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Research on Measurement and Evaluation of High-Quality Entrepreneurship: A Review and Synthesis Prospectus

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Abstract. How to measure and evaluate the quality of entrepreneurial activities is not only an important academic issue in the field of entrepreneurship research but also an important practical problem faced by economic policymakers, especially in the context of the global Covid-19 epidemic and the shift of China's economy from the entrepreneurship high-rate growth stage to the high-quality grow stage. In this paper, we explore the development process of defining and measuring the high-quality entrepreneurial activities, discuss and synthesize the various measurement index for identifying the high-quality entrepreneurship in a complex and uncertain context, concluding that measurement and evaluation of high-quality measurement index experiencing the process of single index to composite index with the consideration of impact of general entrepreneurship policy and specific environment, and also the measurement and evaluation more and more focused on antecedent of entrepreneurial activities which can effectively predict the high quality of entrepreneurial activities from the onset of new firms instead of consequence of entrepreneurial activities. At the end of the article, we propose three viewpoints: First, entrepreneurial quality can be measured using quantitative methods; second, there are limitations for the evaluation of high-quality entrepreneurial quality in practice; third, entrepreneurship indicators should be continuously updated with the accumulation of practice.

Keywords. Measurement, Evaluation, High-Quality Entrepreneurship

1. Introduction

In March 1999, the Second Session of the Ninth National People's Congress adopted the Amendment to the Constitution, which for the first time included "non-public ownership economy such as the self-employment economy and private economy an important part of the socialist market economy" into the fundamental law of the country, and the number of Chinese entrepreneurs grew rapidly, furthermore, the number of entrepreneurs surged again after the implementation of the "mass entrepreneurship and innovation" strategy in 2015, also the number of college entrepreneurs increased significantly,

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reaching 558,149 that year, forming a boom in entrepreneurship. In 2019, General Secretary Xi Jinping pointed out, “to create a good environment for innovation and entrepreneurship development environment and “especially to provide favorable conditions for the development of small and medium-sized enterprises and young people”. A favorable institutional environment for entrepreneurship has facilitated the birth of more SMEs, and vibrant entrepreneurial activity has likewise contributed well to China's socio-economic development. China's economic structure has entered a stage of transition from being large to being strong, and the State Council's Opinions on Promoting the High-Quality Development of Innovation and Entrepreneurship to Create an upgraded version of “Double Innovation” has promoted the high-quality development of innovation and entrepreneurship. In the past three years, under the weakening momentum of the global economic recovery, the heavy setback of the global Covid-19 epidemic, and the international trade war, the revitalization of the economy has become a problem home and abroad ,which all government departments are eager to crack it. At the beginning of 2020, domestic departments developed a series of institutional documents to encourage and support entrepreneurial activities, and General Office of the State Council promulgated to enhance the role of “Mass Entrepreneurship and Innovation”. On September 15, 2022, Premier Li Keqiang attended the National Double Innovation Activity Week and pointed out that China has nearly 150 million Market players, which are the mainstay of China's employment and livelihood protection.

With the rapid increase the number of startups ,also increase the doubt of Is it true that “the more entrepreneurs there are, the better the economy will be”? Are all start-ups true entrepreneurship? What is the scope of the impact of entrepreneurial activity on socioeconomic development? What type of entrepreneurship should be the focus of policy encouragement and support to generate greater economic momentum? These questions have guided scholars in their ongoing quantitative and qualitative measurement and evaluation of entrepreneurial activity.

Although the government, society, the business community, and scholars all advocate that entrepreneurial activities should focus on “ quality “ but not “ quantity “, and call for startups to improve quality to promote high-quality economic development. However, there are still ambiguities in the definition and theoretical boundaries of how to define the quality of entrepreneurial activities of startups. What’s more, there is a great controversy in how to identify and evaluate the quality of entrepreneurial activities and the level of entrepreneurship among regions. However, the number and representativeness of research results are insufficient, and the subjective and abstract nature of quality evaluation and the different institutional environments of each country make it more individualized and different, and there is no unified standard for quality evaluation of entrepreneurial activities. In China, entrepreneurship quality is mainly evaluated by the Institute of Innovation and Entrepreneurship of Tsinghua University based on the theory, methods and tools of the Global Entrepreneurship Monitor (GEM). This work provides an important basis for the analysis and international comparison of startup quality in China. In addition, a quality measurement and evaluation system for entrepreneurial activities with Chinese characteristics has not yet been established, and the existing research is more from the interest of scholars, relatively fragmented and not deep enough, and it is difficult to provide effective guidance for evaluating and improving the quality of entrepreneurship in different regions in practice.

In conclusion, an in-depth study of entrepreneurial quality can identify high-quality entrepreneurial activities, which can contribute to the establishment of policy orientations for entrepreneurship management and the formation of a good entrepreneurial culture in the country and region; otherwise, it can lead to erroneous conclusions and mislead entrepreneurship management policies, which can affect socio-economic development. For example, establishing small self-employed firms or regions with high start-up rates as praiseworthy models leads to a policy that tends to encourage firms with low innovation margins and no growth. Shane even suggests that most new ventures are not entrepreneurial and those government policies should avoid encouraging small firms with low innovation margins or self-employment, and should provide more incentives for the formation and growth of high-quality entrepreneurial firms[1].

2.2. The relationship between the quality of entrepreneurship and economic development

2.1 Why the entrepreneurship quality rather than quantity

Early entrepreneurship research proposed a positive correlation between the amount of entrepreneurial activity and socioeconomic development, and Jeffrey Timmons noted that over the past 30 years, the American entrepreneurial generation has revolutionized the economic and social structure of the United States and the world, thus also shaping the way Americans live, work, study, and this change has gradually shaped the entrepreneurial economic society of the United States. Audretsh suggests that there are fast-growing firms that are willing and able to grow and expand to new levels of scale through successful commercialization and dissemination of new ideas. They play a special role in economic development [2]. The intensity and direction of the interaction between entrepreneurial activity and economic development determine the direction of entrepreneurship policy. As the study of entrepreneurial activity intensifies, scholars diverge considerably on the topic of the relationship between the number of entrepreneurship and economic development. The relationship between entrepreneurship and socioeconomic development is not linear but may be either L-shaped or U-shaped relationship.

What matters is the quality of entrepreneurial activity or the level of entrepreneurship in a region, not the number of startups"[3]. "Catching-up countries in the early stages of development should not be guided by the idea that 'more entrepreneurs are better ' philosophy, but should instead focus on strengthening the quality of domestic entrepreneurship."

Based on the starting point that "entrepreneurship quantity is not necessarily a good indicator of the role of entrepreneurial activity in economic development"[4], Morris and Jones et al. similarly suggest that focusing on "entrepreneurship quality" rather than "entrepreneurship quantity" may help us better understand the intrinsic link between entrepreneurship and economic development. Morris and Jones et al. suggest that a focus on "entrepreneurship quality" rather than "entrepreneurship quantity" may help us better understand the intrinsic link between entrepreneurship and economic development[5].

2.2 What entrepreneurial quality brings to economic development

"How entrepreneurship has contributed to economic development" is a long-standing research proposition, but also an evolving one. In the 1930s, Schumpeter proposed that entrepreneurs were "innovation breakers" because they brought innovation. In the 1970s, attention was focused on the innovative role of large firms. In the 1990s, researchers found that small firms had a catalytic effect on economic development, which boost job creation and the introduce the innovation. "Opening a new restaurant or a dry cleaner is unlikely to employ thousands of people or commercialize new technologies, but innovation-driven firms such as Facebook or Google exhibit both a propensity for growth and for innovation that has a significant economic impact". Scholars have found in their research that "high-quality entrepreneurship is likely to be more resilient in times of economic retreat and can also be an important driver of economic development", a view that further emphasizes the importance of entrepreneurial quality for healthy and sustainable economic development[6][7][8].

It has also been shown that the quality of start-ups greatly affects their contribution to the direct total job market; studies based on this have found that the quality of entrepreneurial activity varies by type, with manufacturing generating more significant job growth than services, and innovation manufacturing and knowledge-intensive services generating a greater and more direct contribution to jobs. This leads to the conclusion that the quality of entrepreneurship is higher in manufacturing than in services, and higher in knowledge-intensive services than in labor-intensive services. Domestic scholars have suggested in their studies that "improved entrepreneurship quality can significantly increase economic efficiency, promote industrial structure upgrading, boost development levels, and improve social welfare. Thus, significantly improving the quality of overall economic growth[9]."

Various studies have shown that over time, the long-lasting and far-reaching economic implications of the quality of entrepreneurship in start-ups become more evident. While encouraging an increase in the number of entrepreneurial entities, a shift in perspective that focuses more on the quality of entrepreneurship not only promotes entrepreneurship and encourages innovation, but also enables companies to survive crisis and maintain sustainable development. It is more conducive to foster entrepreneurship, promote regional and national economic development, and enhance regional and national competitiveness.

3. The concept of entrepreneurial quality is identified

Over the past two decades, economists have made great strides in promoting the measurement and evaluation of the quality of entrepreneurial activity. From focusing on calculating the density of SMEs to focusing on the growth dynamics of startups, the concept of "entrepreneurial quality" has gradually become a hot issue in academic discussions. In this paper, we analyze the concept of entrepreneurial quality from two perspectives: time and quality-related research.

3.1 Timeline of research on entrepreneurial Quality

Research conducted by D. Birch in the 1970s and 1980s showed that most of the new jobs in the U.S. economy were created by small businesses rather than large firms[10]. Henrekson, in response to the phenomenon that entrepreneurship measurement only focuses on the birth rate of new firms and ignores the differences in quality across time and regions, suggests that "entrepreneurship is neither a new business nor a new firm, he proposed that "entrepreneurship is neither the composition rate of new firms nor the share of self-employment, but rather the concentration of fast-growing new firms"[11].

The discussion of the concept of "entrepreneurial quality" also includes the findings of Venkararaman, who argues that "entrepreneurial quality" should be reflected in the improvement of overall social welfare and permanent improvement of overall quality of life brought about by entrepreneurial activity, emphasizing that the attributes of "entrepreneurial quality" are not only expressed in economic activities but also in their social relevance[12]. Low et al. argue that entrepreneurial quality is by contrast to entrepreneurial quantity, which is concerned with breadth, while entrepreneurial quality is concerned with depth[13].Todorovic et al. argue that entrepreneurial quality is not only a function of economic activity, but also a function of social relevance. Todorovic and McNaughton (2007) argue that entrepreneurship should be more value-added, i.e., how much new value it contributes to the economy[14]. Shaoming and others argue that "entrepreneurial quality" focuses more on the share of successful new firms that have expanded rapidly over the years[15]. Ma and McNaughton argue that "entrepreneurial quality" focuses more on the share of successful new firms that have expanded rapidly over the years[16]. Guzman et al. define high-quality entrepreneurship from an outcome perspective as firms that can issue an IPO or liquidate at a high value within six years of establishment, which has ambitious entrepreneurs and startups with growth potential, based on these, they propose a system of indicators to predict high-quality entrepreneurship[17]. Chowdhury et al. define high-quality entrepreneurial activity relative to low-quality entrepreneurial activity, where they designate the business sector motivated by the necessity, without the aspiration to grow, thinking only about creating jobs for business owners and not benefiting society as a whole as low-quality entrepreneurial activity, while defining high quality entrepreneurship as growth-oriented, efficiency-based, and transformative entrepreneurship that expands its tax base by creating new products, processes, and jobs for the government[18]. Henrekson et al. suggest that quality is relative to quantity, while quantity-based measures the rate of startups and quality-based measures the prevalence of high-growth firms. And high quality entrepreneurship based on Schumpeterian entrepreneurship is defined as rapid growth or large-scale gains based on the results demonstrated, i.e., an increase in jobs or sales, or an increase in the wealth of the founders[19].

3.2 Discussion of the definition of entrepreneurial quality

The researchers classified entrepreneurship into three categories: necessity-motivated entrepreneurship vs. opportunity-motivated entrepreneurship, production entrepreneurship vs. innovative entrepreneurship, and small and medium-sized enterprises vs. innovation-driven entrepreneurship, while the latter in each category exhibited characteristics of high-quality entrepreneurship, i.e., opportunity-motivated,

innovative, and innovation-driven entrepreneurship as high-quality entrepreneurship, while necessity-motivated, non-productive, partial, and meaningless entrepreneurship all belong to low-quality entrepreneurship[20]. In domestic research, the only scholar who explicitly discusses and defines the concept of "entrepreneurial quality" is Qi Wei Na, who defines entrepreneurial quality as "the extent to which a set of behavioral characteristics of entrepreneurial activity meets various entrepreneurial goals and expectations".

To better characterize high-quality entrepreneurship, the research field has contributed such measures as entrepreneurship success, high performance and potential entrepreneurship, high growth entrepreneurship, ambitious entrepreneurship, high expectation entrepreneurship, high aspiration entrepreneurship, and high impact entrepreneurship, and alternative concepts such as strategic entrepreneurship planning and innovative entrepreneurship. These concepts intersect with high-quality entrepreneurial activities, but the connotation of each concept differs somewhat in response to the research objectives.

3.3 Identification of the concept of entrepreneurial quality

From the above definitions, it can be seen that despite scholars' attempts to explore the definition of concepts, these existing concepts have different perspectives and vary greatly, some definitions of quality based on comparative perspectives from quantity and quality, some based on comparisons from the perspectives of entrepreneurial behavior and outcomes. Others defined it from the perspectives of differences between corporate entrepreneurial quality and regional entrepreneurial quality. Because of the inconsistency in the definition of concepts, it is difficult to form a relatively consistent and consensus indicator system for measuring quality.

Differences in the conceptualization of entrepreneurial quality inevitably produce differences in the measurement methods and results of entrepreneurial quality. The challenges in defining entrepreneurial quality come from several reasons. First, quality is an abstract concept that is difficult to measure directly like quantity. Second, defining quality mainly comes from the definition carried out by researchers based on their research projects, which is highly subjective, such as in the above-mentioned concepts, which are defined in terms of growth characteristics of entrepreneurship, innovative characteristics, or value creation to society perspective. The difficulty of defining entrepreneurial quality is strongly related to the confusion in the concept of entrepreneurship: "Entrepreneurship means something different to different people, including scholars and thought leaders, because it is multidimensional and people study it from different perspectives, which also produces different definitions[21]. Third, entrepreneurial quality has a temporal and spatial character, and the definition of the concept is highly variable in different countries and regions as it develops over time, and similarly, people's perceptions of entrepreneurial quality vary greatly at different times, and these differences are highly related to the continuous addition and improvement of people's perceptions of the essential characteristics of entrepreneurship. Fourth, entrepreneurial quality may refer to both microscopic comparisons of the quality of entrepreneurial activities and may also refer to differences in entrepreneurship quality between countries or regions, both in terms of entrepreneurial process and outcomes. These challenges have prevented entrepreneurial quality from being effectively defined

and systematically measured and evaluated in a standardized manner to date.

In the 2000 version of the GB/T19000-ISO9000 family of standards, quality is defined as the degree to which a set of inherent characteristics of an object meet the requirements. Defining quality in entrepreneurship according to this definition requires answering the following sets of questions: First, is the object of entrepreneurship a verb or a noun? Is it a process or a state to be assessed? Does it assess its behavior or its outcome? If it is a noun, does the quality of entrepreneurship refer to the quality of entrepreneurial activity or of the entrepreneur or of the entrepreneurial institution? If it is entrepreneurial activity, does it measure the quality of individual entrepreneurial activity or the quality of entrepreneurial activity in a region as a whole? Is it judging its quality in the present or predicting its quality in the future? How is an entrepreneurial activity defined? Is it the activity of starting a business, the introduction of a new economic activity, or is it innovation or breaking market equilibrium[22]? Different concepts inevitably lead to different operationalizations in measurement. Second, what are the inherent characteristics of entrepreneurial activity? Is it growth or innovation? Is it explicitly specified or implicit? Third, there is also some controversy in terms of meeting the requirements. The subjects who evaluate the quality of entrepreneurial activities are complex and broad, and may come from researchers on entrepreneurship, as well as from government, management, social institutions, venture capital agencies, and even entrepreneurs themselves; are these evaluate subjects consistent in their understanding of entrepreneurial quality? Finally, measuring the extent to which requirements are met requires the establishment of quantitative criteria; who defines this benchmark and how is it developed? What kind of indicators will show the scientific validity of its quantification?

A comprehensive definition of concepts in existing research fields shows that the definition of entrepreneurial quality varies significantly and there is no unified consensus so far, which has a lot to do with the ambiguity of the conceptual definition of entrepreneurship: existing definitions of entrepreneurial quality include both the definition of the behavioral characteristics of entrepreneurship and its outcome characteristics. The definition of individual entrepreneurial activities and the definition of regional entrepreneurial activity levels. The evaluate subjects include both relevant scholars, as well as policy management, entrepreneurs and social groups. Researchers may define and measure quality an economic perspective or from the field of management, showing a diversity of characteristics.

Despite the difficulty in defining the quality of entrepreneurial activity, research on entrepreneurial quality measurement also needs to follow the following principles: (1) No definition, no measurement. The measurement of entrepreneurial quality should be carried out based on a clear, consensus-forming definition of the concept. (2) Entrepreneurial quality refers specifically to the entrepreneurial quality of startups, because all the net job growth is from newer and smaller enterprises, and the reason for being small is precise because they are newer and have more room for growth, so the object of entrepreneurial quality research refers specifically to startups. (3) The definition of the quality of entrepreneurial activity should be defined with the research and application. Some existing studies define entrepreneurial quality in a theoretical and practical way; Fourth, entrepreneurial quality in a general sense mainly refers to the quality of entrepreneurial activities, which has both behavioral and outcome characteristics, and focuses on both the existing performance of entrepreneurial activities

and the prediction of their potential. Based on the above principles, synthesizing the research results of previous scholars, and based on General Secretary Xi Jinping' s emphasis that "high-quality development is the development that reflects the new development concept", this paper defines the quality of entrepreneurial activities as those that have high growth and innovative will in startups and can bring job growth with high output results for the benefit of society. The quality of entrepreneurship in regions and countries is defined as the degree of concentration of high-quality startups in regions or countries.

4. Research on entrepreneurship quality evaluation index system

The controversy over the definition of the concept of entrepreneurial activities has led to the diversified presentation of measurement indicators, and in terms of the development trend of indicators, the development of indicators has undergone a course of development from quantitative to qualitative and from unidimensional to multidimensional, and comprehensive indicators are currently the most popular. Based on the research history of different scholars on entrepreneurship quality assessment, the representative indicators for measuring entrepreneurship quality are summarized as follows.

4.1 Focus on a single entrepreneurial quality indicator of rapid growth

4.1.1 Focus on the most rapidly growing indicators

That is, the top 5-10% of firms with the most rapidly growing number of employees [23], or firms that increase the number of employees by more than 20% per year over three to four years[24], or double the number of employees within five years [25].

4.1.2 Focusing on depth of entrepreneurship (depth) indicators

Low and other researchers have used two indicators to measure entrepreneurial quality: a ratio of income indicator = owner income/owner employment and a financial income indicator = non-agricultural owner income/total sales of goods and services in a country[13]. Although these two indicators can distinguish the quantity (breadth) and quality (depth) of entrepreneurial ventures, they cannot distinguish qualitatively between types of high-quality entrepreneurship and whether the entrepreneur is an opportunity-motivated or a necessity-motivated entrepreneur.

4.1.3 Focusing on Growth Company Index (GCI)

The National Commission on Entrepreneurship, one of the first organizations to track the growth of newly created firms, designed and developed the Growth Company Index (GCI), which uses data from the Longitudinal Business Database (LBD) to rank the quality of entrepreneurship in 394 labor market sectors. The GCI (Growth Company Index) was designed and developed by the Council to rank the quality of entrepreneurship in 394 labor market sectors using data from the Longitudinal Business

Database (LBD), which measures the percentage of firms that grew at least 15 percent annually (or 100 percent over the same period) in terms of employment from 1992 to 1997. This indicator demonstrates that the researcher's understanding of quality entrepreneurship is based on "growth as job creation". A single indicator cannot make a distinction between the employment growth nature of different industries, to the detriment of the manufacturing sector and more in favor of the service sector; third, the lack of a provision for the employment base, looking only at the employment growth rate, a measure that is more favorable to small entrepreneurial entities. These limitations lead to an inability to get a clearer picture of the size and distribution of high-growth firms. Subsequently Camp, Henderson and others revised the indicator accordingly on this basis[11].

4.1.4 Focusing on Entrepreneurship Quality Index (Shaoming)

Shaoming et al. developed a new standardized entrepreneurship quality index EQI based on the concept of "growing" startups", $\text{Entre quality index}_i = \sum_j I E_j HG_j\%$[15]. The EQI is based on the GCI, but has been adjusted to address the limitations of the GCI in three ways: First, the unit of assessment has been changed from labor market sectors to counties, making data collection more convenient and the institutional impact more consistent. Second, the EQI is based on the North American Industry Classification System's three numerical codes for classification (NAICS), which allows for category comparisons; third, it is divided into three categories based on the initial number of employees in the business, i.e., the number of employees category of 1-50, the number of employees category of 51-100, and the number of employees category of 100-500, and based on this classification, different employment growth rates are set for the five-year period on the benchmark of 2000-2004, while the entrepreneurship quality index can be adjusted with the increase of LBD data. The researcher believes that creating and developing an entrepreneurial quality index will allow the researcher to empirically identify the economic, social, policy and firm factors that influence the development of entrepreneurial quality.

4.1.5 Focusing on Entrepreneurship Quality Index (Guzman & Stern)

This is a single set of indicators led by Guzman and Stern to assess the quality of entrepreneurship, including the Entrepreneurial Quality Index (EQI), which measures the average level of quality of a group of startups in a given group[17]. The Regional Entrepreneurship Cohort Potential Index Regional Entrepreneurship Cohort Potential Index (RECPI), which measures the growth potential of a group of firms in a given region; the Regional Entrepreneurship Acceleration Index (REAI), which The EQI was developed and designed based on the idea that "high-quality startups are determined by the ambition of their founders and their intrinsic growth potential", based on significant growth outcomes (either initial public offerings or high-value acquisitions), by using the EQI index from 1988 to 2014 in 15 U.S. states. data from business registration records of 15 U.S. states (51% of the overall U.S. economy) from 1988 to 2014. A systematic measurement of entrepreneurial quality was used to create a composite entrepreneurship index at the national level. The purpose of this study is to enable a more rigorous examination of changes in established startup cohort potential (RECPI) over time and

location through a focus on entrepreneurial quality, as well as the ability of the entrepreneurial ecosystem to realize this potential over time (REAI).

The EQI measures both the entrepreneurial quality of a given group and calculates the probability of growth of individual companies, an indicator that ensures that the quality results are comparable with each other, the formula characterizes.

$$EQI_{r,t} = \frac{1}{N_{r,t}} \sum_{i \in \{I_{r,t}\}} \theta_{i,r,t}$$

$\theta_{i,r,t}$is the entrepreneurial quality estimated at the birth of nascent，$\theta_{i,r,t} = P\left(g_{i,r,t+s} \middle| H_{i,r,t}\right) = f(\alpha + \beta H_{i,r,t})$，$H_{i,r,t}$ is a collection of all characteristics of a company i that was incorporated at time t, region r. These characteristics are collected by information at the time of incorporation registration, including the length of the company name, whether the company name is the same as the founder's name, whether it is a legal entity, whether it has a registered trademark, whether it has a patent, whether it is incorporated in Delaware or locally, whether it is in a trade resource concentration area, whether it is in the bio, e-commerce, IT, pharmaceutical, or semiconductor business, etc.$g_{i,r,t+s}$ is the growth result of company i in the year s after its founding (this result can be estimated by IPO or high value liquidation within six years of founding), and$\{I_{r,t}\}$ represents the set of all companies in a given region in a given year, and$N_{r,t}$ represents the number of firms in that region in that year. RECPI divided by GDP allows for a direct compared of regional entrepreneurial quality, through which the researchers measured entrepreneurial quality in 15 regions of the United States from 1998 to 2014, concluding that the Silicon Valley region has the highest entrepreneurial quality; REAI provides a measurement of the ecology that enables entrepreneurial quality to grow. The final conclusion of this study suggests that entrepreneurship in the U.S. is growing, contrary to the long-term decline in total U.S. entrepreneurship observed by Decker et al. using a range of data such as the U.S. Business Dynamics Statistics (BDS). It is also a strong indication that the choice of different measurement methods can lead to very different final results.

This type of indicator system is designed based on the idea that the essence of entrepreneurship is to “promote employment and rapid growth of enterprises”, which has the advantages of simplicity, convenience, ease of implementation and comparability of calculation results.

4.2 Productive entrepreneurship indicators

Russell conducted an empirical study on institutional culture and entrepreneurial quality using Baumol's theory of productive and unproductive entrepreneurship types as the basis of his research, concluding that a good legal system will lead to more productive entrepreneurship and less unproductive entrepreneurship and that productive entrepreneurship is important to the economy because it is the fundamental source of economic growth and wealth creation[26]. As the measurement of productive entrepreneurship, the authors use indicators such as venture capital investment per capita, patents per capita, the growth rate of self-employment activities, firm birth rate (all new firms), and large firm birth rate (new firms with 500 or more employees) to construct a system of productive entrepreneurship indicators.

4.3 Comprehensive indicators of Schumpeterian entrepreneurship

The indicator is represented by a joint collaborative study by Swedish scholars, which is based on four types of indicators of Schumpeterian entrepreneurship based on macro studies, consisting of the number of venture capital-backed IPOs per million inhabitants, unicorns per million inhabitants, billion-dollar entrepreneurs per million inhabitants, and the researchers call these four indicators quality-based entrepreneurial activity indicators, while they also list quantity-based measures of entrepreneurial activity, including firm owners, self-employment, employers with outside employees, low or high growth expectations for total early-stage business activity, and new business registration for limited companies. This indicator captures the core qualities of innovation and carries out comparisons through relative quantities, which does make it easy to filter out the highest quality entrepreneurship, but its emphasis on large-scale, fast-growing firms excludes the growth of SMEs, which account for the vast majority, and the data are not representative enough. At the same time, the indicator places more emphasis on outcome-based measurement and comparison, which does not allow an understanding of the growth mechanisms of startups and makes it impossible to guide more.

4.4 Composite indicators to measure entrepreneurial dynamics and innovation components

The goal of developing this indicator is based on defining entrepreneurship as “real entrepreneurs” rather than small business owners. The corresponding index attempt to capture the performance of truly ambitious entrepreneurs on a variety of outcomes, such as income, employment growth, innovation, and participation in international operations. Three of the most representative indicator systems are the World Bank Group Entrepreneurship Survey (WBGES), the OECD-Entrepreneurship Indicators Program (EIP) and Global Entrepreneurship Monitor (GEM).

The WBG Entrepreneurship Survey Project (WBGES) measures early-stage entrepreneurial activity in legal entities, with data from 101 countries for 2000-2008, and consists of two indicators: the entry density ratio indicator, which refers to the number of new firms per 1,000 people in the working population, and the entry rate is the percentage of new firms among existing firms. The limitation is that the measurement is only for limited liability companies, using official data from existing databases, and its applicability is relatively limited.

The EIP project was launched in 2004 to enable international comparisons and monitor the effectiveness of a country's economic policies through a uniform system of measurement indicators. This indicator adds a sales growth indicator to the measurement of employment growth. High-growth firms are defined as those that have grown by 20% in the number of employees per year over three years, or include gazelles with at least 10 employees in the year of establishment, thus excluding the majority of start-ups, which account for 90% of all firms.

Launched in 1997, the GEM project has published annual surveys since 1999, and by 2019, GEM has cumulatively surveyed more than 3 million adults in 114 economies around the world. This makes GEM the world's largest and most widely studied study of entrepreneurial activity. one important measurement of GEM is total early-stage entrepreneurial activity (TEA), which measures the proportion of early-stage

entrepreneurs in the total population of working age (18-64), with early-stage entrepreneurs defined as those who are immediately ready to start a business or, have been in business for less than 3.5 years. With the refinement of data and research, GEM measures mainly the indicators of the propensity to grow, the propensity to innovate, and international orientation. Of these three measures of entrepreneurial quality in early-stage entrepreneurial activity, the GEM indicator system is now the most widely used and provides a good reference for entrepreneurial activity management policies.

Table 1. Main entrepreneurial indicators

Name	Scope	Measurement Level	Indicator Description
OECD-EUROSTAT Entrepreneurship Indicator Programme (EIP) (2004-2006)	All companies, including new and incumbent companies	Individual, Company and System	Determinants: R&D, system, culture Performance: Employer birth and death rates, growth, employment Impact: Job creation, economic growth, poverty reduction
	Early Stage Companies	Gazelle companies	From the start of operations, the company reaches the parameters of a high-growth company in the first five years
World Bank Group Entrepreneurship Survey (WBGES) (2000-2007)	Early stage entrepreneurial activities of legal entities	Entry density rate indicator; entry rate	The number of new firms per 1,000 people in the working population. Percentage of new companies among existing companies. Access Rate
GEINDEX (2004-2008)	New and Incumbent Companies	Individual, company and system level	Attitude Events Desire
EIM COMPENDIA (1972-2009)	Mostly incumbent companies	Individual Level	New and Established Small Business Owners
Global Entrepreneurship Monitor (GEM) (1999-2021)	Early stage entrepreneurial activity - including ready to start a business or less than 3.5 years old	Mostly individual level, increasingly with less corporate level	Growth Expectations: Percentage of early-stage startups employing at least five people per year for five years from now
			Innovation orientation: the percentage of early-stage startups that can show that their product or service is new to at least some

			customers
			International orientation: percentage of startups showing that at least 25% of their customers are from other countries
Global Entrepreneurship and Development Index, or GEDI (2011), later changed to Global Entrepreneurship Index GEI (2015)			Entrepreneurial attitude Entrepreneurship Entrepreneurial Aspirations
Entrepreneurship quality indicators (Valentina etc,2019)	Innovative and willing to grow	Data information for 28 EU member states for the period 2011-2017	Innovation rate (INNOV) and high job start-up expectation rate (HJOB), data from GEM

source:author's summary

4.5 Chinese scholars' entrepreneurial quality research results

Based on Timmons' entrepreneurship theory, Chinese scholar Qi Wei Na defined entrepreneurship quality in terms of behavioral and outcome characteristics of entrepreneurial activities. She also constructed a regional entrepreneurship quality index system in two dimensions: innovativeness and scale. It contains a total of regional knowledge creation level, regional knowledge flow level, enterprise innovation level, enterprise investment performance, enterprise production performance, enterprise growth performance and human capital, as well as fourteen three-level indicators.

Chinese scholar He Xingbang has measured entrepreneurial quality in three dimensions: entrepreneurial effectiveness, entrepreneurial activity, and entrepreneurial skill level, with eight basic indicators. Entrepreneurial effectiveness reflects the business effectiveness of entrepreneurial enterprises through various financial indicators, and is a direct reflection of the quality of entrepreneurship at present. The indicators used to measure the change in entrepreneurial effectiveness include two: the increase in profit per capita of new private industrial enterprises and the increase in main business income per capita of new private industrial enterprises. These two indicators reflect the effectiveness of newly created enterprises in terms of both profit and income. The degree of entrepreneurial activity reflects the vitality and enthusiasm of capital entrepreneurship, reflecting entrepreneurs' expectations of market opportunities and business environment advantages and disadvantages, the higher the degree of entrepreneurial activity, the competitive effect and the efficiency improvement brought by scale advantage are important factors affecting the quality of entrepreneurship. The indicators used to measure the degree of entrepreneurial activity include three: new private industrial enterprise assets, new private enterprise households, and new private enterprise employment. These three indicators reflect entrepreneurial dynamism comprehensively from three aspects: increase in assets, number of enterprises and employment. Technology level reflects the technical content of entrepreneurial activities, which affects the competitiveness of enterprises and market prospects, and is one of the determining

factors affecting the quality of entrepreneurship. The indicators used to measure the technological level of entrepreneurship include three: the ratio of new products in high-tech industries to GDP, the increase in the number of enterprises in high-tech industries, and the increase in the average number of employees in enterprises of high-tech industries. These three indicators comprehensively measure the changes of entrepreneurial technology level in three aspects: the output value of high-tech industry, the number of high-tech enterprises, and the number of high-tech personnel.

The development of these two indicator systems provides a practical quantitative expression of high-quality entrepreneurship from a theoretical perspective with comparable data. The disadvantage is that there are no better data resources to support them, especially the difficulty in stabilizing the collection of longitudinal data, which leads to less reliable results.

4.6 A comprehensive system of indicators to measure entrepreneurial activity

4.6.1 Global Entrepreneurship Index (GEI)

The GEI is a comprehensive system of multiple indicators of entrepreneurial activity that provides another valuable tool for comparative analysis of the level and quality of entrepreneurship in individual countries. The development of this indicator builds on the diverse set of indicators developed to measure countries' performance in economic and social dimensions that began in the early 21st century, including the ease of doing business, the Global Innovation Index, and others. Thus a group of scholars affiliated with the Washington-based Global Entrepreneurship Development Institute developed the Global Entrepreneurship and Development Index (GEDI) in 2011 and in 2015, renamed the Global Entrepreneurship Index to provide a perception of entrepreneurship from a multidimensional phenomenon. The concept of this indicator system is based on the GEM methodology and is divided into three dimensions, including entrepreneurial attitudes, entrepreneurial capabilities and entrepreneurial Aspiration. The specific indicators are shown below.

Table 2. Structure of global entrepreneurship indicators

	Institutional variables	**Individual variables**	**Entrepreneurial Pillars**
Attitude Subsystem	The cohesive role of the market	Opportunities	Opportunity Perception
	Post-high school education	Skill recognition	First-time business skills
	Business Risks	Risk Perception	Risk Acceptance
	Internet usage	Meet the Entrepreneurs	Network
	Corruption	Career Status	Cultural Support
Capability Subsystem	Freedom	TEA Opportunities	Opportunistic startup entrepreneurship
	Technology Absorption	Technical Department	Technology absorption
	Staff Training	Higher Education	Human Capital

	Market-driven	Competition	Competition
Willingness Subsystem	Technology Transfer	New Products	Product Innovation
	GERD	New Technologies	Process Innovation
	Business Strategy	Gazelle companies	High Growth
	Globalization	Export	Internationalization
	Depth of capital market	Informal Investment	Venture Capital

Source: Adapted from Acs et al. (2015)

4.6.2 National Entrepreneurial Environment Index (NECI)

The NECI indicator is a composite indicator developed by GEM scholars in 2018 that indicates how the quality of entrepreneurship compares between countries in an entrepreneurial framework. The NECI is generated from expert empowerment scoring and is primarily used to measure whether the entrepreneurial environment in which entrepreneurs are located encourages or discourages entrepreneurial activity. In an environment with high income and high support for entrepreneurial activity, entrepreneurs are apt to achieve their growth ambitions, and transfer to the established business state.

These two composite indicators involve the aspects which relates to the entrepreneurial activity, and signals the well-thought of the measuring and building the index system of high-quality entrepreneurial activity. But in practical, these measurement is hard to operationalize and also owing to the dispersed measurement, the essence of high-quality entrepreneurial activity will be diluted.

5. Conclusion and Discussion

The definition of entrepreneurship quality has subjective and dynamic characteristics, and no indicator is a perfect indicator. With the development of time, the research on entrepreneurship quality has diversified characteristics, which are manifested in diversified research purposes, diversified research tools, and diversified research results, indicating the diverse connotative characteristics of entrepreneurship. However, such diverse characteristics also bring confusion and misunderstanding to the measurement and evaluation of entrepreneurial activities and prevent a better understanding of the actual status and comparability of entrepreneurial quality. This paper develops a preliminary understanding of entrepreneurship quality evaluation by sorting out the indicators of entrepreneurship quality measurement from different perspectives of scholars and summarizing the indicators from the dimensions of rapid business growth, productive or unproductive, Schumpeterian entrepreneurship and entrepreneurial motivation and innovation.

First, entrepreneurial quality can be measured using quantitative methods, thus making the quality results more credible. If entrepreneurial quality is estimated using qualitative methods, the conclusions are susceptible to subjective factors and the results are less comparable with each other. The reproducibility, validation and controllability of quantitative characteristics guarantee the credibility to some extent, avoid the influence of the evaluator's bias, enable the hypotheses to be confirmed or falsified in practice, and

study the causal relationships between variables with relative precision. However, when conducting entrepreneurial quality research, if conditions allow, a combination of qualitative and quantitative methods can be used to combine the two different paradigms according to specific research questions, forming a hybrid specific research approach to achieve the effect of complementing each other and taking advantage of each other's strengths and weaknesses. Secondly, there are still situations in which entrepreneurial quality evaluation cannot be applied in practice, such as some companies that can attract a large amount of investment by data and flow may not have objectivity when conducting entrepreneurial quality evaluation. The current indexes do not fully fit the evaluation of entrepreneurial quality of all types of enterprises, and some enterprises in the "accumulation" period may have poor quality in terms of revenue and staff turnover, but later there may be a "burst" period of development and sustained strength. In this case, the entrepreneurial quality evaluation cannot give more objective feedback to operators. In addition, some government-subsidized entrepreneurial projects may not perform well in the quality evaluation, and the diverse understanding of "quality" is not well developed in the current evaluation system. Finally, as far as the indicators of entrepreneurship quality evaluation under different entrepreneurial objectives are concerned, entrepreneurship indicators should be continuously updated with the accumulation of practice. Multiple start-ups are defined by different research objectives, such as rapid growth, and are measured by rapid growth indicators from the perspective of creating more jobs. After the measurement yields the corresponding evaluation results, the corresponding indicators are updated; while the measurement results are fed back to the enterprises, they are compared and analyzed according to the actual business situation, and feedback is given again to the evaluation while promoting high-quality development of entrepreneurship, thus promoting the existing indicators validly.

This comprehensive and systematic review of existing research results on the measurement methods and index construction of entrepreneurial quality at home and abroad will help to comprehensively measure and evaluate the high-quality of entrepreneurial ventures in China which will maximize their resilience to create more jobs and produce innovation, and boost the development of China's economy under the impact of the global Covid-19 epidemic.

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