

Open Innovative Approach to External Knowledge Resources, New Innovative Smart Practice for New Venture Startups

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Abstract—Nowadays, companies open up their innovation processes and incorporate internally and externally developed and extended technologies and knowledge to create business value which is considered as the most popularized method for managing innovation. Open innovation is defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation. Open innovation concept has increasingly grown during past decade among academicians and practitioners in particular with emphasizing its application in large firms, but little has been studied in small firms like startups or venture companies. Startups and venture companies are considered as new established enterprises in the first step of their operations, operating to solve problems, where the solution is not clear and the success of firm is not promised and guaranteed. Their main problem is that they are limited by the responsibility of newness and smallness. Therefore, open innovation is considered much more important for startups than for large firms. By establishing relationships with external partners and sources of knowledge exist in other organizations startups might overcome their business limits. The main purpose of this paper is to represent different aspects of conceptual literature of applying external sources of knowledge as open innovation practice and utilizing them in startups and venture companies as new firms in order to increase their performance and overcome weaknesses and limitations. The method of this study uses a conceptual literature review and develops various concepts regarding open innovation notion and different types of OI and its application as an external source of knowledge in small firms. It is expected that this literature review of existing research on open innovation approach by using external knowledge sources in startups and venture companies as a smart practice helps to make a contribution to better understanding the important role of applying concept of OI in new small firms for better performance and more growth.

Index Terms—External knowledge resources, new venture companies, open innovative approach, startups.

I. INTRODUCTION

Open innovation is considering as a widespread practice and notion in organizations and developed into a prominent research topic in the current innovation management literature [1]-[3]. Currently companies open up their innovation processes and incorporate internally and externally developed and extended technologies and knowledge to create business

value which is considered as the most popularized method for managing innovation. Ref. [4] first proposed the notion of "open innovation" hereinafter will be called OI and has quickly increased and absorbed interests of researchers and practitioners which is shown by special publications in journals and conferences and rapidly has been growing as body of literature. Open innovation is defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation” [5]. Even though the notion of open innovation is increased among academicians and practitioners, open innovation research has focused substantially on large companies while small and medium enterprises (SMEs) have received in comparison little attention [5]-[9], [3]. In model of closed innovation, it is assumed that innovation processes in firms needed to be controlled and monitored by the company.

Changes in business and industry environment have led to an increased movement of knowledge expertise and the development of new financial structures such as venture capital, moving to the boundaries of innovation processes to start separated [10], [11]. Ref. [12] defines open innovation as: "a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology". Startups play a fundamental role in improving and increasing the level of economic efficacies [3]-[13].

Startups are a considerable source of many pioneering innovations [14]-[17]. The startup can be defined as a new venture company with limited and scarce technical and financial resources. Startup can be defined as an "organization formed to search for a repeatable and scalable business model" [3]-[18]. They are limited by the responsibility of newness and smallness [19], [3]-[20], and shortage of access to sufficient resources. The lack of resources induces startups to search for external partners and resources in different phases of development and commercializing their new ideas or technologies [21]-[23]. Therefore, open innovation is considered much more important for startups than for large firms. Even though the open innovation literature provides a framework for understanding startups' role in innovation ecosystem and how they utilize external streams of knowledge to become a forthcoming member of the innovation ecosystem, the systematic framework by which startups can organize and manage open innovation activities is still not fully explored [3].

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There are some factors which are related to the success of startups. i.e. the entrepreneurial perspective [9], the dependence on innovation ecosystem[56], the use of external knowledge flows [6], [24], [25], and the role of networks [3]-[26]. Startups or young new venture companies as new established firms regarding to their smallness suffer a structural lack of tangible and intangible resources [27], [28]. The lack of financial and human resources hinders the development of new innovation processes. Adopting open innovation (OI) practices is a vital activity for startups in order to succeed to dominate the weakness of newness and weakness of smallness [3]-[29].

As a scientific insight, the startup phenomenon and OI are closely related [28]. OI literature strongly underlined the effect of open innovation activities and strategies on reinforced and stabilized businesses and large enterprises, which discussion of specific organizations such as SMEs and startups were ignored (except [30], [31]) [25].

Thus, new venture companies and startups are considered as new comers to business environment so that they are suffering from lack of adequate internal organizational resources, internal expertise, research capabilities, and increased cost of R&D that hinder them to foster and flourish their overall performance. Regarding this, it would be very vital for new venture companies or startups to utilize external knowledge sources as inbound or outside-in flows of knowledge which is considered as inward open innovation sources or using it as external environmental resources inside their firms. While the extant studies had investigated and addressed some important roles of open innovation in startups, the accurate surveying and exploring role of utilizing external sources of knowledge as inward open innovation sources or activities in startups and new venture companies as newly formed firms have not fully studied. Startups and new venture companies are restricted by the nature of newness and smallness in size and scope of activity [3]-[33], Also deficiency of access to sufficient widespread resources. Therefore, the lack of access to resources causes startups and new venture companies to search for external partners, open innovation resources and external sources of knowledge in different phases of development and commercializing their new ideas or technologies in order to utilize them as inward (Outside-In) open innovation activities in their firms for better development and efficient performance [3]-[35].

There have not been a large number of literature studies works on startups or new venture companies and open innovation strategies. Thus, this research is necessary because open innovation research of venture companies is insufficient.

This paper contributes to the literature of how startups and new venture companies can be much more benefited from external sources of open innovation as a new approachable practice for them. And also what types of R&D collaborations exist as external sources of knowledge or outside-in flow of knowledge to be exploited inside startups and new venture companies.

The main purpose of this paper is to represent conceptual literature role of open innovation activities as a novel approach for startups and new ventures. The basis of this paper is literature review of open innovation practices and activities from outside organizational environment of startups

and new venture companies. The main problem which is addressed here is to explain how startups and new venture companies can do their best practices by using open innovation sources from outside the boundaries of their organizations.

II. METHODOLOGY

In order to meet the demand of research gap in open innovation activities and using external knowledge sources as inflow of new innovative ideas to new venture companies and startups, the research method of this paper is based on conceptual literature review relevant to open innovation notion and its application as an external source of knowledge in new venture companies and new startups. It is a literature review paper which used systematic conceptual literature review that develops notions in this field of study. This theoretical and review paper offers a conceptual framework for open innovation approach as a new practice for new venture companies and startups for better performance and more effective growth.

III. LITERATURE REVIEW

Today the important engine of growth for the worldwide economy which create new jobs, causes innovative products and services to the market or expand new technologies are startups [36]. Startups and new venture companies are new established enterprises in the first step of their operations, operating to solve problems, where the solution is not clear and the success of firm is not promised and guaranteed.

Startups are organizations established to search for a repetitive and scalable business model [18]-[36]. The business of these enterprises is often technology oriented and has numerous potential to grow. There is no common confirmed definition, but most business scholars believe that a startup is determined by its age, growth, income, profitability or stability. Startups can frequently terminate their smallness and limited size and scales with an acquisition by larger firms or maybe can grow in terms of revenue and number of employees when they turned into a profitable organization.

Startup stage can be end by forming initial stock of knowledge. It is crucial for the existence and permanence of the business of startups and new venture companies [36].

By establishing relationships with external partners and sources of knowledge exist in other organizations startups might overcome their business limits. Such relationships improve the quality of startups' products and services and positively affect their business models and performance.

Firms may improve their innovation and financial performances by both internally using external technologies and externally exploiting internal knowledge. Contrary to the vertically integrated model of innovation [37], the open innovation paradigm is characterized by its sensitive and permeable innovation process and the strong interaction between the company and its environment [36]. The term of startup points out that a venture is new and might search to create a new market. As new venture companies introduce new products or services that make changes to the stance of

incumbent firms, they are often considered the sources of gales of creative destruction [9]-[38]. These new ventures are supposed to have more innovative role than other firms [9]-[40]. By starting entrepreneurial activities through startups, Existing studies indicate that building relationships with external partners should be considered as a priority for the success of startups [28]-[43].

TABLE I: STRENGTHS AND WEAKNESSES OF NEW VENTURE COMPANIES AND STARTUPS

Strengths of New Venture Companies and Startups	References	Weaknesses of New Venture Companies and Startups	References
Possess inherent innovation potential-As they are established by entrepreneurs, they can create values by leveraging innovation to utilize new opportunities and create new product market territory- New innovative ideas can be brought to the market and being transformed in economically sustainable enterprises- Able to transform entrepreneurial judgment into profit	[44], [45], [46]-[36], [47]-[9], [28].	Lack of perfect and complete assets like: <i>market access-distribution system- operational Knowledge-strategic and technical know-how- Insufficient budget for supporting R&D process</i> -Limited resources and requirements of large amount of investments in R&D, organization building and market development-Lack of knowledge in order to identify and exploit opportunities in Entrepreneurial decision making	[44], [48], [49]-[36], [48]- [9].

A. Open Innovative Approach for Venture Company Startups

With considering the resource constrained notion, entrepreneurial growth for new venture company is dependent on a combination of internal knowledge and external environment resources [9]-[51]. Various external knowledge sourcing relationships are considered as a crucial element of entrepreneurs' capability to identify more different types of market opportunities [52], convey this message that entrepreneurs in startups and new formed venture companies need to expand and develop their business models so that allow them to exploit external sources of knowledge as inflow stream of knowledge into the new venture and new startup [9]. In addition to individual level of firm's perspective, openness to external sources of knowledge is also more commonly considered in the larger innovation ecosystem, networks, clusters and institutional contexts [9]-[55]. As a matter of fact, startups and entrepreneurial new venture company success can be considerably facing such huge challenges by the innovation ecosystem in which it is embedded [45]-[56]. Utilizing external knowledge depends on some issues such as the repetition of interactions with external partners [9]-[51], and the general network embeddedness and knowledge spillovers that the new venture company or startup can gain in developing its business model [6], [9]-[60].

Simultaneously, new venture companies and new startups are compelled to consider cost increasing effects and decreasing returns [61], [62], whereas considering how to administer and lead inflows of new ideas and intellectual property when searching for variety and diversity of external knowledge acquisitions [63], [64], [9]-[52].

B. Different Types of Open Innovation and Notion of Inbound Open Innovation as External Knowledge Resource

Ref. [4] invented the phrase of "Open Innovation" in order to create a contrast with closed innovation strategy in organizations. It is supposed that firms generate their own innovative ideas and try to develop, expand and build, marketing and distribute their novel innovative ideas and knowledge by their own.

Open innovation instead of relying solely on a firm's capability; manage the process of carrying out internal and external technology management activities along the innovation process [65], [66]. Therefore, organizations and companies engaged in open innovation activities, collaborate with their external environment from various aspects: From one aspect this can be led to external technology acquisition and exploitation. On the other side, this can be done by sharing their core competencies and major strengths and capabilities with other companies in external environment [66].

Large established firms relied on their own R&D departments and favored a closed innovation model where all innovations are under the firm's control [4], [67], [68]. This "closed innovation model" is contrasted with the open innovation paradigm that describes a new cognitive framework for a firm's strategy to profit from innovation [1]-[25]. Research on open innovation differentiates between two types of open innovation:

TABLE II: OPEN INNOVATION NOTION AS EXTERNAL KNOWLEDGE SOURCE

Inherent Concept of OI	Reference	Types of Open Innovation	Reference
Open innovation supports firms to purposively use inflows and outflows of knowledge to accelerate internal innovation, and to expand markets for external use of innovation, respectively.	[69, p.1].	<i>Outside-in</i> or inbound where new ideas flow into an organization and <i>Inside-out</i> or outbound where internally developed technologies and ideas can be acquired by external organizations with business models that are better suited to commercialize a given technology or idea	[63].

By applying and utilizing external open innovation sources as inbound open innovation activities through collaborating with network partners by small firms, new venture companies or startups, they will be able to rectify the scarcity of internal resources and competences [70]-[73].

The inbound process refers to the purposive inflows of knowledge and regards the technology exploration and innovation activities to capture and benefit from external sources of knowledge [74]. Antecedent research suggested that a firm can advance and increase its innovation performance by interacting with various external partners,

mainly with suppliers, customers, competitors, universities and research institutes. Opening the innovation process to suppliers, customers and competitors is a major consideration for OI [61], [74]-[76]. Another aspect of OI is outbound OI that is progressively considered as a strategic activity by firms, which can use and profit from their own internal innovations without investing in complementary assets. It is also defined as the commercialization of technological knowledge particularly or additionally to its application and utilization inside the firms [77], [78]. It can be done through different types of contractual forms, for instance, by out licensing agreements, alliances, spin off, and technology transfer. By doing this, organizations can externally leverage their technological knowledge [79]-[81].

C. The Role of Utilizing Open Innovation Practices in Startups and Venture Companies

Innovation is extensively considered as one of the prominent and remarkable factors for the successfulness of firms in nowadays business environment [82], [66]. Due to attain competitive advantage position in the market and better performance, firms are continuously seeking for new, novel and effective innovation models. Out of different types of innovative strategies, open innovation approach seems to be largely expanded [66]-[84]. Open innovation is significantly known as a new paradigm not just for large and high-tech firms, but in other less technology intensive companies like SMEs [25]-[66], [73], [85]-[87].

Knowledge exchange can propose chains of benefits for reducing time to market, cost and risk reduction and better access and utilizing from specific expert's knowledge. Consequently, organizational abilities or capabilities to form such a constant and numerous research collaboration with other knowledge resources is a key factor in execution of innovation activities in manufacturing [65], [83], as well as in services [66]-[88]. Startups can play a substantial role in innovation process [14], as through startup step, new innovative ideas can be disseminated to the market and make the firm's position sustainable. Startup's innovation and performance success depend on the presence of knowledge flows in different aspects: they influence and are influenced by incumbent firms [31], [43]-[66]. Most of the time they are part of clusters, where they can access specialized knowledge [89]. Entrepreneurial ecosystem is a supportive system for startups and new venture companies through institutions and other organizations such as: *Business Angels*, *Venture Capitalists* and *Research Organizations* [66]-[90].

It is shown by existing literature that networking is the best option and most appropriate priority for the success of startups [21], [42], [43], [31]-[66]. With considering this fact that startups and new venture companies are suffering from limited resources, open innovation networks can open a horizon to utilize interesting alternatives.

Networks can provide current novel approaches to horizontal cooperation and provide an opportunity to exploit the core competencies of startups in wider area [66].

According to the literature, it is deemed that open innovation is a crucial innovation tool for better performance of startups and new venture companies in order to prevail over lack of resources in such firms [66]-[91]. The challenges of

smallness and newness in small firms encourage them to innovate in collaboration with other firms [7], [92]-[94], [95], [66].

Open innovation can affect small companies to be benefited from it than large firms according to simpler organizational processes and flexibility to changing business environment [3]-[73]. There exist a large number of challenges which startups and new venture companies encounter in order to bring and commercialize innovation to the market place. Deficiency of complementary assets, funding constraints and increasingly competitive business environment, forces startups to search and seek external knowledge resources. Startups and new venture companies can start to practice open innovation activities in various paths and start to collaborate with large firms can be one important aspect of OI collaboration for them [3]. In this regard, as adopting open innovation approaches conveys this meaning that firm's boundaries are redefined, Thus, it allows technological knowledge to become an exchangeable factor and contributes to the development of mechanism and organizing of inward and outward flows of technological knowledge [10], [66]-[83].

Open innovation interactions between startups and large companies can build a win-win strategy for both. The large company can share resources such as time and expertise as valuable knowledge that can bring successfulness for startups and new ventures [3]-[96]. There is a common understanding of this concept that both startups and large companies can benefit from developing and establishing strategies based on alliances and partnership in an open innovation approach. Startups and new venture companies can play an important role in open innovation networks [66]. In the OI literature, networks have been considered as a crucial instrument to the success and achieving the goal of innovation processes [97].

They have been considered important for the success of startups and new venture company either by acquisition of resources such as knowledge or financing [41], or by introduction of new products to the market [28]-[98]. Knowing the importance of how the structure or processes of the networks can affect startups as well as new venture companies or other player's processes and outcomes involved on innovation process is considered as a remarkable point [28].

D. Collaborative Actions of Open Innovation in Startups and Venture Companies

New established companies develop and make new markets for new products or services according to a dedicated technology or skills [36]-[46]. In order to increase the possibility of survival for startups, research based ventures and startups require gaining some resources very rapidly: Cash flow for obtaining the financial independence, external legitimacy and market share [36]-[46]. New venture startups are particularly small institutions with few numbers of staff and financial resources. Due to their smallness, such those firms mostly lack the necessary physical, human and financial assets to introduce a new technology or product to the market [36]-[45]. These new formed firms require overcoming the challenge of smallness by creating a new organizational structure and define organizational roles, tasks and

operational processes. Those kinds of challenges regularly cause inefficiency and conflict among organizational member, which consequently put startups and new business venture companies in a disadvantageous position compared to successful firms that could succeeded to deploy integrated business practices [36]-[99]. Even though there are interactions between a new firm and external environment, startups and new venture companies lack exchange relationships with all types of external players such as customers, buyers, suppliers, distributors and governmental organizations. These relationships between startups and external partners should be created; nonetheless, there are lack of access, sufficient experience, reputation and legitimacy of high position for such firms. As a result, startup and new venture companies are recognized by higher failure rates than large firms [36]-[44].

Achieving and access to technological, technical and commercial resources through building strategic R&D alliances with other firms can make a positive potential aspect for startups and new venture companies. Without such alliances, startups and new venture companies need years to gain such operational experiences [100]. By developing R&D collaboration network, startups and new venture companies can exploit of relationships and available resources as remarkable prominent established actors. By following this path, they will be able to decrease the risks of newness due to their knowledge, resources, dimension and stability. In addition, supportive authenticity and validity that partners offer as consultation to startups and new venture companies provide this opportunity to retaliate the disadvantages of organizational inexperience and newness [36]-[49]. The confirmation and support of a startup's technology standards in high uncertain industries can tremendously increase its reputation and position. Such supportive behavior and approaches by industrial partners improve the visibility and perceived quality of the startups and new venture companies and can act as a free advertising strategy that guide to new relationships with other high level actors [17]-[36].

Absorbing confirmed technology standards should increase the firm's reputation and pose it to the attention of crucial potential customers, investors, and partners. Therefore, by collaborating with industrial partners, startups and new venture companies can access to supplementary capabilities such as distribution, manufacturing and marketing capabilities which are critical and vital for successful development and commercialization. Startups and new venture companies might exploit and utilize partner's production facilities and the expertise in R&D management and development process. Furthermore, new ventures may access to more financial resources to support the initial step of startup and new venture companies and use partner's experience in assessment of future's payment, gaining experience on how to operate and grow a firm in the same industry, strategic and operational know-how [36]-[103]. Briefly, R&D alliances with industrial partners bring such opportunities: possess permanent exchange relationships [109], acquire innovative capabilities [104], and attain external approval of their operations [105], utilize the perceived quality and validity of partner's products and

services among potential customers, suppliers, employees, collaborators and investors [36]-[106].

Although being involved in alliances with partners contains a set of risks for startups and new venture companies such as arise of unintended knowledge spillovers, loss of control over their own activities and low effectiveness because of cultural issues [107], many studies showed that collaboration with partners positively affect both innovation outputs like patents and startups performance [44]-[36], [104], [106], [108], [109].

TABLE III (A): STUDIES ON OPEN INNOVATION AND LARGE FIRMS

Authors	Year	Key Focus	Key Insights
[110]	2011	How do large companies implement open innovation?	43 large multinational firms reviewed across a wide range of sectors and their open innovation implementation approaches and has adopted a taxonomical approach to analyze the path taken by firms to move from closed to open innovation practice. The implementation path of OI was found to depend on: (1) innovation requirements, (2) The timing of the implementation and (3) the organizational culture. Each of these factors have led to differences in how OI has been implemented across multinational large companies.
[111]	2012	The relationships among intellectual capital, research outcomes, and technology transfer (TT) performance, investigating the role of university TT offices (UTTOs) in the innovation process in firms	The role of the university is that of mediating knowledge transfer and Assisting in avoiding possible market failure. There are more university-industry interactions and collaborations, not only in scale but also in scope. Universities not only disseminate knowledge to companies but also assist companies in Terms of practical applications. University Technology Transfer Offices connect academia and industries to support the mechanisms of TT and commercialization, by which a broadly Skilled workforce demanded by the marketplace is created.

TABLE III (B): STUDIES ON OPEN INNOVATION AND LARGE FIRMS

Authors	Year	Key Focus	Key Insights
[112]	2015	How large corporations From the tech industry have begun to tap into entrepreneurial innovation from startups?	Large companies have long sought ways to become more entrepreneurial. They have adopted (and often later abandoned) mechanisms like corporate venture Capital- internal incubators- strategic alliances- and joint ventures. However, the growth and increasing viability of startup firms, and their attendant disruption, create a new imperative to develop more agile, rapid means for large companies to engage with the startup community. Instead of viewing startups as simply agents of disruption, companies are trying to collaborate with startups to transform them into engines of corporate innovation.

E. R&D Collaborations Types with External Partners and Various Aspects of Knowledge as Open Innovation Source

Different kinds of collaboration with external partners as external sources of OI (inbound) influence on innovation performance of startups and new venture companies.

Exploiting higher different types of external partnerships lead to higher innovation performance derived from R&D alliances [44], as firms are most probably access to a wide range of technological capabilities. In fact, startups and new venture companies might not only collaborate with industrial units and element as external sources of inbound OI, but also with scientific partners, such as universities and research institutes. In particular, collaboration with suppliers and customers as other types of R&D and OI external sources is relevant to incremental innovation, whereas collaboration with universities and research institutes is positively related to radical innovation [36]-[114]. Specifically, collaboration with universities, research institutes and governmental labs lead startups and new venture companies to different advantages. These partners are considered as the most updated information and knowledge centers which hold tacit knowledge to be transferred to startups and new venture companies through licensing or acquisition [115] and also collaboration with universities provides access to international knowledge networks [116] and therefore, to international markets [36]. Furthermore, universities and scientific partners can be engaged in expanding prototypes and managing patents and licenses [36]-[117]. R&D collaboration as external source and inbound open innovation stream to firms make interaction opportunities that generate new concepts, business ideas, emerging knowledge and technological know-how which startups and new venture companies can translate them into new products [81]-[97]. As knowledge is being considered as the main source and essence of open innovation collaborative partnership with others, thus,

there exists a crucial classification of different types of knowledge which exchanged in open innovation networks.

TABLE IV: TYPES OF EXCHANGEABLE KNOWLEDGE IN OPEN INNOVATION NETWORKS

Technological Knowledge	Market Knowledge	Managerial Knowledge
Implies to know-how, capabilities and competencies crucial to the process and implementation of product and process development that includes scientific knowledge as well as applied and experimental knowledge. Reference: [100]-[7]. [8].	Is generally defined as organized and structured information and knowledge about the market, containing competences and know-how focused on customer's characteristics, preferences and requirements that firms should satisfy them. Reference: [74], [100]-[8].	Refers to skills and competencies to coordinate and supervise organizational resources and processes efficiently and effectively. It comprises operational and applied knowledge such as: total quality management and or lean management as well as more abstract and complex knowledge like decision making, strategic processes, and cross functional competences. Reference: [100]-[8].

F. The Interactive Role of Actors with Startups and Venture Companies in Open Innovation Processes

To start innovation process points out the involvement of startups in relationships with different types of actors. Scholars have extensively studied this phenomenon and according to their research these actors regarded from the literature: *Incubators, large corporations, Venture Capital firms, higher education systems* [28].

Incubators: The literature on startups and open innovation focused on the analysis mainly on three types of incubator: Technology incubator [118], Industrial incubator [34], and university incubator [28]-[119]. The importance of technology business incubators in encouraging the innovation process by building a relationship between market failures of new venture companies and startups because of lack of managerial experience and ability to boosting capital at early phase and improving access to capital at a firm's early stage is addressed by antecedent study [119]. They found two questions about the role of universities in the startups lifecycle such as: (1) university plays a modest role as a source of new initiative ideas for incubators and incubatees, and (2) universities play a crucial role in the next future stages of incubatees' new product development process [28].

Ref. [120] addressed that there are three various goals of the incubator as a conveyor of knowledge transfer from large firms to society for industry incubator. It motivates innovation and entrepreneurship as in the shape of new venture companies, motivates innovation in the mother companies and motivates innovation more specifically in the society.

Overall, they emphasized the role of publicly co-sponsored industry incubator as a kind of program to commercialize knowledge within firms which have been suffering from structural deficiency [28].

Large Corporations: The increasing growth trend and livability of startups and new venture companies caused a mandatory affair to develop more agile and quick mechanism for large companies to be involved in the startup and new

venture community [28]. Ref. [112] reported four different models that companies can utilize to get involve with startups successfully. It is focusing on two new models that seem to have their own strengths: outside-in and platform startup programs. [28]. There are some specific challenges in small firms such as startups and new venture companies need to be managed in partnership with larger firms that caused this situation into an unbalanced partnership [121]. The challenges grow when one partner is an inexperienced startup trying to utilize a new and novel technology at a low level of readiness, and the other partner is a larger firm with long duration of establishment, as a complex organization with operations extended around multiple business areas and geographic locations [28].

Venture Capital Firms: The literature about startups and OI emphasized the important role of VC as a facilitator able to transfer experience and knowledge between new firms and create contacts with third parties [28]. Also the role of VC as investors in entrepreneurial firms like startups and new venture companies identified as offering potential but also existence of high risk. VC's managing mechanisms is connected to a strict time schedule, and willingness to remove existing uncertainties can receive better sense of the risks, determine clear goals and timelines, communicate clearly and think critically about financial and product market cycles [28]-[122].

Higher Education System: Higher education system is an important source of knowledge, and as competitiveness is a dependent element on knowledge, ideas and creativity, higher education system emerged as a crucial item for economic development [28]. Ref. [123], analyzed the role of higher education institutes as mediating factor which cover the gap between producers and consumers of knowledge as they own staff and different research units that are able to contribute to venture startups and young entrepreneurs to know opportunities gather resources and create new organization [28]. Ref. [124] reported that universities should expand their role as "third mission" to supplement their initial and traditional assignment and representativeness of research and teaching activities that needs to be developed by universities like faculty consultancy, licensing of university IP to established firms, creating of spin-out ventures with university IP, and also supporting to establish and build student and faculty-led startups and new venture companies.

TABLE V: CHARACTERISTICS OF ACTORS IN OPEN INNOVATION PROCESS OF STARTUPS AND NEW VENTURE COMPANIES

Incubators	Large Corporations	Venture Capital Firms	Higher Education Systems
A business incubator is a company that helps new venture company and startup firms to be developed by offering needed services such as management training and or office space for their business activities.	These types of companies accepted different mechanism like corporate venture capitals, internal incubators, strategic alliances and joint ventures to collaborate with startups and new venture companies or to make new spin offs or spinouts.	VC firms generally structured and formed as partnerships. They are considered as the general partners that serve as the managers of the firm and will serve as investment advisors to the VC funds increased. VC are known as disseminator of knowledge as it offers a network of relationships that include financial, commercial or technology driven contacts.	An open innovation ecosystem for startups and new venture companies cannot be considered complete without the important role of higher education system.

IV. DISCUSSIONS AND CONCLUSION

The present paper has highlighted the importance of utilizing external knowledge resources as open innovation activities that known as a smart practice for startups and new venture companies. It explored different conceptual literature in open innovation and new venture startups and their approach in applying external knowledge sources as open innovation stream and activities toward new venture companies and startups for increasing performance and removes their structural weaknesses and barriers. It synthesizes the current understanding of open innovation and its types and the important role of exploiting inbound open innovation as one of the aspects of OI and external source of knowledge in new venture companies and startups. Since new venture companies possess limited and scarce technical and financial resources and they are constrained by the responsibility of newness and smallness, and also as startups can be considered as source of many pioneering innovations, the main approach of startups and new venture companies should be based on absorbing knowledge from larger firms, as well as from other actors such as research organizations, universities or other specialized network partners when they engage in open innovation activities.

Shortages of access to sufficient resources motivate and encourage startups to collaborate with external partners and resources in different steps of development and commercializing their new ideas. Therefore, in this paper it is addressed that adopting open innovation (OI) practices by new venture startups is a vital activity in order to succeed to dominate the weakness of newness and weakness of smallness so that it can compensate the shortage of financial and human resources as impediments of development for new innovation processes in these new established firms. The importance of OI notion as a smart practice and approach for new startups is that lack of adequate internal organizational resources, internal expertise, research abilities and skills, and growing trend of R&D cost makes it vital for new venture companies or startups to utilize external knowledge sources as inbound or outside-in flows of knowledge. These various types of R&D collaborations exist as external sources of knowledge or outside-in flow of knowledge can be exploited for startups and new venture companies. As a result, making relationships with external partners should be considered as the first vital priority for the success of startups. Generally, firms can make progress and increase their innovation performance by interacting with various external partners, mainly with suppliers, customers, competitors, universities and research institutes and new venture startups are not excluded.

Networking or collaborating with industrial partners is crucial to the success and achieving the goal of innovation processes. In doing so, building strategic R&D alliances with other firms can make a positive potential aspect for startups and new venture companies. It brings many capabilities and contributes to build stronger core competencies for new venture firms in different organizational and strategic practices. External knowledge partners as OI sources are considered as the most updated information and knowledge centers that possess tacit knowledge in order to be transferred to startups and new venture companies through licensing or

acquisition. Also collaboration with universities or research institutes provides access to international knowledge networks and ultimately to international markets. This study as a conceptual literature review extends the important concept of utilizing OI practices from outside of the firm's boundaries as external sources of knowledge in external environment in order to be applied in startups and new venture firms to overcome their constraints and limited capabilities by collaborating with external sources of knowledge and OI actors. Future research might consider deepening and extending the conceptual and theoretical literature about open innovation activities and its application in entrepreneurial startup and new venture companies to perceive the various roles of knowledge partners and actors in leveraging the overall entrepreneurial performance of small firms such as new venture startups.

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