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# Improving the Economic Impact of Startup Ecosystem in India: A Study Based on Entrepreneurial Ecosystem Theory

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**Abstract**

Business incubators (BIs) provide a range of services and facilities aimed at nurturing the startups to grow successful business. Improving the economic impact of the startup ecosystem can be effected by investigating the potential role of business incubators. An extensive survey, on the startups, BIs, government officials, mentors, and funders pan India, is used to test a set of hypothesis based on the effect of BIs in influencing factors cited as research gaps in literature. Partial Least Squares SEM (PLS-SEM) approach was employed for data analysis and the path coefficients which quantify this effect are estimated. The results of data analysis show that while influence of business incubators on startup resources, government resources and incubator resources have a direct implication on the economic impact, money support and market connect indicate a negative impact. However, money support is found to have a strong influence as a mediating factor on all other factors. Applied with the interpretation of entrepreneurial ecosystem theory, study concludes that the money support factors need to employed with the scope of process theory rather than the resource theory perspective. The insights gained by the study is useful to improve the functions of BIs and the startup ecosystem.

**Keywords:** business incubator, economic impact, SME, money support, social startups, incubator services

## 1. Introduction

Business incubators (BI) play a critical role in nurturing the startup ecosystem by advocating for, training, providing funding support, facilitating networking, and offering mentorship. Given the acknowledged importance of startup ecosystem in a country's economic development, the role of BIs in improving the economic impact is of interest. Consequently, research endeavors focused on comprehending this role (Ogutu and Kihonge (2013), Albort-Morant et al. (2016), Al-Mubaraki et al. (2013), and Markley et al. (1995)), particularly in relation to unexplored factors, are imperative for the sustained enhancement of future prospects.

.India is globe's third-largest startup ecosystem, positioned for steady annual expansion between 12% and 15%. By the year 2018, 40,000 fresh jobs, added to a cumulative total of 160,000 to 170,000 jobs within the startup domain with filing of over 5,000 patents has enhanced intangible assets significantly (Maradi, 2023).

Vardhan et. al. (2021) studied the role of universities in generation of knowledge and development of an ecosystem where the knowledge is transferred to initiate new ventures. Ramar et al. (2016) studied business incubators in developing entrepreneurship characteristics of university students in Tamilnadu. It was recommended that the state universities across Tamil Nadu can begin with Business Incubation centers. Narayanan et al. (2019) explored the complimentary perspective of incubator operation in emerging economies.

Rathore et. al. (2020) provides a conceptual framework developed through strategic performance indicators (SPIs). The framework depicts the need and importance of Operational performance indicators for each identified SPIs. Adhana (2020) discusses the role of incubators in producing and nurturing successful business ventures and the government's policy measures in fostering entrepreneurship culture and setting up university business incubators.

Gandhi et al. (2021) studied the performance of technological business incubators (TBIs). Findings show that number of patent granted, selection criteria for incubates, corporate linkage, and nature of functioning of TBI have a significant influence on TBI success. Vincent et al (2021) use survey data from incubator firms, to conclude that business incubation dimensions have a statistically significant positive effect in generating start-up performance. Kashmiri et al. (2017)

analyze and examine the role the government policies play in the development of entrepreneurship and its impact on economic development. A qualitative method using Focused Group Discussions (FGD's) was conducted among 50 young aspiring entrepreneurs receiving Entrepreneurship Training at Jammu & Kashmir Entrepreneurship Development Institute (JKEDI). The framework clarifies the determining attributes of entrepreneurship, government policy and economic development dimensions and their proposed relationships.

The above overview of the studies in the Indian context is either limited to a narrow scope or to a narrow geographical location. While such focused studies have its own significance and value, there is much scope to determine and study a more extensive set of factors with a pan Indian scope.

The objective of the study is to quantitatively establish the potential role that can be played by an incubator in influencing a set of factors, identified as research gaps, so as to improve the economic impact of the startup ecosystem. A brief review of articles is presented to highlight the research gaps based on which a construct framework and hypothesis statements are formulated in the scope of entrepreneurial ecosystem theory. The methodology employed to gather data from the stakeholders in the Indian startup ecosystem and analysis is detailed followed by the reporting of results of the SME analysis. A discussion on the analysis of results highlighting the contribution of this study is presented summarizing the key take away.

## 2. Literature Review

Research conducted by Ogutu and Kihonge (2013) examined the influence of BIs on economic growth and entrepreneurship development. Additionally, Albort-Morant et al. (2015) conducted a study on the international impact of business incubators. Al-Mubaraki et al. (2013) focused on analyzing the outcomes of business incubation activities in developing countries. Markley et al. (1995) explored the economic and fiscal implications of a business incubator, showcasing how it can stimulate job creation and increase income within a local community. In a separate study, Markley et al. (1995) presented case studies illustrating how incubators affect local economic conditions and state fiscal aspects.

In the premise of the resource dependency theory, the economic impact, which is the dependent variable, is influenced by the factors Start-up resources (SR), Money Support (MS), Market Connect (MC), Incubator resources (IR), and Government resources (GR) identified as the key independent variables. Hence, the present study is directed to investigate the potential role of BIs in leveraging these resources for the economic development specifically in the Indian context. The presence of resources such as investment capital or knowledge producers alone does not guarantee entrepreneurial success (Minniti et. al., 2008; Audretsch, 2007). Further, collocation and the availability of social capital, do not necessarily lead to startup success (Bandera et. al., 2018). Hence a holistic theory and analysis is required. The review of the research gap factors are discussed below with the provision of the corresponding hypothesis index which is elaborated in the tables 5 – 9.

A study by McAdam (2008) concludes that it is important to investigate the correlation between the usage of BI resources by a startup and its success or failure to understand the resource based perspective of enhancing the startup success rate. Vanderstraetena et. al. (2020) emphasis the importance of good communication between the incubated firms and the incubator to enable co-development of services. In conclusion, it is necessary to explore the interaction between the founder and team with a BI (SR_H1). Colombo (2009) observe that startups which use high end technologies vastly benefit from research collaborations with international research partners. Guo et. al. (2022) study the innovation ecosystem in the context of China, where obtaining intellectual property rights is a measure and validation for an innovation. Edelman (2016) discuss the role of family support both in terms of social capital, emotional support, and financial assistance in young entrepreneur's business venture. Hence, start-up profile based on the business model adopted, the technology used, ownership of intellectual rights and regional effects is another factor to be studied (SR_H2). Nigam (2020) study the effect on funding availability based on the intellectual capital owned by a startup. Both positive and negative effects are observed (SR_H3). The exit strategies planned by an entrepreneur may have financial implications (DeTienne, 2015). Lukeš et. al. (2019) study the sales revenue and job growth as the growth indicators for incubated start-ups and non-incubated strat-ups in Italy and observe mixed results, though in the long term incubated startup report an increase in sales revenue (SR_H4). Sarto et. al. (2020) state that while incubators are suitable to ensure a longer lifespan for startups providing long term office space, accelerator programs are suitable for startups which are

technology based and operate in the service sector (IR_H3). Banerji et al (2019) explore the success of a founder with his social media foot print, specifically LinkedIn (SR_H5). They conclude that the fund raising ability of founder with a good LinkedIn connectivity and longer exposure to industry experience is much higher than others.

In the case of financial resources, Falato et. al. (2021) discuss the fragility in the investments made by capital funds market in the face of Covid epidemic. Shinkle et. al. (2020) explore the influence of grants in the innovation made by new age firms. Cacciolatt et. al. (2020) indicate that the credibility of a start-up is a crucial factor for grants (MS_H2). The availability of debt resources and management depends on the exit strategy of the entrepreneur (DeTienne et. al., 2015). Proper debt management (MS_H3) is important as improved credit rating enables access to more finances (Cacciolatti et. al., 2020). The startup performance may vary based on the nature of fund (MS_H4). Equity based funds are effective at early stages of development, but impact the profitability. Grants and spin off options improve profitability. In public venture capital funds, the contractual agreements may include clauses on cash flow rights and control rights, board seats composition, and ownership percentages (Murtinu, S. 2021). Vanacker (2011) define the scope of bootstrapping to ways in which the need for external funding is reduced. Spithoven et. al. (2015) quantify the importance given to research and development by the amount of expenditure made in their final accounts. Hence, the fund usage breakup is an important parameter for assessment of the startup future prospects and performance (MS_H5).

Mukul et. al. (2021) reiterates the importance of social capital as a strategical advantage not replicable by competitors. Given their contribution in helping get market leads, network resources, and mentoring, sufficient time and energy should be spent to develop such ties (MC_H1, (MC_H2). McGrath et. al. (2019) state that though it is assumed that startup firm will have the capability to network, the reality requires guidance in the face of any disruptions, customer base and the specific manager engaged for networking. Kurpjuweit et al. (2020) recommends stagewise collaboration to enable allocation of resources to the promising startup while the failed collaborations are not supported further (MC_H3).

Wagner et. al. (2021) highlights the importance of supply chain ecosystem is crucial for many start-ups. McAdam et. al. (2016) study the university incubation models from the viewpoint of stakeholders. With multiple stakeholders involved, the models adopted have to be tailored to the context taking the influence of stakeholders into consideration rather than following best process. Regional stakeholders are found to influence both the incubation process and the nature of innovation products (McAdam, 2016). Hence, the incubation model should define the stake holder position clearly. Giudici et. al. (2018) conclude that the vision of a venture enables the continued engagement of stakeholders during uncertain times (MC_H4). Busch (2022)conclude that training programs should not only focus on developing skills but primarily focus on developing a mindset which is flexible and capable of encountering uncertainities. Jourdan et. al. (2017) propose non market strategy, where activites of a firm outside the market place like lobbying with regulators and engaging with activists, to enable obtaining competitive advantage (MC_H5).

Ayyash et. al. (2020) comment on the diversity in the nature of BIs and their characteristics (IR_H1) by three parameters namely, the BI model, the objective and the nature of business supported is very inconsistent. Spithoven et. al. (2015) state that in spite of internal R&D capabilities and human resources, start-ups have to reach out for external R & D resources (IR_H2). Surana et. al. (2020) state that BIs should align with sustainable development goals and enable capacity building for startups. Bruneel et. al. (2012) also reiterate the need for BIs to be updated in their service profile (IR_H4). Madaleno et. al. (2022) observes that structural changes in economy are found to correlate with the growth of incubators and accelerators (IR_H5).

Jourdan (2017) study the correlation between public funding and the outcome in terms of market performance (GR_H1). It is observed that non-obvious trade off and restrictions are part of the sponsorship funds. In the special case of women entrepreneurs, apart from funding, non-economic support in the form of mentoring, and coaching should be given which will result in high success rate while requiring minimal investment (Welsh, 2021). Hottenrott et. al. (2014) opine that public policies on R & D investments can result in innovative products by enabling international collaborations. Welsh et. al. (2021) state that government policies need to ascertain the economic development level and then formulate appropriate support (GR_H2). Apart from public venture capital provision, government policies which can impact startups firms include tax credits, subsidies, and guarantee schemes (Murtinu, 2021). Bausch et. al. (2020) observe that there is a need to study the effect of the local political context and networks on the outcomes of social undercurrents (GR_H3). Amore et. al. (2013) observes that in products made for public consumption, close relationship with local government is very impactful. Government also conducts training programs based on their policy framework for startups

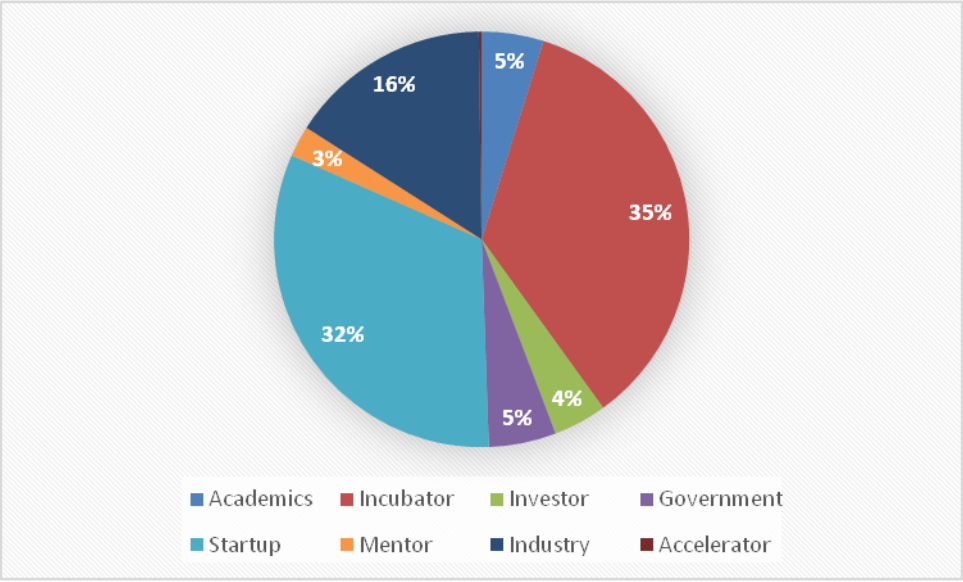
and BIs should focus on conducting such programs (GR_H4) with collaborations with the government (Busch et. al., 2022**)**. Buffart et. al. (2020) advocate programs for startups must be conducted with consideration of regional requirements and with specific technology requirements. Bendig et. al. (2022), reiterates the importance of VC funding in enabling green technologies reach the market. Millette et. al. (2020) make a case for incubators to play a crucial role in encouraging such ventures and soliciting the support of government to such initiatives (GR_H5).

Hence, the identified research gaps are sub-factors of the independent variables. The objective of the present study is to determine the role of BI in influencing these sub factors. For this a set of hypothesis are formulated as statements stating the functioning of a BI influencing the sub-factor. A total of twenty five hypothesis are proposed for each of the resource variables, Start-up resources (SR), Money Support (MS), Market Connect (MC), Incubator resources (IR), and Government resources (GR). The framework construct is in the scope of entrepreneurial ecosystem theory.

## 3. Methodology

The formulated hypothesis statements are provided in the tables 5 – 9 with the corresponding hypothesis index provided with the literature reference in the literature review section. Each hypothesis statement is directed to a specific sub factor discussed in the literature review section. A questionnaire was developed with the hypothesis statements and the responses were collected with a rating between 1 – 5 ranging from ‘not agreeing’ to ‘strongly agree’. A survey using the questionnaire was conducted through online platforms and in conformity with ethical guidelines. The survey participants constituted startups, incubators, mentors, government agencies, venture capitalists, and investors constituting the stakeholders in the startup ecosystem in India. The survey participants were required to answer all the questions thus obtaining data capturing the perception of all the stakeholders. The response rate was within 50% and atleast a reach out to 1000 potential participants. An initial pilot study with 60 responses was used to validate the study framework and the questionnaire. In the expanded survey, a total of 457 participants answered the survey questions and the details of the types of participants is shown in fig. 1.

Figure 1: Survey Population




As depicted in Figure 1. the respondents to the research survey were primarily the start-up and incubator personnel. In the startup ecosystem as well, the startups and incubators form the major group given their evergrowing numbers. The other categories are relatively lesser in number. Hence the participant break up is representative of the real world population in the startup ecosystem. The next prominent category is participants from the industry sector. Being in the technology and business sector, they have good insight into the start-up ecosystem and practical knowledge in addition to being a considerable population. The other groups are relatively low in percentage fraction which also reflects their participation and interest in the start-up ecosystem.

The data acquired through this survey was subjected to analysis using Structural Equation Modeling (SEM) given the demonstrated success in numerous studies of comparable scope (Ahmad et al., 2019; Seetharaman et al., 2017). Specifically, the Partial Least Squares SEM (PLS-SEM) approach was employed for data analysis (Schamberger et al., 2020). With its widespread application across diverse fields, ADANCO 2.0 was employed as the tool for conducting PLS-SEM analysis on the survey data. ADANCO 2.0, a structural equation modeling tool, was utilized to construct the research framework involving the independent variable's influence on dependent variables (Wright, 2012).

The basic framework of dependant and independent variables which was elaborated to reflect the identified factors and subfactors is used to formulate a structural equation model for PL-SEM analysis. Path analysis was performed and model parameters which fit the model were estimated.

## 3. Analysis Results

### 3.1 Validity of constructs

#### 3.1.1 Measurement of construct reliability:

To assess the reliability of constructs, three parameters were determined: Composite Reliability (CR), Cronbach's alpha (α), and Dijkstra-Henseler's rho (ρA). A Cronbach's alpha value exceeding 0.6 establishes construct reliability (Pallant, 2001). The calculation of Dijkstra-Henseler's rho (ρA) (Dijkstra, 2015) becomes crucial for a conclusive analysis. The results of the analysis are presented in the Table 1. From the results, it is obvious that Dijkstra-Henseler's rho, Cronbach's alpha (α) and Jöreskog's rho (ρc) of all the variables are having values above 0.7. Based on these results it is concluded that the variables possess construct reliability.

Table 1: The estimated parameters for quantifying construct reliability

| Construct | Dijkstra-Henseler's rho ($\rho_A$) | Jöreskog's rho ($\rho_c$) | Cronbach's alpha(α) |
|---|---|---|---|
| **SR** | 0.7439 | 0.7160 | 0.7156 |
| **MS** | 0.7807 | 0.7707 | 0.7720 |
| **MC** | 0.8223 | 0.8176 | 0.8201 |
| **IR** | 0.8383 | 0.8360 | 0.8351 |
| **GR** | 0.8097 | 0.8003 | 0.7973 |
| **OM** | 0.8316 | 0.8154 | 0.8183 |

#### 3.1.2 Convergent Validity:

Convergent validity assesses the real correlation between two measures in relation to their theoretically anticipated value. Average Variance Extracted(AVE) is adopted to evaluate convergent validity, given its widespread usage as a commonly accepted metric. The AVE is calculated for each construct, namely SR, MS, IR, GR, MC, and OM. A value of at least 0.50 is recommended. The results of the AVE determined for the variables of this study and summarized in Table 2 The SR construct with a value of 0.34 is a low value of correlation which needs to tested with other measures for a conclusive analysis. Further, analysis is done with this insight about the survey results.

Table 2: The results of the average variance extracted determined for the independent variables

| Construct | Average variance extracted (AVE) |
|---|---|
| **SR** | 0.3477 |
| **MS** | 0.4056 |
| **MC** | 0.4745 |
| **IR** | 0.5057 |
| **GR** | 0.4487 |
| **OM** | 0.4745 |

### 3.1.3 Discriminant validity

Discriminant validity serves to ascertain whether theoretically unrelated constructs also demonstrate a lack of correlation in observed survey data. The evaluation of discriminant validity, as proposed by Henseler, Ringle, and Sarstedt (2015), is achieved through the heterotrait-monotrait ratio of correlations (HTMT). In terms of discriminant validity, an HTMT value below 1 is desired, with values below 0.85 indicating a stronger confirmation of this validity.

Roemer (2021) introduced a modified coefficient, HTMT2, which offers reliability for estimating the correlation between latent variables, particularly when empirical correlations are positive. Notably, HTMT2 values are smaller than HTMT values. The outcomes from determining HTMT and HTMT2 are summarized in Table 3. The results suggest that MC and MS does not exhibit strong discriminant validity, though the values are in the acceptable range. All the other variables exhibit strong values. Furthermore, the Fornell-Larcker criterion (Table 4), a commonly used standard, is employed to assess discriminant validity.

Table 3: The parameters estimated for analyzing the discriminant validity

| | HTMT | | | | | | HTMT-2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Construct | SR | MS | MC | IR | GR | OM | SR | MS | MC | IR | GR | OM |
| SR | | | | | | | | | | | | |
| MS | 0.8754 | | | | | | 0.8264 | | | | | |
| MC | 0.8734 | 0.8583 | | | | | 0.8689 | 0.8455 | | | | |
| IR | 0.8254 | 0.8132 | 0.8275 | | | | 0.8049 | 0.7978 | 0.8249 | | | |
| GR | 0.7717 | 0.8311 | 0.8382 | 0.8399 | | | 0.7597 | 0.8191 | 0.8409 | 0.8336 | | |
| OM | 0.7866 | 0.7484 | 0.7499 | 0.8246 | 0.8294 | | 0.7677 | 0.7358 | 0.7412 | 0.8144 | 0.8205 | |

Table 4: Fornell-Larcker criterion for analyzing the discriminant validity

| **Fornell-Larcker criterion** | | | | | | |
|---|---|---|---|---|---|---|
| **Construct** | **SR** | **MS** | **MC** | **IR** | **GR** | **OM** |
| **SR** | | | | | | |
| **MS** | 0.8754 | | | | | |
| **MC** | 0.8734 | 0.8583 | | | | |
| **IR** | 0.8254 | 0.8132 | 0.8275 | | | |
| **GR** | 0.7717 | 0.8311 | 0.8382 | 0.8399 | | |
| **OM** | 0.7866 | 0.7484 | 0.7499 | 0.8246 | 0.8294 | |

### 3.2. Framework based structural model

The previous sections have analysed the results on the validity of the variables to be considered as constructs in a construct framework which is ultimately taken as the structural equation model (Fig. 2) to determine the influence of the independent variables on the dependent variable.

### 3.3 Path Coefficients:

Path Analysis delves into the correlations within a predefined network within the model framework. This involves the use of two variables: one serves as the presumed cause, while the other functions as the effect resulting from the cause variable. For a significant influence between a cause variable and its associated effect variable within the model, the path coefficients should surpass 0.100.

Figure 2 shows the structural model with the path coefficients between the variables to illustrate the effect of one variable on the other denoted by pointed arrows. For each of the independent variable, the corresponding sub factor constructs are

specified with the corresponding loadings. These values are used to discuss the hypothesis formulated based on the identified research gaps. Further for the constructs, the coefficient of determination is the proportion of the variation in the dependent variable that is predictable from the independent variable. It specifies the robustness of the results, which provides the confidence on the analysis.

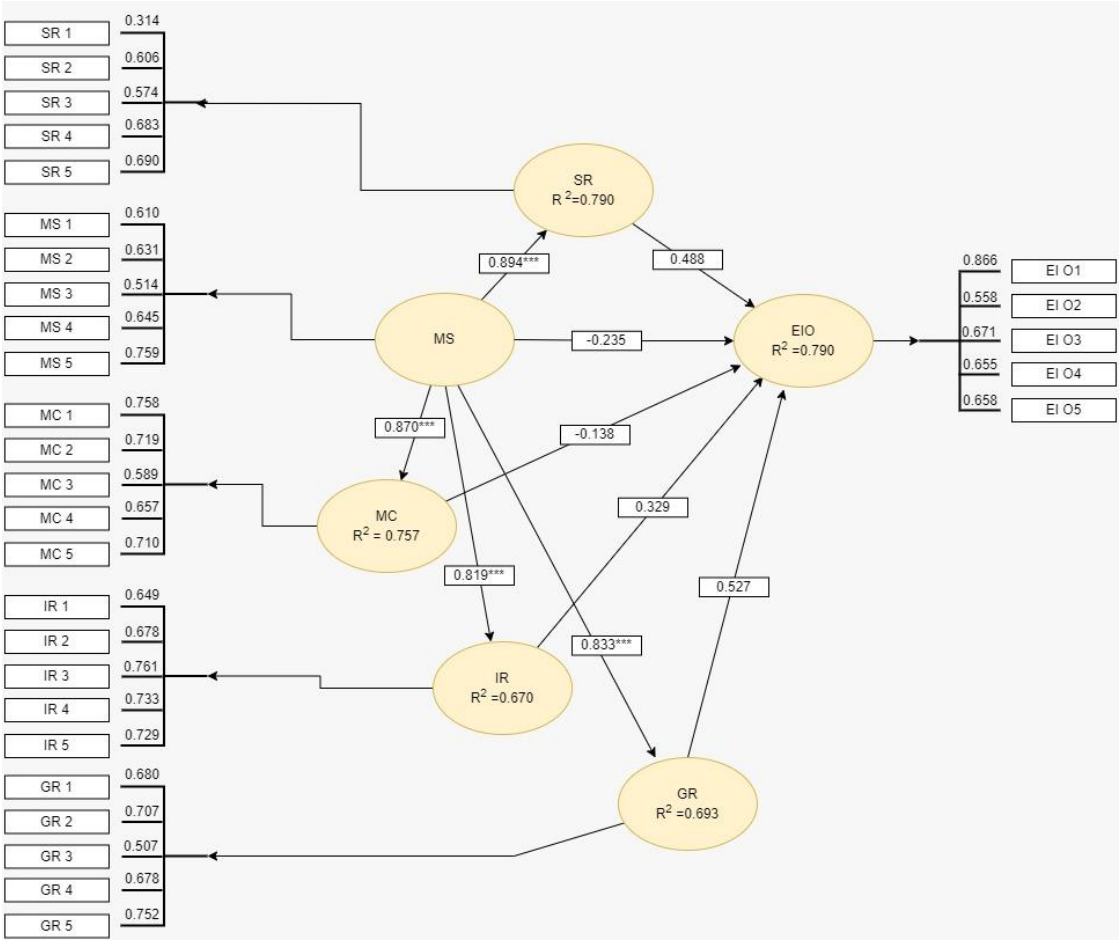



Figure 2: Structural Model with the respective path coefficients

### 3.3.1 Hypothesis testing and analysis

The set of 25 determinant hypotheses were formulated based on the research gaps identified on review of the state of the art literature. Five sub factors were identified for each independent construct. Hence five determinant hypothesis were formulated for each independent construct. As each sub factor was based on a specific research gap related to an independent construct, the effect of the independent construct on the dependent variable is defined through the effect of the five sub factors. An estimated loading range between 0.5 and 0.8 indicates a moderate impact on the independent variable (Bullmore et al., 2000), while a loading exceeding 0.8 suggests a strong effect (Wright, 1934).

#### 3.2.1.1 Startup Resources (SR)

The sub factor identified as research gaps are the nature of founder and team profile as determining factors for leveraging Business Incubator support (SR1); startup profile defined by technology and IPR ownership, business model employed and demographic (SR2); Startup financial status defined by sales turnover (SR3), financial buffering for survival, shareholdings, mode of sales (SR4); and Achievements and recognition received by startup (SR5).

The objective of this analysis is to study the role of BI is influencing these factors and the corresponding effect on the economic impact.

Table 5: The test of determinant hypothesis for SR

| Sl.No. | Determinant Hypothesis | Loading | T value | Effect |
|---|---|---|---|---|
| SR_H1 | Founder and team profile are determining factors for leveraging Business Incubator support. | 0.3139 | 4.7563 | Less (rejected) |
| SR_H 2 | Business Incubators support in improving the startup profile. | 0.6061 | 12.2852 | Moderate (accepted) |
| SR_H 3 | Business Incubators improve startup finances in terms of Sales Turnover, Startup Survival due to finance, Shareholding, Financial Analysis, and Mode of Sales. | 0.5742 | 12.1915 | Moderate (accepted) |
| SR_H 4 | Business Incubators play a pivotal role in achievements of startups. | 0.6834 | 17.7797 | Moderate (accepted) |
| SR_H 5 | Business Incubators motivate start up by generating a conducive startup environment and providing good PR profile. | 0.6898 | 15.9322 | Moderate (accepted) |

The value of the loadings indicate a moderate effect while the t value indicates strong significance, except for the first sub factor. The loadings for the founder and team profile being the determining factors in leveraging BI support, which affects the economic impact, is lower than 0.5 indicating a lesser impact. Hence, it can be concluded that the profiles of the founder and team does not strongly determine how the BI support is leveraged.

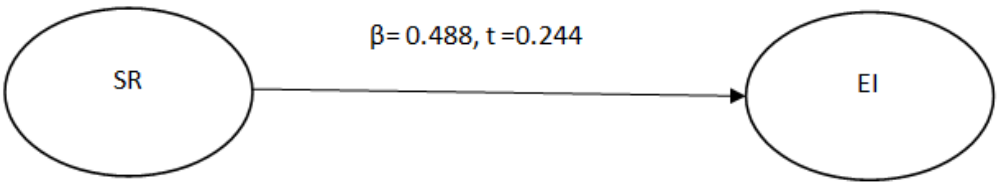



**Fig. 3 Path coefficient for the factor startup resources**

The overall impact of the startup resource factor, determined by the sub-factors, on the economic impact is analysed and the result is illustrated in Fig. 3 The path coefficient β is 0.44 with the $R^2$ value of 0.76. Hence it is concluded that the role of BIs in impacting the economic impact by way of influencing the startup resources is significantly important. Based on the above results, the action points for BIs would be to focus on these sub-factors. Specifically providing a conducive environment, enabling a good public relations (PR) profile indicates the maximum loading. This observation is supported by the study of Pakura et. al. (2023) which states that entrepreneurs gain advantages from utilizing social media by engaging with stakeholders, performing environmental scanning, and developing proficiency in PR planning and the approach to social media PR varies based on the age of the startup. Therefore, BI have an important role to play given their access to the relevant PR resources.

Further, given the low loading factor of the founder and team profile determining the usage of the BI resources, BIs should adopt a proactive role in engaging with the founders and team with consideration of their profiles. This observation is emphasized as a special class of founders the influence of female entreprenuers (Roos, A. (2019), Ayala et. al. (2014), Shneor (2013)) and disabled (Kašperová, E. (2021)) require specialized guidance and mentoring to enable and encourage their participation.

### 3.4.2.2 Incubator Resources (IR)

The incubator resources as a influencing factor is explored through effect of the sub factor defined by the influence of Business Incubator model which includes the monitoring framework, Business Models, Performance Metrics, Incubator Profile, and Incubator Strategy (IR1); Technology Resources offered comprising R&D labs, TTO, IPR service (IR2);

Provision of Acceleration programs for scale up (IR3); programs and services such as Training Programs, Infrastructure - Co-working spaces, Acceleration Services, Mentorship, expansion, satellite operations (IR4); and Incubator Growth indicators (IR5).

The objective of this analysis is to study the influence of these factors and the corresponding effect on the economic impact. The Table 6 depicts the quantitative analysis quantifying the loadings of these factors.

Table 6: The test of determinant hypothesis for IR

| Sl.No. | Determinant Hypothesis | Loading | T value | Effect |
|---|---|---|---|---|
| IR_H1 | Business Incubator model (monitoring framework, Business Models, Performance Metrics, Incubator Profile, Incubator Strategy) influence the growth of startups | 0.6489 | 14.1283 | Moderate (accepted) |
| IR_H2 | Technology Resources (R&D labs, TTO, IPR) provided by Business Incubators help in startup technology development. | 0.6781 | 17.2656 | Moderate (accepted) |
| IR_H 3 | Acceleration program provided by Business Incubator enable startups to scale up their operations. | 0.7607 | 24.4756 | Moderate (accepted) |
| IR_H4 | The programes and services provided by Incubator (Training Programes, Infrastructure - Co-working spaces, Acceleration Services, Mentorship, expansion, satellite operations) benefit the startups | 0.7332 | 23.4873 | Moderate (accepted) |
| IR_H 5 | Incubator Growth indicators (Incubator Success, Incubator sustainability, Incubator Awards and Recognitions, Performance of Incubator) translate into economic benefits to the local economy through their startups | 0.7289 | 20.2099 | Moderate (accepted) |

For all the sub-factors, value of the loadings indicate a moderate effect while the t value indicates strong significance. The loadings for conducting acceleration programs for enabling startups to scale up has the maximum loading among the considered sub factors. Since activities related to scaling up are conducted for startups which have developed a potential product or service, the expected economic impact potential is also higher. This observation is an important insight for BIs in light of the study by Madaleno et. al. (2022) on economic impact of incubator and acceleration program colocation, where further research was mandated for a conclusive result citing multiple knowledge gaps. The results of the present study validate the involvement of BIs in accelerator programs.

Similarly, incubator growth indicators determined by the incubator success, sustainability and awards are obtained as a result of incubating and graduating successful startups. Hence, this is also having a significant loading value. Other factors like provision of technology resources and incubator models though important enablers, require the simultaneous operations of many other factors to ensure economic impact.

The overall impact of the incubator resource factor, determined on the basis of the subfactors, on the economic impact is analysed and the result is illustrated in Fig. 4. The path coefficient is 0.329with the $R^2$ value of 0.67. Hence it is concluded that the role of BI resources in impacting the economic impact is significantly important. Based on the above results, the action points for BIs would be to focus on these sub-factors. BIs should focus on accelerator programs and provide customised services based on the development level of startups.

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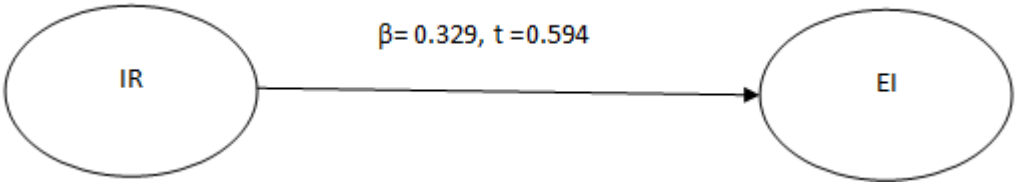


Fig. 4 Path coefficient for the factor incubator resources

**3.4.2.3 Government Resources (GR)**

The research gaps in the study of influence of government resources, formulated as the sub factors are assistance to Startups to avail Government Benefits by providing Infrastructure Grant, Recognitions, and Subsidies (GR1); Information on Government Policies regarding impact, awareness, tariffs, and implementation with assistance in implementing them (GR2); leveraging changes in Political Impact (GR3); collaborating with Govt. Associations and conducting programs for start-up growth (GR4); encouraging startups to orient their functioning towards Societal factors which include Regional Focus, Economic Development, Country Culture, and creating Social Impact (GR5).

The analysis aims to study the role of BI in enabling startups to leverage government resources through these the influence of these factors and the corresponding effect on the economic impact. The fig 5 depicts the quantitative analysis quantifying the loadings of these factors.

Table 7: The test of determinant hypothesis for GR

| Sl.No. | Determinant Hypothesis | Loading | T value | Effect |
|---|---|---|---|---|
| GR_H 1 | Startups avail Government Benefits through Business Incubator assistance (Infrastructure Grant, Recognitions, and Subsidies) | 0.6796 | 17.6082 | Moderate (accepted) |
| GR_H 2 | Bussiness incubators keep a tab on Government Policies (Impact, Awareness, tariffs, implementation) and help in implementing them. | 0.7072 | 19.5988 | Moderate (accepted) |
| GR_H 3 | Business incubators agile to leverage changes in Political Impact | 0.5067 | 11.4360 | Moderate (accepted) |
| GR_H 4 | Business Incubators collaborate with Govt. Associations & conduct programs for start-up growth | 0.6781 | 17.4020 | Moderate (accepted) |
| GR_H 5 | Business incubators encourage startups to orient their functioning towards Societal factors (Regional Focus, Economic Development, Country Culture, Social Impact). | 0.7518 | 22.4519 | Significant (accepted) |

All the sub factor value of the loadings indicates a moderate effect while the t value indicates strong significance. The loadings for incubator agility in leveraging political changes provides the least of the loadings among the sub factors, which can be explained by the fact that such effects take long time to realise as economic benefits. On the other hand, the highest loading was for the determinant hypothesis on BIs encouraging startups to function with consideration of societal factors. Such activities will directly result on operations which will impact the society resulting in economic impacts. This observation is relevant in light of the study by Karahan, et. al. (2022), on German university spin-off startups,

regarding the BI service utilization and SDG mandate fulfilled. They conclude that BIs need to collaborate with government for policies and offer a range of services which are specifically focused on meeting the tailor made requirements of startups with challenges in meeting the SDG mandate. Along similar lines, the BI being updated on government policies also creates an economic impact definitely as government policies are drafted with the intended purpose of creating societal benefits.

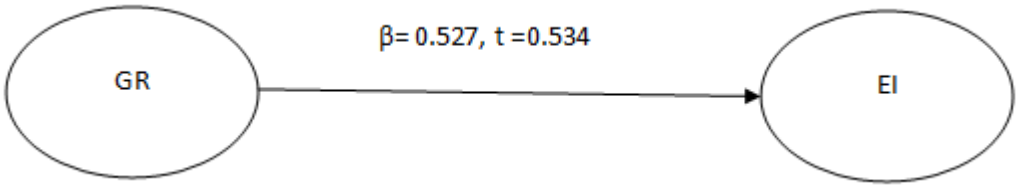


Fig. 5 Path coefficient for the factor government resources

The overall impact of the government resource factor, determined by the sub-factors, on the economic impact is analysed and the result is illustrated in Fig. 6. The path coefficient is 0.527 with the $R^2$ value of 0.693. Hence it is concluded that the role of BIs in impacting the economic impact by way of leveraging the government resources is significantly important with highest path coefficient value. It is also important to note here that these observations are peculiar to the Indian context. Given the fact that the Indian government has literally kick started the start-up ecosystem and is still plays an active role in enabling the ecosystem to thrive, the emergence of this factor as the most significant factor is conclusive observation.

**3.4.2.4 Market connect (MC)**

The study of role of market connect, is analysed by the following gap factors: creating and facilitating networking opportunities for startups (MC1);enabling market expansions by national and international collaborations (MC2); aiding in marketing strategy through orientation and opportunities, and evaluating performance (MC3); enabling access to stake holders and monitoring their engagements (MC4); and helping in strategizing to develop competitive advantages for the start-ups to overcome competition (MC5).

Table 8 depicts the quantitative analysis through the loadings of these factors. These results point out the impact of each of the sub factor based on the test on the determinant hypothesis formulated.

Table 8: The test of determinant hypothesis for MC

| Sl.No. | Determinant Hypothesis | Loading | T value | Effect |
|---|---|---|---|---|
| MC_H1 | Business Incubators create and facilitate networking opportunities for startups (Industrial Network, Public Network, Government Network) | 0.7577 | 20.3189 | Significant (accepted) |
| MC_H 2 | Business Incubator's national and international collaborations materialize to startups market expansions. | 0.7189 | 21.0448 | Moderate (accepted) |
| MC_H 3 | Business Incubator aid in marketing strategy (Orientation, Opportunities, Global, Performance) | 0.5889 | 12.4191 | Moderate (accepted) |
| MC_H 4 | Business Incubator enable access to stake holders and monitor their engagements | 0.6566 | 15.1870 | Moderate (accepted) |
| MC_H 5 | Business Incubator help in strategizing to develop competitive advantages | 0.7095 | 18.7596 | Moderate (accepted) |

All the sub factor value of the loadings indicate a moderate effect while the t value indicates strong significance. The loadings for incubator aiding in market strategy provides the least of the loadings among the sub factors. Market strategy

can differ from one company to another and by itself is dependent on many factors. Though BIs can provide an overall knowledge, guidance and monitoring, further engagement is limited. While the importance of this sub-factor is established, the influence level is lesser when compared to other sub factors. For instance, creating and facilitating network connections has the highest loading in this category. This analysis while pointing out the significance of each sub factor also enables the BIs to strategize their function, deciding the allocation of time and resources in a prudent manner to enable economic impact.

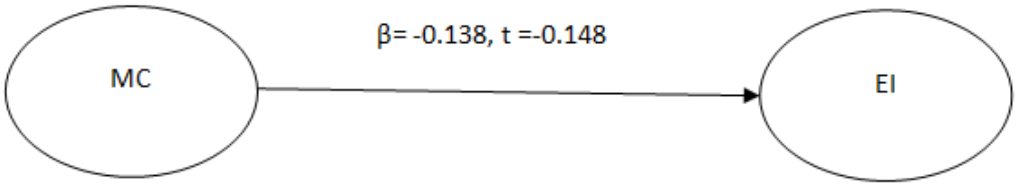


Fig. 6 Path coefficients for the factor market connect

The overall impact as determined by the sub-factors playing a role in market connect, on the economic impact is analysed and the result is illustrated in Fig. 6. The path coefficient is -0.138 with the $R^2$ value of 0.757. A negative path coefficient value indicates that the overall hypothesis of the positive role of BI in impacting the economy through the market connect activities is false. However, it is important to also note that this effect is investigated only in terms of the sub factors identified as research gaps. Hence the failing of the hypothesis has to analysed in light of these sub-factors and is hence not a general observation. The study by Goldasteh, et. al. (2022) provides insight into the factors which are required to be addressed to enable startups to overcome the market chasm. Further, since market connect is a very specialized element for a startup, the generalized functioning of BIs can only afford a limited role with the startups having to take a proactive role. The outcome of the analysis points out the fact that when it comes to market connect, BIs can focus more of educating the startups and providing access to the available network resources. Beyond that the way in which the startups proactively engage with marketing activities and customer interactions and service will determine the economic impact created and these domains are only marginally influencible by BIs.

**3.4.2.5 Money Support (MS)**

The money support is a crucial factor for survival factor as start-ups have very little capital resources. The research gap sub factor through which this factor is analysed are as follows: aid in raising investments (MS1); sensitizing and improving the grant approval chances (MS2);advise on and enable access to debt (MS3); and leveraging funds obtained from different sources (MS4).

The analysis aims to study the role of BI in enabling startups to access, use, and manage funding resources through these the influence of these factors and the corresponding effect on the economic impact. The fig 10 depicts the quantitative analysis quantifying the loadings of these factors.

Table 9: The test of determinant hypothesis for MS

| Sl.No. | Determinant Hypothesis | Loading | T value | Effect |
|---|---|---|---|---|
| MS_H1 | Business Incubators aid significantly in the investments raised by Startups | 0.6103 | 14.6695 | Moderate (accepted) |
| MS_H 2 | Business Incubators help in sensitizing and improving the grant approval chances for the startups | 0.6310 | 15.5511 | Moderate(accepted) |
| MS_H 3 | Business Incubators advise on and enable access to debt | 0.5144 | 12.1268 | Moderate (accepted) |
| MS_H 4 | Business Incubator help the startups in leveraging funds from different sources (Govt./Angels/ Venture Capital/Incubator/ Accelerator) | 0.6453 | 15.9108 | Moderate (accepted) |
| MS_H 5 | Business Incubators provide advisory and | 0.7593 | 25.4458 | Significant (accepted) |

| | | | | |
|---|---|---|---|---|
| | regulate efficient utilisation of funds by startups. | | | |

All the sub factor value of the loadings indicate a moderate effect while the t value indicates strong significance. The overall impact of the money support factor, determined by the sub-factors, on the economic impact is analysed and the result is illustrated in Fig. 7. The path coefficient is -0.235, which indicates that the overall hypothesis that BIs role in money support translates to economic impact is a failed hypothesis. This leads to the conclusion that focus on money support will only reduce the economic impact. Though this observation can be perceived as counter intuitive given the importance of money support, the study by Mittal et. al. (2020) mention the observation that many Indian e-startups have been running in loss inspite of obtaining significant funding. However, similar to the market connect factor, this result should be interpreted in light of the sub factor studied as determining hypothesis. Notably, BIs providing advisory and regulation of efficient utilization of funds by the startups has the highest and significant loading value. This further reiterates that while access to funds is important, the economic impact can be realized only when the available funds are utilized efficiently. In light of this, money support is analysed as a mediating factor.

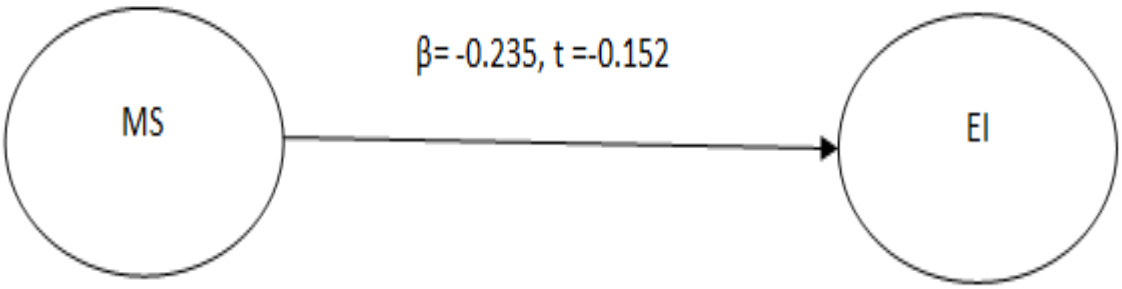


Fig. 7. Path coefficient for the factor money support

### 4.3 Mediating effects

In this regard, the mediating effects of money support on other factors are analysed. The results are summarized in table 10. and illustrated in fig. 9 – 12. The path coefficients are very high indicating a strong effect of money support in influencing other factors. This leads to the conclusion that money support acts as a catalyzing force for other directly influencing factors on the economic impact of BIs.

Table: 10: The influence of MS on other factors indicated by the loadings

| Sl.No. | Factor | Loadings | T value | Effect |
|---|---|---|---|---|
| 1 | Startup resources | 0.8940 | 24.5139 | Significant |
| 2 | Market Connect | 0.8702 | 28.6523 | Significant |
| 3 | Incubator resources | 0.8187 | 22.9811 | Significant |
| 4 | Government resources | 0.8328 | 23.3452 | Significant |

#### 4.3.1 Startup resources:

**Formulated Question:** Business incubators must enable the improvement of Startup resources by money support to influence the economic impact obtained.

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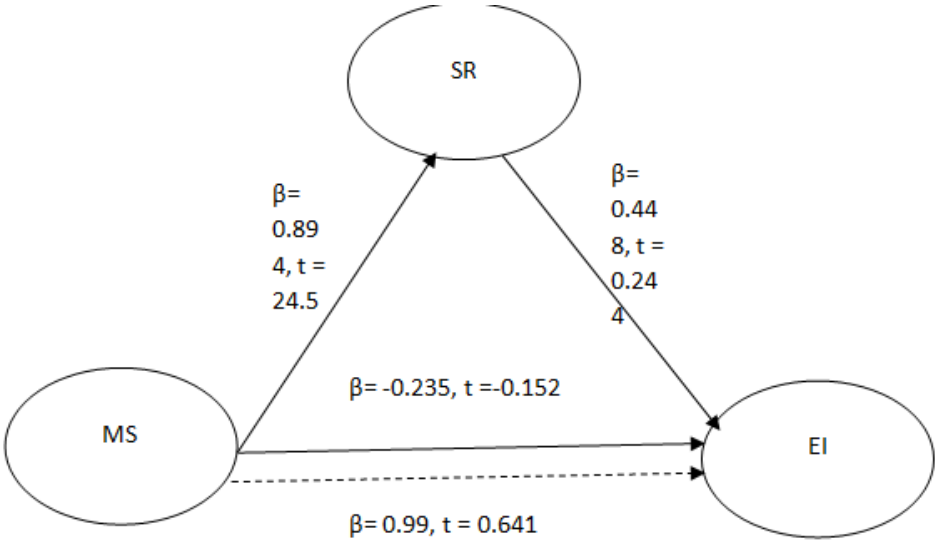


Figure 8: The impact of MS on the EI through the SR

The results show a highly significant path coefficient value of 0.894 and a t value of 24.5. The indirect effect of money support on economic impact also is significant with a path coefficient of 0.99. This result answers the proposed question. The highly important insight this provides is that it is not sufficient for BIs to provide money support alone, but to influence the improvement of startup resources by money support.

**4.3.2 Incubator resource:**

**Formulated Question:** Business incubators must improve their resources by money support to influence the economic impact obtained.

Similar to the earlier observation, money support significantly impacts incubator resources. Hence this shows that BIs must monitor the effectiveness using the money support to improve their resource in order to impact economic growth. As seen in Fig. 9, a highly significant path coefficient value of 0.894 and a t value of 24.5 is obtained. Milne (2020) study the influence of funding received by incubators on the assistance provided to incubates. However, it is also observed that incubators are constrained to follow the mandate set by the public and private funders with regard to the utilization and outcome expected from the funding. Public funders set socio-economic goals and hence this will result in the improvement in the economic impact.

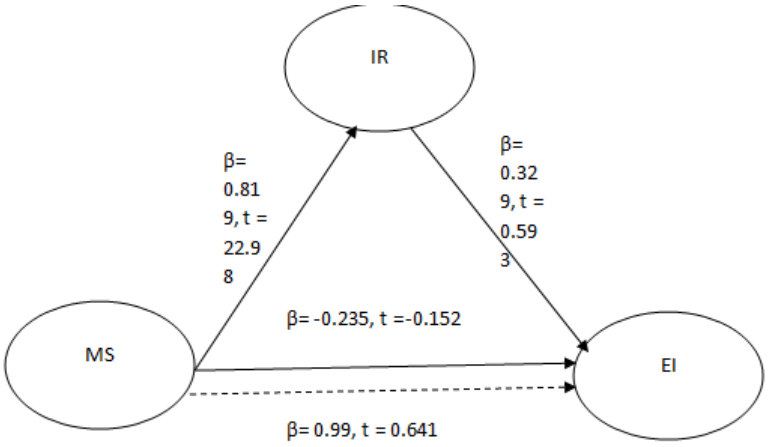


Figure 9: The impact of MS on the EI through the IR

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### 4.3.3 Government resource:

**Formulated Question:** Business incubators must improve the government resources mobilization by money support to influence the economic impact obtained.

Similar to the earlier observation, money support significantly impacts incubator resources. Hence this shows that BIs must monitor the effectiveness using the money support to improve their resource in order to impact economic growth. As seen in Fig. 10, a highly significant path coefficient value of 0.833 and a t value of 24.5 is obtained. Based on the sub-factors in the government resource category, collaborations with government to conduct training programs, advocating sustainable social mandates and engaging with the government to follow the policies and implementing them require manpower and financial support. Hence money support is observed to play a crucial part in the functioning of the incubators to leverage government support.

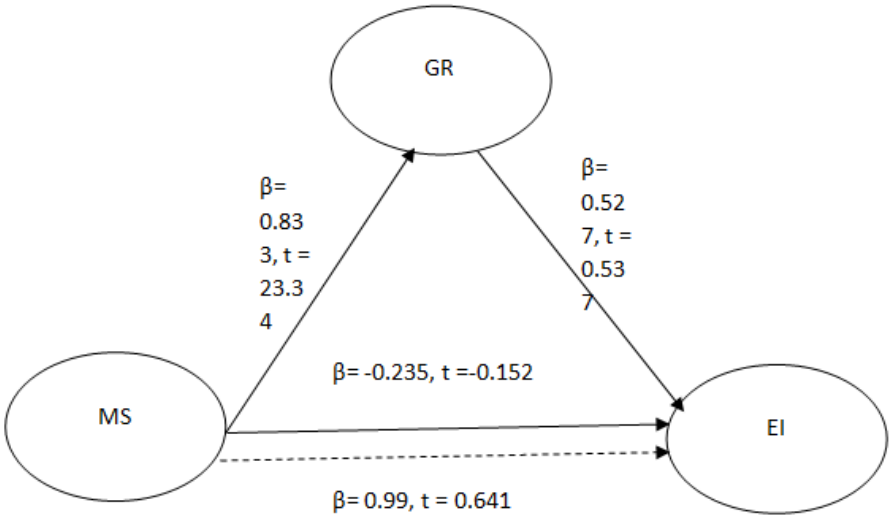


Figure 10: The impact of MS on the EI through the GR

### 4.3.4 Market Connect

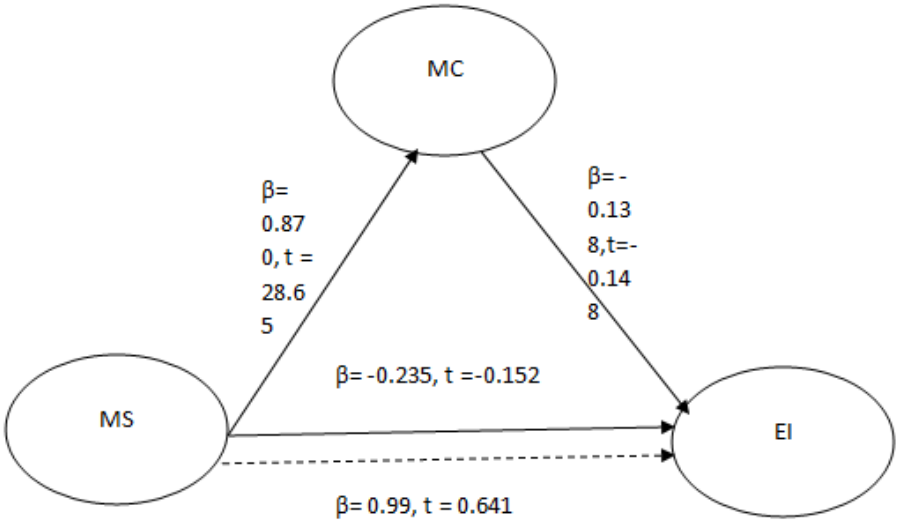


Figure 11: The impact of MS on the EI through the MC

The effect of money support on market connect is significant with a path coefficient value of 0.870 and a t value of 28.65. However, as discussed earlier the influence of the sub factors of the market connect through the functioning of BIs to influence economic impact has a reverse effect. As discussed by Goldasteh, et. al. (2022) overcoming the market chasm requires the addressing of other factors not considered in this study. The operation strategy of BIs seeking to enhance economic impact would be better successful if the market connect activities are influenced through a different set of factors.

The study on the mediating effects of money support on the other factors has provided insights to the effective functioning of BIs. It confirms the findings that presence of resources such as investment capital or knowledge producers alone does not guarantee entrepreneurial success (Minniti, et al., 2008; Audretsch 2007). This analysis offers an important insight that BIs need to strategize money support activities as a background work and couple it with other factors which are significantly influenced by money support. BIs must curate programs with money support as an important and indispensable sub activity which determines the success of the program objectives. Money support activities should not be planned as independent activity and the economic impact studied as the outcome since positive impact will not be observed. BIs focusingsolely on money support and not prioritizing other activities simultaneously will not observe successful outcomes.

**5. Discussion**

This article on business incubators (BIs) provides a comprehensive theoretical contribution by synthesizing diverse research findings into a cohesive framework. It offers a detailed examination of the various roles that BIs play in supporting the startup ecosystem, encompassing advocacy, training, funding support, networking, and mentorship. By analyzing and integrating research studies such as Athreye et. al. (2020), Falato et. al. (2021), Stevenson et. al. (2021), Cacciolatti et. al., (2020), Jiao et al. (2021), Griva et. al. (2021), Kurpjuweit et al. (2020), De Cock et. al. (2020), Busch (2020), Runst et. al., (2021), and Ćorić et al (2020) in the context of sub-theories of entrepreneurial ecosystem theory, the study establishes a nuanced understanding of the multifaceted impacts of BIs.

In a study by Sharma et al. (2014), it has been determined that Indian incubators have positively impacted and have been contributing to India's economic growth. However, this might be improved upon or maximized by strengthening the structure of the incubator model, altering the current national legislation, and enhancing coordination amongst the many start-up eco-system players. According to a study Incubated start-ups develop far more quickly than their non-incubated competitors, and they also have a 40% higher survival rate, at 80% (Sharma et al., 2014).

This theoretical contribution involved identifying and elucidating the observed impacts of BIs on economic growth, entrepreneurship development, and their influence on local community prosperity using a framework based on all aspects of the entrepreneurial ecosystem theory. The impact of money support on the startup resources, government resources and market connect signify the application of resource dependency theory and stakeholder theory. The observation in the present study that market connect and money support has a reverse impact on economic impact reflects the observations that presence of resources such as investment capital or knowledge producers alone does not guarantee entrepreneurial success (Minniti et al., 2008; Audretsch, 2007). Hence, the social capital theory from the view of the chosen factors is not applicable to the startup ecosystem. However, it also observed that the hypothesis that Business Incubators create and facilitate networking opportunities for startups was found to have significant validity. This leads to the conclusion that network theory and social capital theory should not be considered as the sole basis for leveraging networks, but should be integrated with process and system theory to derive benefits. Additionally, the significant loading factors observed for the hypothesis on conducting advocacy and knowledge transfer on fund utilization, debt management, SDG orientation, and conducting training programs imply the relevance of the knowledge overflow theory.

Furthermore, the article pinpoint gaps in the existing research landscape, paving the way for a proposed quantitative analysis framework. This framework would aim to quantify and assess specific factors that BIs influence, identified through these gaps, in order to enhance the economic impact of the startup ecosystem.

In essence, the article's theoretical contribution lies in consolidating empirical evidence, identifying patterns across studies, and proposing a structured methodology for comprehending and optimizing the pivotal role of BIs in driving economic development within the vibrant and evolving startup ecosystem.

**5.1Implications:**

In summary, the article holds both theoretical and practical implications. Theoretically, this study's contribution lies in its comprehensive analysis of factors and sub-factors affecting business incubators (BIs), particularly in elucidating direct and indirect effects. By formulating and testing hypotheses around previously unexplored sub-factors, this study fills critical research gaps, advancing the available literature on BIs. It provides a foundational framework that can guide future theoretical explorations, offering a more holistic understanding of how these various elements interplay within the context of BIs.

The analysis throws light on the fact that startup ecosystem needs to be analysed using the entrepreneurial economy theory encompassing the entire range of sub-theories namely cluster theory, process theory, resource dependence theory, social capital theory, systems theory, network theory, knowledge spillover theory, and stakeholder theory. The significance of the combined outlook is clearly emphasized by the results.

Practically, the study's implications are significant for BIs as it serves as a roadmap for them to fine-tune their strategies, operations, and engagement approaches. The survey outcomes and analysis act as a compass for BIs, providing actionable insights to optimize their functioning within the startup ecosystem. This means BIs can adapt their programs, services, and interactions based on the identified factors and their direct or indirect effects, ultimately enhancing their effectiveness in nurturing and supporting startups. By addressing previously unexamined aspects, this study equips BIs with valuable insights to tailor their initiatives more precisely, contributing to their overall impact and efficacy in fostering entrepreneurial success.

**6. Conclusion:**

The present study aims to investigate the potential role of BIs in impacting the economic growth through the start-up ecosystem. By choosing factors which are listed as limitations in the study of the start -up eco system, and an overall framework of constructs based on the entrepreneurial ecosystem theory, the study determines the perceived effect of the factors on the economic output based on the analysis of a survey outcomes.

The main insights from this study gained as the research findings are summarized. The hypothesis tested with significant loading factors are as follows: Business Incubators provide advisory and regulate efficient utilisation of funds by startups. Business Incubators create and facilitate networking opportunities for startups. Business incubators encourage startups to orient their functioning towards Societal factors (Regional Focus, Economic Development, Country Culture, Social Impact).

Money support resources is identified as a mediating factor exhibiting a high loading factor with all of the other resources. However, as a direct resource, money support does not impact the economic output. This is an important insight gained form this study as the access to money resources is often based on the perceived valuation. Valuation of a start up being a highly subjective endeavor, is likely to be misleading given the myriad influencing factors (Hoffmann, 2003). The present analysis underscores the need to restructure the access and management of money sources based on this insight. This is further reinforced by the accepted hypothesis that the startup ecosystem perceives the role of BIs is advising and regulating fund utilization to improve economic impact.

The factors have been analysed with regard to the survey outcome. It is a guiding post for BIs to orient their strategy, operations and engagement with respect to the results of the analysis performed in this study. All the factors with respect to the respective sub factors have been analysed with the identification of the direct and indirect effects. As a major contribution of this study, sub factors which have not been analysed in previous studies have been formulated as hypothesis and tested. Hence this study can be considered as addressing the research gaps and adding valuable insights to the available literature.

**6.1 Limitations:**

The survey has been performed only within India and hence the results of the study might have characteristics which are unique to the Indian context. BIs operating outside India must take this fact into account while referring this study. Further, the aim of this study is to address the research gaps in the state of the art literature on the start-up ecosystem. Hence the conclusions of the study must be considered in the context of the sub factor which determine the effect of the factors on economic impact. Studied with the context of other sub factors, these observations are bound to indicate different conclusions.

The study is of interest to the stakeholders of start-up ecosystem. Specifically, the BIs are the most relevant category as the conclusions of the study can be directly applied to design the functioning of BIs.

Further extensions of the present study can span the study of the outcome on applying the conclusions as the functions of BIs. This would result in the further validation of the conclusions drawn from the perception study.

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