processes and therefore can account for differences in how people interpret information. People vary in their ability to perceive their environment accurately and interpret pieces of information, free of bias. This phenomenon has clear consequences for how managers analyze their environment and make decisions (Porac, Thomas, & Baden-Fuller, 2011). Two traits should have a specific influence on this aspect of MK acquisition: agreeableness and emotional stability. Low emotional stability has been shown to reduce performance on various cognitive tasks, as a result of the interpretation and memory biases it creates (Byrom & Murphy, 2013). Emotionally unstable people are biased toward negative information and usually fail to sense positive information (Chan, Goodwin, & Harmer, 2007); they also are more averse to uncertainty (Berenbaum, Bredemeier, & Thompson, 2008; Hirsh & Inzlicht, 2008). In contrast, emotionally stable people exhibit more tolerance for ambiguity and adverse information, and they interpret information with more rationality and objectivity (Nadkarni & Herrmann, 2010), which produces a more accurate picture of environment.

Similarly, agreeableness relates to a better ability for perspective taking (Graziano & Tobin, 2009). Agreeable people can depart from their own beliefs and preferences and consider the opinions of others. This ability is particularly crucial for business leaders who, by virtue of their powerful position, are not formally required to integrate opinions from outside their company or from lower ranking employees. But CEOs with high agreeableness naturally pay equal attention to all interaction partners, regardless of their status (Nadkarni & Herrmann, 2010). Last, because they convey a positive, open image and appear trustworthy to

the people they know, agreeable leaders also increase the chances that others share unbiased information and opinions openly with them (De Jong, Song, & Song, 2013).

3.4. *A fuzzy set approach to the effects of personality on market knowledge*

The Big Five framework has gained widespread acceptance in personality research for its ability to embrace multiple, key, nonoverlapping, broad domains. Most studies, including those focused on CEOs, seek to identify the independent influences of each trait. However, some authors note the limitations of considering the traits as purely independent entities (Arthur, Woehr, & Graziano, 2001). That is, traits "do not exist in a vacuum, but co-exist within individuals" (Penney, David, & Witt, 2011, p. 303), so the notion that they never work together to produce an outcome seems unlikely. The theoretical framework summarized in the preceding sections, in terms of intensity, opportunity, and accuracy, implies potential strong complementary effects. In particular, traits typical of intensive information seekers (conscientiousness and openness) might be influential only in the presence of traits that favor accuracy (agreeableness and emotional stability): Whatever the amount of information collected through intense seeking, it cannot transform into solid MK if the information is processed with strong attention or interpretation biases. A similar argument could be made for extraversion, which provides access to information even in the absence of seeking behavior but still demands accurate processing to be effective.

A few studies consider possible interactions between traits (Blickle et al., 2013; Judge & Erez, 2007; Witt, 2002; Witt, Burke, Barrick, & Mount, 2002), all with a "net-effects" estimation approach (Ragin & Fiss, 2008; Woodside, 2013) that disaggregates the various characteristics of an observation (i.e., various traits) and considers them as independent. This approach does support tests of joint effects, in the form of cross-products of two or more variables, and it can investigate virtually any kind of trait interaction. However, it has serious practical limitations. The required sample size and multicollinearity issues both increase

dramatically with the number of variables considered (Woodside, 2013). Therefore, most efforts focus on two-way interactions (Blickle et al., 2013; Witt et al., 2002), instead of considering "an individual's entire constellation of traits" (Penney et al., p. 303). Another approach, the circumplex model, focuses on second-order factor loadings of the Big Five, such that each specific combination of two traits becomes a trait of its own (Hofstee, De Raad, & Goldberg, 1992), measured as such (Judge & Erez, 2007; Witt, 2002). However, these two-by-two combinations of traits ignore further combinations of higher order.

These limitations suggest the need for an alternative approach; this study opted for fsQCA. As a set-based approach, it considers observations as combinations of attributes (Fiss, 2011). It relies on comparison of cases, set-theoretic analysis of set–subset relationships, and the application of Boolean algebra (Ganter & Hecker, 2014) to identify combinations that systematically discriminate members of the set showing high level of the target outcome. With this focus on "causal recipes" (Ragin, 2008), fsQCA is uniquely suited to seizing complex complementarities among factors (Ganter & Hecker, 2014; Henik, 2015; Ragin & Fiss, 2008; Woodside, 2013).

Moreover, an important tenet of fsQCA is that more than one combination can lead to the outcome (i.e., equifinality; Fiss 2007), which also has important implications for theory building, beyond confirming the conjunctive nature of causality. Instead of revealing how the traits' effects differ in size, as econometric methods would do, fsQCA sheds light on how they differ in nature. For example, if different combinations of traits lead to similar outcomes, it means that some traits can substitute for one another (Woodside, 2013). Other traits might be necessary conditions for an outcome, as indicated by their appearance in all combinations (Fiss, 2007). They would in this case hold a very unique place in the larger five factor model. All in all, using fsQCA supports a conceptualization of the Big Five model as a complex,

integrated structure of traits, each playing distinct in nature but interrelated roles, rather than as five unrelated factors.

4.   Data and measurement

The data for this study came from a sample of 409 CEOs of manufacturing SMEs[1] located in Haute-Savoie, France. The data were collected in December 2007, using a survey mailed to the CEOs of all 1,581 manufacturing SMEs listed in the databases of the Haute-Savoie Chamber of Commerce and Thésame.[2] The survey invitation included a cover letter, explaining that the study was supported by the Chamber of Commerce and Thésame. From the set of 427 responses, the removal of incomplete questionnaires left a sample of 409 CEOs who provided all required data. The response rate was 25.43%, very satisfactory compared with the standards in other studies (Bartholomew & Smith, 2006).

To prevent self-reported biases, this study followed existing recommendations for detecting the potential for common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff & Organ, 1986). The scale anchors and format in the questionnaire varied, to avoid any method bias caused by commonalities across measures (Podsakoff et al., 2003). To address common method variance, Harman's one-factor test sought to isolate any covariance due to artifacts (Podsakoff & Organ, 1986). A single unrotated principal component should not explain more than 50% of the variance for all indicators measured with the same method; the results show an explained variance of 12.68%, indicating no common method concerns.

Many respondents held graduate degrees (47.79%), were men (79.90%), and had long tenures with their company (more than 10 years, 57.11%). Moreover, 44% of the firms had fewer than 10 employees, 39% employed between 10 and 49 people, and almost 17% had

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[1] According to the European Commission, a SME is a firm with fewer than 250 employees (see http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm).
[2] Thésame is an Arve Valley organization that provides support to local firms in the metal products, mechanical engineering, and electronics industries.

between 50 and 250 employees. Firms represented the metal products (25%) or electronics industries (24%), followed by chemicals (18%) and industrial machinery (13%).[3]

4.1. Outcome measure

The outcome variable is MK, measured using a holistic measurement approach adapted to the individual level (De Luca & Atuahene-Gima, 2007). In accordance with the holistic approach, CEOs responded to a series of items.[4] The factor analysis of the items revealed that five loaded above .50 on their corresponding constructs, with eigenvalues exceeding 1 (Hair, Black, Babin, & Anderson, 2010). The Cronbach's alpha value of .724 indicated the good reliability of the following items: "I have easy access to knowledge about markets," "I am aware of the evolutions in my industry," "I can anticipate major changes in my industry," "When someone needs knowledge on a market, he/she turns to me," and "I can easily identify market opportunities for my company." The resulting measure reflected the aggregate perceived level of MK.

4.2. Independent measures

The measures of the Big Five personality traits relied on widely used items that exhibit strong reliability and validity (Barrick et al., 2001; Ones et al., 2007; Zhao & Seibert, 2006). The International Personality Item Pool website[5] provides translated version of the most frequently used items. This study used six items for each trait (Goldberg, 1999). Pretests helped ensure that all items were easy to understand. As Table 1 shows, the measures achieved satisfactory reliability, with Cronbach's alpha values greater than .7 (Hair et al., 2010).

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[3] A comparison of the final sample with the parent population revealed no statistically significant differences in firm size or sector of activity.
[4] The items were pretested with 5 management science researchers and 15 randomly selected CEOs.
[5] See http://ipip.ori.org/ipip.

Table 1. Big Five personality traits and measures

Personality traits	Items	Cronbach's alpha (α)
Openness to experience	- OPE 1: Have a rich vocabulary - OPE 2: Have difficulty understanding abstract ideas (R) - OPE 3: Have a vivid imagination - OPE 4: Have excellent ideas - OPE 5: Am quick to understand things - OPE 6: Spend time reflecting on things	.757
Conscientiousness	- CON 1: Get chores done right away - CON 2: Pay attention to details - CON 3: Often forget to put things back in their proper place (R) - CON 4: Like order - CON 5: Follow a schedule - CON 6: Am exacting in my work	.776
Extraversion	- EXT 1: Am the life of the party - EXT 2: Don't talk a lot (R) - EXT 3: Keep in the background (R) - EXT 4: Start conversations - EXT 5: Talk to a lot of different people at parties - EXT 6: Don't like to draw attention to myself (R)	.761
Agreeableness	- AGR 1: Feel little concern for others (R) - AGR 2: Am interested in people - AGR 3: Sympathize with others' feelings - AGR 4: Take time out for others - AGR 5: Feel others' emotions - AGR 6: Make people feel at ease	.812
Emotional stability	- EMS 1: Stressed out easily (R) - EMS 2: Am relaxed most of the time - EMS 3: Worry about things (R) - EMS 4: Get irritated easily (R) - EMS 5: Have frequent mood swings (R) - EMS 6: Often feel blue (R)	.767

4.3.   Transforming data into sets

The current study uses a set-theoretic approach based on fsQCA, an analytic technique

that allows for assessments of how causal conditions contribute to an outcome. This approach

can analyze causal processes effectively, because it reflects a configurational understanding of

how causes combine to induce outcomes and can handle significant levels of causal

complexity (Fiss, 2007, 2011; Ragin, 2000, 2008). Specifically, fsQCA examines causal

patterns by focusing on set–subset relationships (Fiss, 2011). To explain which configurations

lead to high MK, this method examines the members of the set of "MK traits"; identifies

combinations of attributes that are associated with the outcome of interest (high MK), using

Boolean algebra and algorithms that accept logical, complex, causal conditions; and defines a reduced set of configurations that lead to the outcome (Fiss, 2011; Ganter & Hecker, 2014; Woodside, 2013).

To accomplish this identification of configurations empirically, fsQCA proceeds in three main steps (Fiss, 2011). First, with the independent and dependent variables transformed into sets, the process creates a data matrix called "a truth table" with 2^k rows.[6] Second, two conditions serve to reduce the number of rows: (1) the minimum number of cases required for a solution to be considered and (2) the minimum raw consistency[7] level for the solution. In the current study, the lowest acceptable raw consistency for solutions is .80, which is greater than the minimum recommended threshold of .75 (Ragin, 2008). Note that the proportional reduction in consistency (PRI), which is another alternative measure of consistency, has a minimum cutoff of .50 indicating a high consistency (Ragin, 2008; Schneider & Wagemann, 2012). The minimum acceptable solution frequency was set to three, and 32 cases fell into configurations that exceeded this solution frequency. The estimates of empirical coverage[8] provide information about the relevance of each condition. Third, an algorithm based on Boolean algebra logically reduces the truth table rows to simplified combinations. The current study uses the truth table algorithm described by Ragin (2008), which is based on a counterfactual analysis of causal conditions and can overcome limitations due to insufficient empirical instances (Fiss, 2011). Thus, the truth table algorithm provides parsimonious and intermediate solutions, on the basis of "easy" and "difficult" counterfactuals[9] (Ragin, 2008).

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[6] K is the number of causal conditions in the analysis (5 for this study). Each row is associated with specific combinations of attributes, and the full table lists all possible combinations. The empirical cases (observations) get sorted into the rows of the truth table on the basis of their values on these attributes, so rows may contain many, few, or no cases.

[7] The consistency index is analogous to a correlation coefficient and measures the degree to which membership in each solution term is a subset of the outcome (Fiss, 2011; Woodside, 2013).

[8] Solution coverage is analogous to the coefficient of determination (R^2) (Woodside, 2013) and measures the proportion of memberships in the outcome explained by the complete solution. Raw coverage measures the proportion of memberships in the outcome explained by each solution term assumed to be present; unique coverage measures this proportion explained solely by each solution term, "not covered by other solution terms" (Ganter & Hecker, 2014, p. 1284).

[9] Easy counterfactuals refer to situations in which a redundant causal condition joins a set of causal conditions that already lead to the outcome in question. The presence or absence of the added causal condition has no effect on the outcome. Difficult counterfactuals refer to situations in which a condition can be excluded from a set of causal conditions that lead to

A parsimonious solution includes all simplifying assumptions; an intermediate solution includes only those simplifying assumptions based on easy counterfactuals. A complex solution would include neither easy nor difficult counterfactuals, but this solution usually is unnecessary, providing little insight (Fiss, 2011). The causal conditions represent the core configurations herein, because they are part of both parsimonious and intermediate solutions (Fiss, 2011).

4.4.   Calibration

The fsQCA requires transforming variables into sets, calibrated according to three substantively meaningful thresholds (Ragin, 2008): full membership, full non-membership, and the crossover point, or "the point of maximum ambiguity (*i.e.*, fuzziness) in the assessment of whether a case is more in or out of a set" (p. 30). The crossover point qualitatively anchors the fuzzy set's midpoint between full membership and full non-membership (Ragin, 2000). Drawing on the measurement scales – anchored on a six-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (6) — we used SPSS software to generate factor scores[10] with standardized values for each variable. This approach, similar to performing a z-scale transformation of the original data (Ragin, 2008; Woodside, 2013), maximizes the validity of estimates, because set membership gets defined on the basis of theoretical and substantive knowledge (Fiss, 2011; Ragin, 2008). The factor scores were sorted using the "Sort Ascending" function in fuzzy set application to specify three interval-scale values: minimum rank values corresponding to full non-membership for "strongly disagree" responses, median values corresponding to the crossover point of values, and maximum rank values corresponding to full membership for "strongly agree" responses. The conversion of the interval scale values to fuzzy set membership scores relied on a "calibration" method and the transformation of the data to a scale over the interval (0, 1) as

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an outcome, with the assumption that this condition is redundant; in these cases, determining whether the removed condition is redundant is more difficult (Fiss, 2011).

[10] Multiple regression used to estimate factor scores.

recommended by Ragin (2008). The minimum rank values correspond to 0; the maximum

rank values correspond to 1. In turn, the specified values of the interval scale variable,

corresponding to the three qualitative breakpoints that structure the fuzzy set (Ganter &

Hecker, 2014), were as follows: The threshold for full non-membership included first quartile

values (fuzzy score = .05), the crossover point represented median values (fuzzy score = .50),

and the threshold for full membership featured third quartile values (fuzzy score = .95). These

benchmarks served to transform the interval scale values into fuzzy membership scores,

according to the log odds of full membership (Ragin, 2008)[11]. Table 2 contains the values for

the three points for each personality trait and MK.

Table 2. Summary data: market knowledge, openness, conscientiousness, extraversion, agreeableness, and emotional stability

Statistics	Market knowledge	Openness	Conscientiousness	Extraversion	Agreeableness	Emotional stability
N	409	409	409	409	409	409
Median	0.013	-0.188	-0.203	-0.162	-0.035	-0.159
Minimum	-3.273	-4.768	-3.456	-3.805	-4.959	-2.672
Maximum	2.542	2.143	1.876	2.257	2.304	2.745
Calibration values at						
.05	-1.718	-1.570	-1.663	-1.642	-1.717	-1.589
.50	0.013	-0.188	-0.203	-0.162	-0.035	-0.159
.95	1.757	1.731	1.876	1.632	1.434	1.661

5.   Research findings

The first step was to analyze the data for the presence of any necessary conditions.

Agreeableness and emotional stability emerged as necessary but not sufficient causes of MK;

that is, these two traits favor MK in combination with other traits and appear in all such

configurations. To specify the precise configurations that lead to MK, this study next applied

a truth table analysis. Table 3 contains the results of the fsQCA of configurations that explain

MK. As this solution table shows, two configurational groupings produce high MK with

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[11] Using the calibrate function (x,n1,n2,n3), where x is the name of the existing interval scale variable, the first number (n1) is the value of x that corresponds to the threshold for full non-membership in the target set (.05), the second number (n2) is the value of x that corresponds to the cross-over point (.50) in the target set, and the third number (n3) is the value of x that corresponds to the threshold for full membership in the target set (.95).

sufficient consistency (>.75; Ragin, 2008). These results imply equifinality, in that different configurational groupings lead to MK.

Table 3. Configurational asymmetric analysis of high CEO market knowledge

Configuration	Solution	
	1	2
Openness		●
Conscientiousness		●
Extraversion	●	
Agreeableness	●	●
Emotional stability	●	●
Consistency	0.860	0.903
Raw coverage	0.467	0.389
Unique coverage	0.117	0.038
Overall solution consistency	0.852	
Overall solution coverage	0.506	

Notes: Each configuration represents a parsimonious solution. Black circles indicate the presence of a condition; blank spaces indicate a "don't care" situation, in which the causal condition may be either present or absent.

In the first configuration, 86% of CEOs who exhibit extraversion, agreeableness, and emotional stability reach high MK, regardless of whether they exhibit openness and conscientiousness (i.e., blank space signals "don't care" situations for those causal conditions). According to the raw coverage level, each configuration term in this set (i.e., extraversion, agreeableness, and emotional stability) explains 46.7% of a CEO's MK as the focal outcome. The second configuration indicates that 90.3% of CEOs who exhibit openness, conscientiousness, agreeableness, and emotional stability reach high MK, regardless of whether they exhibit extraversion. Each configuration term in this set explains 38.9% of the MK outcome[12]. Overall, these results indicate that two distinct configurations of CEOs' personality traits can explain MK. Their comparisons reveal some instructive differences and commonalities, as discussed next.

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[12] A parallel analysis for the absence of the outcome (i.e., not high MK) reveals that the causes leading to the absence of MK differ substantially from those leading to its presence. One notable result is that the absence of extraversion leads to the absence of MK in all configurations.

6.   Discussion

This study contributes to two distinct streams of literature. First, it adds to recent attempts to understand the factors of MK, a well-established source of firm performance. In contrast with prior work focusing mainly on internal organizational factors (Ling-Yee, 2004; Luo & Hassan, 2009), the current study reveals the specific role of CEOs and the idiosyncratic nature of the development of MK. By demonstrating the influence of individual traits on MK levels, the results suggest the need to account better for the cognitive underpinnings of MK formation. A micro-analytical approach to MK, with top managers as a relevant level of analysis, appears to offer a necessary complement to studies that consider this construct as an asset of the firm at large.

Second, the findings offer interesting implications for the study of the personality of top managers in general. Extensive meta-analytical work has crowned several decades of studies that show that personality influences entrepreneurial intention and success (Collins, Hanges, & Locke, 2004; Rauch & Frese, 2007; Zhao et al., 2010) and that entrepreneurs differ fundamentally from managers in their traits (Stewart & Roth, 2001, 2007; Zhao & Seibert, 2006). However, prior studies mainly confirm effects on broad ends and outcomes (e.g., survival, growth), without unveiling the complex mechanisms at play. Being the CEO of a SME entails various roles, and the performance of each might be affected in specific ways by that CEO's personality (Brandstätter, 2011). The personality traits involved in improving MK could be detrimental to the task of, say, securing adequate funding. Hence, the need to focus on specific entrepreneurial tasks, instead of just end results (Brandstätter, 2011). Shane, Locke, and Collins (2003) raise similar claims, arguing that attention should now focus on which variables mediate the relationship between personality and success. The rare attempts to date mostly address how personality influences internal dynamics, such as the functioning of top management teams (De Jong et al., 2013; Peterson, Smith, Martorana, & Owens, 2003)

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or their strategic flexibility (Nadkarni & Herrmann, 2010). The current study should bring more attention to the role of personality on another CEO roles, namely, the development of MK.

As another contribution to CEO personality literature, this study presents the application of fsQCA as a new way to reveal complex interdependencies among traits. Only a few studies examine interactions of traits (Blickle et al., 2013; Judge & Erez, 2007; Witt, 2002; Witt et al., 2002), and all of them limit their focus to a specific pair of traits. The current findings provide evidence of complex substitutive and complementary relationships across all five personality traits. Further research accordingly should consider applying fsQCA and think in terms of trait configurations to understand how the five traits differ in the nature, not just the size, of their influence.

Looking at the specifics of the findings, they raise one salient point: Both configurations that lead to high MK include agreeableness and emotional stability, indicating that these traits are necessary conditions. This result sheds new light on the process by which CEOs acquire MK. Both traits relate to the accuracy aspect of MK acquisition, and prior research has clearly identified their influence on cognitive processes, such that they lower the chances of attention or interpretation biases. Regardless of their efforts to source (intensity) and their potential access to (opportunity) information, the way CEOs process the information thus appears central: Neither good access nor active seeking behavior is any good if the information is not "read through the right lenses." If cognitive mechanisms thus are key to understanding the influence of personality on MK, additional research should explore this component further. An experimental approach probably would be well suited to this goal; prior research already has captured cognitive processes involved in the formation of MK this way (Dimov, 2007; Eisenstein & Hutchinson, 2006), though never with personality as a covariate.

Agreeableness and emotional stability affect MK in conjunction with either extraversion (regardless of the presence or absence of conscientiousness and openness) or conscientiousness and openness (regardless of the presence or absence of extraversion). Openness to experience and conscientiousness both refer to the behavioral dimension of information acquisition, i.e. how CEOs search for information. Openness implies curiosity, leading to the hunger for novel information; conscientiousness entails stronger persistence and thoroughness in information search. Extraversion differs, in that it captures the social dimension of information acquisition. Because they are socially more active, extraverts tend to be central in discussion networks and exposed to more information flows, an advantage that occurs even in the absence of deliberate search behavior (Burt, 1992).

Although any definitive interpretation seems premature, the dichotomy of CEOs who rely on either a "behavioral" or a "social" form of information acquisition suggests that CEOs differ in their practices. This result echoes prior research that shows that not all SME CEOs use the same sources when scanning their environment, and a notable distinction in this regard is the one between impersonal (e.g., websites, papers) and personal (e.g., social contacts) sources (McGee & Sawyerr, 2003; Peters & Brush, 1996; Schafer, 1990; Smeltzer, Fann, & Nikolaisen, 1988). Further research should examine if information source preferences mediate the relationship between trait configurations and MK. Sawyer, McGee, and Peterson (2003) also distinguish internal and external sources; the current study did not include this aspect, but personality certainly might affect whether managers prefer one type of source over another.

With the present evidence that personality influences MK, further research should seek to deepen understanding of the boundary conditions of this influence. In particular, researchers could note any moderating effects of the characteristics of the firm's environment. Regardless of the CEO's profile, acquiring MK is obviously more challenging and uncertain

in fast-moving, information-intensive environments (Zaheer & Zaheer, 1997). Bao et al. (2012) show that technological turbulence and competitive intensity moderate firms' ability to exploit new knowledge. An interesting follow-up to the current study would be to examine which personality profiles make the best match for highly turbulent and complex, as opposed to stable and simple, environments.

Finally, the current study contains some limitations that further research might address. The proposed measurement strategy is unlikely to suffer from common method biases, but more research on this question is warranted. In particular, the data collection instrument relies on self-reported measures, and such perceptual measures can lead to biases, especially when the data collection occurs at a single point in time. To overcome this issue, additional research should collate different measures spread over time or use separate primary and secondary observations. A longitudinal study could investigate path dependencies in the development of the configurations that explain the relationships. Research also is needed to control for potentially influential factors, such as gender (Costa, Terracciano, & McCrae, 2001) or firm size (Ganter & Hecker, 2014). Additional applications of fsQCA to the field hold great promise for advancing knowledge about the antecedents of MK; the present study represents an initial attempt that should spark further replications.

6.   References

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