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## THE IMPACT OF FINANCIAL MANAGEMENT ON INNOVATION

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**Abstract.** In the current competitive market, innovation has become a crucial element for organizations, willing to grow. Financial management in this regard is playing a significant role in improving firms' innovation capacity. This research paper evaluates the impact of financial management components on innovativeness of Austrian SMEs. Using data of 118 employees from 41 SMEs operating in Austria, the research finds a significant impact of the financial management model on firms' innovation. The three components: liquidity, controlling, and financial literacy are statistically significant in explaining innovativeness at 1% level. The study suggests focus on the three financial management constructs in order to improve their innovation capability and capacity.

**Keywords:** Financial Management, Financial Controlling, Liquidity, Financial Literacy, Innovativeness, Innovation Capacity

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**JEL Classifications:** M11, M160, G200, O10

**Additional disciplines** ecology and environment; finance

### 1. Introduction

Organisations are anticipated to act promptly and appropriately towards the high market pressures to meet the customers' changing demands due to the increasing competition in the dynamically growing market. In this regard, the basic but the most critical aspect is of adequate financial controlling, in terms of planning the finances and managing the liquidity aspects as well (Kozubikova, Homolka, & Kristalas, 2017; Belas & Sopková, 2016; Ključnikov, Kozubiková, & Sopková, 2017). Meanwhile, it has also been contended that the organisations these days are more concerned towards turnover and profit margins, rather than keeping the financial aims and liquidity as the prime objectives (Upadhaya, Munir, & Blount, 2014; Frame, & White, 2014). Besides, there is another notable aspect of the increasingly competitive market that demands the organisations to be considerate enough, in order to gain the maximum level of competitive advantage within the respective industry (Hristov, & Reynolds, 2015). Innovation management is the most crucial element that has acquired potential magnitude in an integrated manner with the management of finances if the firm intends to be a leading entity even in the incessantly increasing competitive marketplace (Hausman, & Johnston, 2014; Schrage, 2013; Laužikas et al., 2017).

With respect to the element of managing the innovation within an organisational framework, it has been stated that these innovations are employed to mitigate the likely adversities within the technical areas. If managed appropriately, the resulting outcomes are ultimately beneficial both in terms of economic and ecological achievements. Considering the increasing trend of technological integrations across the business domain, the implications of innovation management are undeniable. However, financing of these innovations has been a challenging situation for the business entities, regardless of being a potential driver of firms' competitive advantage in the long run (Botric, & Bozic, 2017). Accordingly, this particular element of managing the finances of the organisations with respect to the innovations' deployment has been a debatable issue of the current literature. Primarily, the reason of financing constraints towards integration innovations has been the uncertainty prevailing across the domain towards the asymmetric information regarding the innovation activities (Hall & Lerner, 2010; Botric, & Bozic, 2017).

In order to sustain competitiveness in the market, the firms must be continuous in innovating their business processes, which requires the firms to manage sustained investment in both the tangible and intangible aspects of business innovations (Fang, Tian, & Tice, 2014). Lee, Sameen and Cowling (2015) have documented that mainly Small and Medium-sized Enterprises (SMEs) or Entrepreneurial start-ups having potential innovation opportunities face financial constraints that eventually limits the adoption of technological innovations. Sufficient financial resources are essential for the successful exploitation of innovatively diverging growth patterns, particularly in terms of advancing the Research & Development (henceforth; R & D) areas. In this regard, it has been established that the option of external capital (preferably stock market) is significantly favourable for such firms since it tends to reduce the asymmetry in the information regarding the innovation activities (Agénor, Canuto, & Jelenic, 2014; Agénor, & Canuto, 2017). However, multiple other perspectives regarding managing the financials and liquidity of the organization in relation to the deployment of innovations have also been presented in the literature; yet, the studies are observed to be deficient in facilitating credible outcomes.

Problems have been there due to the inefficient identification of valued patterns in the data, along with the use of inappropriate controls, and sampling inadequacies as the main reasons. Consequently, this particular study intends to fill the typical gap in the literature, by means of being vigilant in adopting the research method and all other associated elements of the research design. Besides, it has been recognized at first that all the competitive outcomes of innovation element are second to the assurance of the most proficient financial controls within the organizational activities. It leads to the assertion that innovation is dependent on the finances; thus, financial controlling and management turns out to be significantly critical for the competitiveness of the organisations.

## **2. Literature Review**

In the current competitive market, innovation has become a crucial element for organizations, willing to grow. In fact, in some industries like technology, an entity cannot survive without innovation. This is the reason why global giants like Volkswagen, Samsung, Intel, and Microsoft spent a material ratio of their earnings (5.2%, 6.4%, 20.1% & 13.4% respectively) in research and development. Hence the need to bring up new ideas for supporting industry growth through fulfilling the expectation of the consumer is always a concerned factor. It is important to know that no matter how important the innovation element is, it always comes after the primary objectives of business, which are profitability and survival. Therefore, it is crucial to lead the research only if appropriate financial controls are present. Thus, the innovation is in a sense dependent on finance.

### **2.1. Relationship between Finance and Innovation**

The nature of finance is often dependent on the purpose of funding and nature of the project. Research and development is a risky business and does not always comes with a favourable outcome, there is no certainty of the

outcome, the collective nature requires finance from a different source, and the cumulateness indicates that innovation may lead to a merger of different research results (Lazonick and Mazzucato, 2013). All these characters direct us to the facts that Innovation demands finance from various sources, of patient nature and with acceptability of high-risk. Thus, the nature of investment is dependent on the type of finance.

From the perspective of investors (specifically private investors) funding research and development is not the best investment (Turner, 2015), due to its' long-term nature. Instead, they believe that investing in short-term projects, for example, share trading is considered more profitable. This is caused by the modern corporate governance structure that prefers earning short-term returns (Kay, 2012) and reinvesting in companies existing activities or support expansion, plus the uncertainty of achievement is a scary concept for investors. On the contrary, many technological revolutions are resulted through high-risk investment, even though those experiments are more task-based in nature. These sorts of investments are made with the aim of the betterment of some target industrial landscape, for achieving some heights that have never been met before (Mowery, 2010; Foray *et al.*, 2012). Such investments are put in motion to accommodate two kinds of purposes, for meeting the expectations and demand in the market or for developing a new product that will be desired by the market (Climate Policy Initiative, 2013; Mazzucato & Semieniuk, 2017).

As mentioned above, most of the research projects are cumulative and require multiple investments throughout the process. Even in the mission-oriented innovation projects, where the objective and the deadline is set, the risk of financing, and so the innovation is high. This is because the investor has to rely on the hope that the funding will keep flowing in as long as the project requires it, but if for any reason, funding is not available at any time, the whole previous investment will probably turn to a waste, with no return. Thus the financing risk in innovative projects exists, therefore the estimated Net Present Value of any such project may be lower than its actual worth, due to the high-risk element of financing. This risk can be eliminated if the investor commits, to provide more investment until the end of the project, however, in any case, the risk of uncertainty will remain to impact the financial risk in equilibrium. As a result, the investor keeps a close track on his investments, and require regular updates about the potential of the project, possibility of the achievement and time required for completion, in order to preserve his investments and exclude the option of terminating the research (see Bergemann & Hege, 2005). Thus, low financing risk leads to more interest of investors into funding experiments (Nanda & Rhodes-Kropf, 2016).

As much important an innovation is for the growth of any business for the purpose of competitive advantage and strategic gain, finding and maintaining finance stream is still a difficult and considerable part. One of the useful external sources of funding is the stock market. Sometimes a firm does not have the ability to conduct a quality research, and other times the capable firm holds itself back due to the unavailability of funds required for experiments. Listed firms can easily access Stock market, to raise funds for investing in their research activities, unlike private entities which do not have any access to the stock exchange, unless under the capacity of a trader. Public listed companies that are externally financed dependent (EFD) are known for being more efficient in their research programs than other private or non-listed companies. However, the internal finance dependent (IFD) types of both public and private companies have no material difference while supporting their research and development divisions. The extent that listed companies can reach to for the development of their operations or their brand name. It is considered as the best option for public companies to go for EFD, and due to unavailability of this option to private investors, the suggestion is to go for other sources, like private investors or more likely for internal development of fund, so the innovation, experiment or research programs continue for the sake of company's future. There are many ways to evaluate the results, but the most common one is the comparison between cost and benefit of the research that is in the case of achievement of required results. In the case of absence of a proper cost-benefit analysis, a private company may not be able to survive the aftermath of research,

if the expected results are not achieved, a public or large company, on the other hand, can bear the after results and go on to the proceeding operations.

## **2.2. Financial Dependence of Innovation**

Firstly, in comparing public and private companies, it is observed that public firms with dependency on external finance are more sensitive to quality, quantity, and novelty of their patents (for research projects), but ones which rely on internal financial sources are not that concerned about these factors. In fact, when it comes to internal financial sources private firms are better in preserving the researchers than public companies. Hence it can be considered that including outside finance (through public listing), is a good for the innovation factor.

This element can further be proved through observing the benefit of listing on the stock exchange, and the ultimate effect of this listing on company's research and development division. Another important factor is the pressure of investors for early returns. With the excess of the low cost of capital, the public listing also puts the firm under pressure of investors who require the entity to lower the risk approaches and generate returns in short intervals, which is against the nature of innovation (which requires long-term trust and patience) (Stein,1989).

Another observed difference is the ability of the firm for carrying its R&D, and affordability of allocating time and money on something other than its core business activity. But the better presentation of patent profile could merely the cause of acquisition of patents outside firm's own R&D division, these are mostly one of the benefits of mergers, and acquisitions of firms (Bena & Li, 2014; Seru, 2013).

A more accurate outcome can be observed through measurement of spending on innovations including the acquisition of patents in comparison to the returns of the entity after the spending. The factors of concern here are the number of patents acquired after a successful innovation, and these must be further divided into categories and planned future usage, the franchising of the patent (to evaluate the actual worth and demand of the developed research in the market), the intensity of these citations vary industry to industry, therefore, it is better to compare each patent with average number of patents yearly issued in relevant industry. Hence a mere count of developments or patents for innovations in a year is not a sufficient measure (Hall et al, 2001; Hall et al, 2005; Acharya & Xu, 2017).

Firms in the innovation business are more exposed to the financial implications as compared to the companies which carry R&D in addition to their primary business activities. Therefore, the R&D firms are more at risk and are challenged in seeking external finance to keep fueling the innovation process. The main reason being the majority assets of being intangible natures (Patents), which are too volatile in trading markets and lose value as soon as a more relevant and updates innovation arrives in the market. Possessing intangible assets does not relieve a R&D firm from regular expenses for instance, wages and salaries for the staff, patent application fees, research expenses (if outsources), and maintenance of equipment to keep them on up-to-date with current technologies, and out of all these wages of scientist are the most crucial and therefore the most expensive part.

Studies from an early age are intact with the idea that financial management has no adverse effect on innovation activities of the firm, but as the researchers developed more theories, this concept began to revert. In the most current studies, researchers have agreed to the concept of the relationship between financial management and the innovation, and have evident that financial frictions have its adverse effects on innovation (Hall & Lerner, 2010). As Discussed earlier, innovation is not a very attractive sector for short time investors and this hazard further grows due to the fact that the investor may not be able to understand the real value of the income. In other words, only the firm engaged in innovation knows for real, whether the innovation truly serves the purpose or not, hence the idea of being in the dark is not appreciated by the investors. However, this hesitance can be eliminated by building up extra monitoring measures, for timely checks of investments, innovations and the returns in monitory terms, encouraging the investors to further involve in the investing activities.

The relationship between financiers and innovation is modeled by many theorist, and researchers, giving their own view for measuring the correlation between the two. One of the theories is given in Morales 2003, in which

the theorist mentioned the monitoring technologies which enable lenders to keep a close eye on his investment, through regular updates and expected returns, this technique, in addition, allows the financier to force the firm to maintain a fast running cycle, creating outcomes within lesser intervals than they would in absence of his/her investment. (Morales, 2003; Agénor & Canuto, 2017).

### 2.3. The Role of Financial Management in Innovation

A relevant example of the effect of financial management on innovation industry could be China, which has successfully turned the living style of its locals, increased GDP and has maintained a reputable and leading rank in world's top most business countries and all this was done within a span of few decades. There is more than one reason behind the sudden growth of China, and the incline in financial literacy of local investors is one of the major reasons. China realized that one does not need a 4-year degree to read the profit figures, and in order to operate successfully the person must at least have sufficient knowledge or literacy of the finance, to understand the ups and downs of business and the causes of the volatility. And so the Chinese government provided the tool to its inhabitants leading to the growth in business sectors in various industries. Coming to our main topic, the innovation industry in China before the growth in the financial sector was too low, but with the increasing trend in financing sector and availability of more investors, the innovation industry also followed the rise-up. A detailed analysis, including figure based assessments, are presented in a recent article “Financial Literacy in China as an Innovation Opportunity” (Brejcha, Wang & Zhang, 2016 July). Another example of the rapid growth of innovation industry is of Germany in 1930s and 40s when German government gave its scientist a free hand and unlimited access to finance for conducting researches and innovation products. Thus, it has been proved by many scholars, theorists and researchers that for firms engaged in innovation activities and dependent on external finance to maintain the flow of their operations, effective financial management policies and potential willing financiers are vital elements.

#### Overview of the relationship between Financial Management and Innovation.

Author	Description
<b>Lazonick and Mazzucato</b>	Research and Development are risky business and have three critical elements. The uncertainty of outcome, collective and cumulative nature and requirement of the long-term commitment, through patience.
<b>Turner</b>	From the perspective of investors (specifically private investors) funding research and development is not the best investment, due to its' long-term nature
<b>Kay</b>	Modern corporate governance structure, prefer earning short-term returns to keep the up with the market competition.
<b>Mowery; Foray et al</b>	Investments are made with the aim of the betterment of some target industrial landscape, for achieving some heights that have never been met before.
<b>Climate Policy Initiative</b>	Investments are put in motion to accommodate two kinds of purposes, for meeting the expectations and demand in the market or for developing a new product that will be desired by the market.
<b>Bergemann &amp; Hege</b>	The investor keeps a close track on his investments, and require regular updates about the potential of the project, possibility of the achievement and time required for completion, in order to preserve his investments and exclude the option of terminating the research.
<b>Nanda &amp; Rhodes-Kropf Stein</b>	Low financing risk leads to more interest of investors into funding experiments. With the excess of the low cost of capital, the public listing also puts the firm under pressure of investors who require the entity to lower the risk approaches and generate returns in short intervals.

<b>Bena &amp; Li; Seru</b>	A better presentation of patent profile could merely the cause of acquisition of patents outside firm's own R&D division, these are mostly one of the benefits of mergers and acquisitions of firms.
<b>Hall et al; Acharya &amp; Xu</b>	The factors of concern are the number of patents acquired after a successful innovation, and these must be further divided into categories and planned future usage, the franchising of the patent.
<b>Hall &amp; Lerner</b>	In the most current studies, researchers have agreed to the concept of relationship between financial management and the innovation, and have evident that financial frictions have its adverse effects on innovation
<b>Morales; Agénor &amp; Canuto</b>	The monitoring technologies which enable lenders to keep a close eye on their investment, through regular updates and expected returns.
<b>Brejcha, Wang &amp; Zhang</b>	The innovation industry in China before the growth in the financial sector was too low, but with the increasing trend in financing sector and availability of more investors, the innovation industry also followed the rise-up.

### 3. Methodology

The successful execution of a research process demands the collected data to be credible and authentic. It brings in the undeniable importance of selecting the most appropriate method of collecting and analysing the data (Feilzer 2010; Flick 2011). Accordingly, Bryman (2015) has affirmed that needs of being selective towards the research method, as the accomplishment of the study objectives are greatly dependent on the adopted method. In this regard, research approach is identified at first due to its feasibilities of categorising the data collection and analysis methods to be easily selected (Fowler Jr, 2013). Taylor Bogdan & DeVault (2015) have documented three types of research approaches as being *Quantitative*, *Qualitative*, and the combination of both as a *Mixed* research approach. Reviewing both the qualitative and quantitative approaches within the study context, the researcher has selected *Quantitative* approach as the most preferred one. It has been preferred over the *Qualitative* approach based on the fact that the study objectives of assessing the relation in between the management of financial aspects of the organisation and the investments in the innovation deployment for being competitive. Recognising the notable gap in the literature, qualitative and thus, mixed research approach has been disregarded. The significance of *Quantitative* research approach is validated from the study of Creswell (2013), which asserts that this particular approach facilitates the researcher by means of its unique aspect of "*cause and effect thinking*". Rovai, Baker, & Ponton, (2014) have affirmed this unique thinking pattern leads to the accurate and logical interpretation of the problem focus. Consequently, the selected approach has been remarkable in helping the attainment of cohesive results pertaining to the relationship in between the identified variables. Subsequently, there comes the selection of research purpose that depicts the strict abidance of the devised aim of the study. The study context could be either a new idea or analysis of the already identified variables within the extensive research scope. Therefore, the purpose of the study needs to be clearly articulated prior to the initiation of the study. Davies & Hughes (2014) have presented three main purposes of the research, as Exploratory, Descriptive, and Explanatory, depending on the study context. This particular study is explanatory in nature since the objectives are related to the assessment of relationship in between the identified variables of financial controlling aspects and the innovation management at the organisational level. In addition to this, another important element is the consideration of research design, for its potential contribution to addressing the research problem (Bryman & Bell 2015). Research design has its multiple forms, including review-based design, meta-analytic design, experimental and semi-experimental design, descriptive design, correlational design and others (Davies & Hughes, 2014; Lampard & Pole, 2015). Depending on the nature of the study objectives, the researcher adopts the most appropriate design of these all on the basis of their unique aspects. The current study has employed

descriptive and correlational designs for their respective contribution towards the accomplishment of study objectives. The descriptive design has facilitated the analysis of the identified variables in terms of percentages, frequencies, and others. On the other side, the correlational design has assisted in recognising the relationship in between the identified variables under consideration. Even though, the researcher is expected to be considerate towards the selection of the most appropriate approach, purpose and the design of the study, the importance of data sources remains undeniable. It has been asserted based on the fact that the overall authenticity and reliability of the study is reliant over the feasibility of accessing the required data (Matthews & Ross, 2014).

The sources of data are of importance since these sources direct the collection of evidence, in order to answer the formulated research questions that eventually lead towards the accomplishment of the study aim and objectives. Two types of data sources are prevalent across the research domain, entailing a distinct level of significance towards a study; primary sources of data and secondary sources of data (Zikmund et al, 2013; Mertens, 2014). In this particular study, the primary source of data has been used to collect the evidence regarding the objectives of analysing the relationship in between the identified variables. Primarily, this data source has its unique aspect of providing first-hand or direct information accessibility that eventually validates its reason of being selected. The study context already observes a notable research gap that reflects the preference of direct sources of data for mitigating this particular gap; thus, cohesive and coherent concluding remarks have been drawn. It is noteworthy to mention here that the primary or the direct data has been collected by means of Five-point Likert *Survey Questionnaire*. For exploring innovativeness at country level, the study relies on secondary data sources, including World Banks Database and Global Competitiveness Report 2016-17.

The distribution of the survey questionnaire incorporates the researchers' credibility of targeting the most appropriate population in this regard. It has been established from the study outcomes of Weiss & Weiss (2012) that the population of the study is also an essential aspect of the entire research plan, which needs to be carried out vigilantly. In the case of targeting incompetent or irrelevant population, the integrity and credibility of the study outcomes are at risk. Therefore, the researcher has been considerate in this regard, by means of targeting the SMEs at Austria on the basis of the fact that the challenges of financial controls in relation to the innovation management are mostly prevalent across the SMEs. Therefore, the employees from accounting and finance departments of 41 SMEs at Austria have been targeted, based on random sampling strategy. Random sampling has facilitated the collection of evidences across different sectors of businesses, along with entailing the prospects of flexibility and accessibility for the researcher as well. Accordingly, the research proceeded with the sample size of 148 employees, from finance and accounting departments, across the targeted SMEs. However, only 125 questionnaires were completely filled, with only 118 to be regarded as valuable and usable with respect to the research objectives. Aarons et al., (2001) defined questionnaire as a documented form of a number of questions related to the study context. The design of the questionnaire could be open-ended or close-ended, based on the nature of the study. In this particular study, the designed survey questionnaire comprised of close-ended questions, demanding the responders to select the respective answers based on five-point Likert scale. It has been selected due to the anticipated collection of the most relevant evidence that is not instilled within the open-ended questionnaires since open-ended questionnaire incorporates the concerns of irrelevant answers that would eventually be challenging towards the expected success of the study. Here it brings an important consideration of validating the quality of the collected data, and the abundance of ethical aspects of valuing the human participation. The participants were provided with a consent form, having clearly articulated objectives of the study to abide by their right-to-information. Besides, the participants were also ensured in terms of their right-to-privacy as well, since the consent form included the assurance of confidentiality of their private information. Additionally, the participants were also given the right-to-withdraw, in the case on any concern or problem.

After the collection of information through a questionnaire, statistical analysis techniques were employed for generating the results. Among the credible techniques of statistical analysis, the study has employed descriptive statistics, factor analysis, reliability test, and regression analysis. Descriptive analysis techniques highlight the

basic trends or patterns that might foster the forecasting regarding the potential impacts on the study context (Davies & Hughes, 2014). Once the patterns within the collected data have been comprehended, factor analysis and reliability tests have facilitated the researcher in determining the hidden unpredictability within the identified and correlated variables (Kline, 2014). Consequently, regression analysis led to the identification of the relationship in between the dependent and independent variables; thus, fostering the success of the study (Punch & Oancea, 2014). As a result, the overall research process has been conducted in the most vigilant manner, since the credibility, objectivity, and integrity of the study could not be compromised at any cost.

#### **4. Research Objectives and Hypotheses**

##### **4.1. Research Objectives**

The current research paper aims to determine the relationship between financial management and firm innovation. For this purpose, it focuses on small and medium enterprises (SMEs) operating in various business sectors in Austria (see Figure 1). Financial management, in this study, is represented by financial liquidity, financial controlling, and financial literacy. Following are the objectives of the study:

1. To examine the relationship between financial management components and innovativeness of Austrian SMEs.
2. To develop a financial management-innovation model based on the data from Austrian SMEs

##### **4.2. Research Questions**

The research question of the current research paper is:

*What is the impact of financial management components on innovativeness of Austrian SMEs?*

Based on the above question, following sub-questions are proposed:

1. What is impact of financial liquidity on innovativeness?
2. What is impact of financial literacy on innovativeness?
3. What is impact of financial controlling on innovativeness?

##### **4.3. Research Hypotheses**

The statistical relationships between financial management constructs and innovativeness of the Austrian SMEs is based on the following hypotheses:

H<sub>1</sub>: The impact of financial liquidity is significant on innovativeness of the Austrian SMEs.

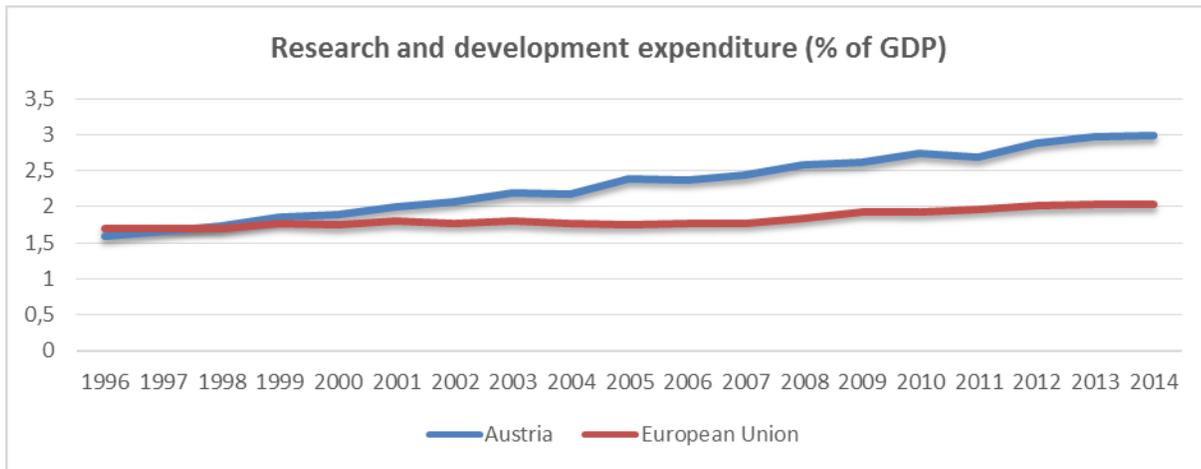
H<sub>2</sub>: The impact of financial controlling is significant on innovativeness of the Austrian SMEs.

H<sub>3</sub>: The impact of financial literacy is significant on innovativeness of the Austrian SMEs.

#### **5. Research Results**

##### **5.1. Innovation in Austria**

For overall competitiveness, the factor of innovation plays a significant role not only at organizational level but also at the country level. According to Global Competitiveness Report 2016, Austria ranks 11<sup>th</sup> in the overall innovation and sophistication factors; 8<sup>th</sup> in business sophistication; and 14<sup>th</sup> in innovation in the world (Schwab, 2016). Moreover, Austria ranks high in the capacity for innovation (7<sup>th</sup>), PCT patent applications (11<sup>th</sup>) and company spending on research and development (19<sup>th</sup>) (Schwab, 2016). It suggests that the country and its businesses considers the significance of innovation, research and development.



**Figure 1.** R&D Expenditure  
Source: World Bank (2017)

According to the Figure 1, in Austria, the expenditures for R&D on creative work (for increasing knowledge) as a percentage of GDP is constantly increasing. The R&D expenditure in Austria is also higher than average R&D expenditure in the European Union as % of the GDP.

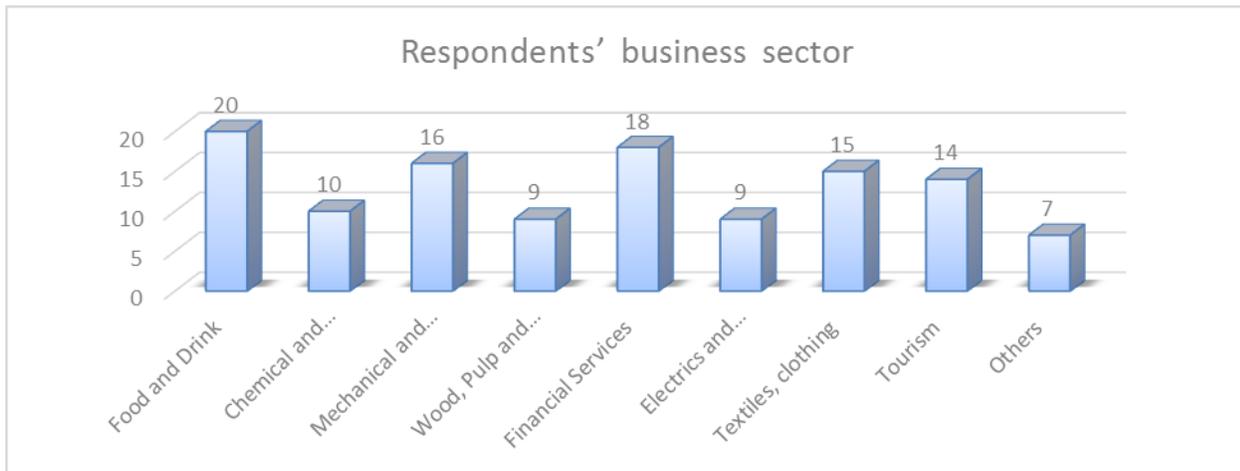
## 5.2. Demographic analysis

**Table 1.** Respondents' business sector

<i>Business Sector</i>	<i>Frequency</i>	<i>Percent</i>
Food and Drink	20	16.9
Chemical and Automotive	10	8.5
Mechanical and Steel Engineering	16	13.6
Wood, Pulp and Paper	9	7.6
Financial Services	18	15.3
Electrics and Electronics	9	7.6
Textiles, clothing	15	12.7
Tourism	14	11.9
Others	7	5.9
Total	118	100.0

Source: Authors' own estimation

In the context of the current research study, which examines the impact of financial management on innovation in Austrian SMEs, majority of research participants (16.9%) are working in the Food and Drink sector, followed by Financial services (15.3%), and Mechanical and Steel Engineering sector (13.6%) (Table 1, Fig. 2).



**Figure 2.** Respondents' business sector  
Source: Authors' own estimation

### 5.3. Validity and Reliability

For inferential testing, the researcher ensured validity and examined reliability of the test instrument i.e. the 5-point Likert Scale questionnaire. The validity of the questionnaire is tested through an expert review. Moreover, the validity of the innovativeness construct is ensured by adopting items from previous literature. The internal consistency reliability of the test items is examined via Cronbach's alpha statistic, which reveal relatively high degree of internal consistency (greater than 0.7) of each construct (liquidity, controlling, financial literacy, and innovativeness).

### 5.4. Factor Analysis

In order to summarise the questionnaire items, principal component analysis (PCA) technique is used, which applies varimax rotation method. The KMO value and Bartlett's test suggests that the sample is adequate and appropriate for running factor analysis

**Table 2.** Rotated Matrix

<i>Rotated Component Matrix</i>	<i>Component</i>			
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Your firm consider establishing and executing internal controls over financial and accounting procedures	.958			
It is important for your organisation to conduct appropriate financial planning and reporting	.919			
Your organisation performs in-depth financial analysis	.898			
Your organisation has sufficient free cash flows available		.943		
Your organisation has the ability to pay its short-term debts		.903		
Your organisation has a reasonable cash conversion cycle		.841		
Your organisation invests in research and development			.835	
Technical innovation is supported and readily			.730	

accepted	
Management actively seeks innovative ideas	.683
You are appreciated for innovative and new ideas.	.764
You are aware of current financial needs of you company	.758
There is appropriate expenditure and income management.	.877
Your organisation focuses on long term financial goals	.805
Extraction Method: PCA	
Rotation Method: Varimax	

*Source: Authors' own estimation*

The Table 2 extracts four components (factors) from the total of 13 items (liquidity = 3; controlling = 3; literacy = 3; and innovativeness = 4). These factor loadings combined correlated items into unobservable (latent) constructs, which are used in regression analysis.

### 5.5. Regression Analysis

The statistical relationship between the components of financial management and the construct of innovation is tested using multiple regression analysis. The association between the variables can be mathematically represented as:

$$I = \alpha + \beta_1L + \beta_2C + \beta_3FL + e \dots\dots\dots (1)$$

Where I, L, C, and FL represent innovativeness, liquidity, controlling, and financial literacy. In this section, the research hypotheses of the study are tested.

**Table 3.** Multiple Regression Analysis

Dependent Variable: Innovativeness	<i>B</i>	<i>t</i>	<i>Sig.</i>
(Constant)	.035	.097	.923
Liquidity	.332	4.459	.000
Financial Literacy	.222	4.034	.000
Controlling	.435	9.953	.000
F Statistic			64.78
P Value			0.000
R Square			0.630
Adjusted R Square			0.621

*Source: Authors' own estimation*

The Table 3 reveals that the overall multiple regression model is statistically significant at 0.01 level, which suggests that financial management significantly affects innovativeness or innovation capacity of the Austrian SMEs. The financial management components of this study, that are financial liquidity, financial literacy, and financial controlling, are all statistically significant at 1%, with positive beta values. It means that liquidity, literacy, and controlling with respect to finance improve innovativeness or innovation capacity of the Austrian SMEs operating in diverse business sectors. Following model is established on the basis of the above results:

$$I = 0.332(L) + 0.435(C) + 0.222(FL) + e \dots\dots\dots (2)$$

The constant term is removed from the model due to its insignificant relationship with the dependent variable.

### Discussion and Recommendations

The research paper aims to evaluate the impact of financial management components on firms' innovation. These components include financial literacy, controlling, and liquidity. Based on the quantitative analysis (regression analysis), the study finds a significant impact of the overall financial management model on innovation capacity of the Austrian firms. The analysis of each component within the financial management model is based on their respective research hypotheses:

H<sub>1</sub>: The impact of financial liquidity is significant on innovativeness of the Austrian SMEs – H<sub>1</sub> is confirmed, which means that higher liquidity in terms of free cash flows, ability to pay short-term debts, and cash conversion cycle enhance innovation capacity of the firms.

H<sub>2</sub>: The impact of financial controlling is significant on innovativeness of the Austrian SMEs. – H<sub>2</sub> is accepted, which suggests that internal controls over financial and accounting procedures, financial planning and reporting, and in-depth financial analysis increases innovation capacity of the SMEs in Austria.

H<sub>3</sub>: The impact of financial literacy is significant on innovativeness of the Austrian SMEs – the third hypothesis is also confirmed, showing higher awareness, appropriate expenditure and income management, and focus on long-term financial goals increases firms' innovativeness.

Based on the above findings, the Austrian SMEs are suggested to increase their focus on the three financial management constructs in order to improve their innovation capability and capacity. Future studies on the problem may consider a qualitative analysis (based on in-depth interviews), or a quantitative analysis based on secondary data. Moreover, future primary studies should increase the sample size (firms and respondents) for more representative and reliable results.

### Conclusions

Financial management and controlling plays a significant role in the overall performance of businesses. In this paper, the significance financial management is assessed with respect to innovation. Based on the primary data of 118 respondents from 41 SMEs operating in Austria, the research finds a significant impact of financial management components on firms' innovation. Individually, financial liquidity, literacy, and controlling are statistically significant in explaining firms' innovation capacity. It suggests that Austrian firms are required to focus on these financial constructs for enhancing innovative capabilities and capacities.

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