Understanding Crowdfunding Ecosystem as Alternative Source of Entrepreneurial Finance for SMEs in Ghana

Joseph Owusu^a, Wilberforce A. Owusu-Ansah^b, a,bDepartment of Marketing and Corporate Strategy, Kwame Nkrumah University of Science and Technology, Ghana, Email: *ajosephowusu87@yahoo.com, bwoansah@gmail.com*

Recently, crowdfunding has gained significant recognition in entrepreneurial finance across the world. The goal of this current paper is to bring to fore better understanding of the under-researched funding behaviour of crowdfunding by employing social capital network theory to demonstrate that Small Medium Enterprises (SMEs) in Ghana can substantially benefit from crowdfunding source of finance. This research depends on social capital network theory to guide, organise, and explain the phenomenon. The study looks at the ecosystem standpoint to understand the various crowdfunding stakeholders and the roles they play in the process. The present study also reviews the related literature focusing on how the study fits into the general context of crowdfunding phenomenon. Based on the typology approach, our study identified four models of crowdfunding: namely, peer-to-peer lending, equity, rewards, and donation. Guided by the identified models and their importance, we propose a conceptual research model and conclude by indicating how this current research supports the financing needs of SMEs in Ghana.

**Key words:** Crowdfunding, Ecosystem, Entrepreneurial finance, Ghana, SMEs.
Crowdfunding is a novel way of democratisation entrepreneurial fundraising powdered by technology enabled-based process that is changing funding behaviour in the 4th industrial revolution era (Gierczak et al., 2016). It is the most recent growing alternative form of financing new business ideas by the use of online social networks (Massolution, 2015). The economy of Ghana has witnessed astronomical increases in the number of SMEs establishment over the years, which contribute heavily to the socio-economic development of the country, particularly in reducing poverty through income and employment. However, these SMEs have been constrained by a lack of available working funds as the major factor mitigating against their performance and subsequent growth. Additionally, most of these SMEs begin small and have only a fair to slim chance to survive. If they survive, they invariably remain small because of a lack of funds. These funding issues are manifested in a mismatch between reliable and available funds that can be accessed by SMEs, a lack of a systematic approach to funding SMEs, cumbersome credit procedure demanded by banks, inadequate access to formal sources of finance, high interest rates on bank loans, and unrealistic security demands from SMEs by the banks. Nonetheless, the primary aim of crowdfunding is to mobilise capital by a founder or entrepreneur for investment with the aid of social networks and internet. Instead of collecting funds from a few individual investors, crowdfunding assists founders of a project to tap into the bigger crowd in which a substantial number of backers contribute their respective amount (Agrawal et al., 2013; Mollick, 2014).

Crowdfunding is considered as a way to reduce the funding gap among SMEs in Ghana. Looking at the novel way of raising funds through crowdfunding and the increasing reliance that SMEs will likely have on this source of finance, it is therefore imperative to conduct research for a better understanding of the phenomenon. However, until now limited studies have looked at it in a very systematic, cohesive, and comprehensive manner. Consequently, we argue that there seems to be a certain amount of confusion surrounding the emergence and the operations of crowdfunding. We further argue that the establishment of social networks gives birth to social capital, which ultimately supports SMEs in raising finance for their operations and subsequent growth. In order to enhance and understand this holistic research phenomenon, the research is arranged as follows. In section two we employ social capital network theory as a tool to guide and explain the research phenomenon. Section three looks at the fundamental ecosystem of crowdfunding. In section four we review the existing literature and identify areas of non-cohesion. Section five focuses on the various types of crowdfunding. Section six proposes a model for further study. Finally, the study indicates how this current research supports the financing needs of SMEs in Ghana.
Social Capital Theory

Putman (1995) propounded the theory of the social capital network. The argument of the social capital network put forward is precise and straightforward. Thus, “investment in social relations with expected returns.” This universal premise is in congruence with numerous discussions by various academic scholars (e.g. Bourdieu & Wacquant 1992; Coleman, 1988; Lin, 1999). Individual participation, interaction and networking produce perceived profits. However, our study is focussed on this fundamental explanation to argue how embedded resources in social network will enhance social capital activity in raising funds for SMEs. We argue that the flow of information sharing from the perspective of imperfect market conditions and social relations can reveal certain important strategic locations and may leak essential information to individuals and organisations about potential opportunities and choices not yet discovered. Likewise, these associations have the potency to reach organisations, individuals and the community as a whole, especially when concerning the availability of unidentified available resources.

Such a network information platform minimises the transaction cost involved in employing individuals to search for organisations which can put in capital for suitable reward. In this sense we defined social capital as embedded resources of social capital networks, which relies on two assumptions: (i) more networking results in greater social capital (ii) the greater the social capital the easier it is to mobilise funds. The concept of social capital network is made up of information sharing, obligation, trustworthiness, expectations, norms and effective sanctions (Schmid & Robison, 1995; Zvilichovsky, 2013). We further echoed that organisations are more likely to raise funds when they strongly develop and maintain strong relationships with social networks. Evidence abounds that trust is at the centre of social networking (Colemen, 1998; Lin, 1999) and social capital has the tenacity to produce good outcomes during information sharing and attenuates information asymmetry (Everret, 2010; Liu et al., 2013; Zvilichovsky, 2013). With trust at the centre of social capital, the individual is reassured and can provide additional resources far beyond his personal capital which may be useful to the firm. The essence of relying on social capital theory is that with social capital theory markets are identified andformed and investors are easily reached. Social networks sometimes replace social insurance which can be converted to business insurance and allow crucial firms to embark with business transactions (Spence et al., 2003). This way is valuable and supportive to banks in establishing social networks with SMEs (DeYoung et al., 2012). Ultimately, these factors, namely information sharing, trustworthiness, expectations, and obligations, may explain how and why the social capital network is imperative to explaining and understanding crowdfunding as an alternative source of entrepreneurial finance for new and existing SMEs in Ghana.
Crowdfunding Ecosystem

According to Clarkson (1995) stakeholders are groups of people without which an organisation cannot exist and operate. Knowing the various players in the crowdfunding ecosystem is essential to understanding how the crowdfunding platform works. Different participants play different important roles in diverse ways to determine the processes, functions, and practices on how the whole system of crowdfunding operates. One of the best ways to understand the whole crowdfunding ecosystem is to identify the various stakeholders and their unique functions in the processes. Here the focus on stakeholders is not based on an increase in the stakeholder’s value but rather we used it to explore the major roles and the interrelationships that exist in embarking on the crowdfunding process (De Buysere et al., 2012; Massolution, 2015). These stakeholders do not operate in isolation but act and mingle with each other to create a good working environment. Based on the stakeholder approach, we therefore review the major players of the crowdfunding ecosystem, taking into consideration their contributions to the system.

Website Developer

Technology is one of the major drivers of crowdfunding. Therefore, website developers are important and play key roles in the crowdfunding ecosystem. As technology in business is associated with transparency and efficiency it permits founders to make known their ideas to a large number of both actual and potential backers. The website developers create an enabling platform to facilitate effective and efficient communication between founders and backers. These social platforms include Twitter, Facebook, Snapchat and Instagram among others, which permit backers, founders and other supporters to interact easily to promote ideas or projects in their respective social network links. Website developers operate as intermediaries and provide privacy to backers in contributing to crowdfunding process. Developing crowdfunding websites is at the infant-stage, however. In order to reach many potential backers to solicit enough capital, future website providers are supposed to vary their services by introducing factors such as basic and premium funds to augment the current functionality and levels of enabled technology (Braete et al., 2013). Even though crowdfunding is enabled by technology, in some contexts website providers’ limit the accessibility of information, which limits transparency. This is because some kind of information about crowdfunding are important compared to others and is subject to the type of model in place. Technology enhances transparency but only for a specific type of information and to specific category of stakeholders. Gelfond & Foti (2012) indicate crowdfunding website developers are indispensable actors in the ecosystem through which crowdfunding structures and legal demands are prescribed. It is important to note that crowdfunding website developers do not assure contributors that the founders will certainly deliver on their promises but providers of funds have already tested the idea and are willing to contribute based on the perceived benefits.
(Hamermesh & Tsotlias, 2013; Sigar, 2012). In a nutshell, website providers depict the hub of crowdfunding ecosystem, which plays a crucial role in controlling the holistic crowdfunding process and see to its smooth implementation.

**Founder**

Founder is one of the important actors on the crowdfunding platform. A founder could be an individual or group of individuals coming together to form a team to solicit funds for an idea or a project. Existing literature variously describe them as the owner, creator, firm, borrower and entrepreneur among others. In crowdfunding these terminologies are used to describe individuals who have the capabilities to unleash or generate new ideas and launch them at crowdfunding website to seek funding. The crowdfunding phenomenon begins with a founder’s inability to raise the needed capital for the project. The fundamental role of the founder in the entire crowdfunding ecosystem is to clearly come out with an idea or a project that is commercially viable and has the ability to urge actual and potential backers to contribute toward accomplishing the project. On a crowdfunding website, a founder has the responsibility to meticulously supply the necessary information needed for transparency and accessibility to avoid misunderstanding (Helmer, 2014). Also, during this time, the founder takes the advantage to test the idea in the market in order to receive confirmation, gain exposure, establish relationships, and to open the door for communication with the potential backers (Dingman, 2013; Gerber et al., 2012). It is important to note that most founders come to the crowdfunding website with enough rich experience both in business and product. Founders with rich business experience mostly have had working experience with start-up firms or opened a venture previously and have developed the skills and expertise in moving an idea from a concept stage forwards. On the other hand, founders with product experience may have expertise in the manufacturing of the product in question but may lack the needed experience and strategy in the product marketing and distribution. Overall, the founder’s experience changes, thus a founder may have enough experience or little experience in either the business or product knowledge.

**Backers**

Backers are equally indispensable actors of crowdfunding ecosystem. They contribute funds in financing an idea or a project. Backers also play an important and remarkable responsibility of testing the idea at the market level to validate whether the idea or the concept is economically worth pursuing. These backers spread the idea by the use of social network alongside their personal network besides contributing their capital to fund the project. Notwithstanding, because the roles they play go beyond basically contributing money, the extant literature sometimes uses terminologies such as investor, funder, contributor, lender instead of backer. Evidence abounds that there are several factors that explain a backer’s interest in contributing
to a crowdfunding venture. For instance, related prevailing literatures explain the theory of generosity that is the satisfaction of personal conviction of giving without any expected return or benefit (Belleflamme et al., 2014; Bruton et al., 2015). Other reasons include voting rights and earning dividends and may trigger backers to involve themselves in order to become shareholders of the project (Gerber et al., 2012). Additionally, some backers also participated in the crowdfunding project with the aim of receiving material returns while others support the project with the motive of gaining appreciation in terms of recognition. Until now, empirically, limited studies have been undertaken regarding a backer’s motivation for contributing in a crowdfunding campaign. Nonetheless, it is most likely that combinations of these factors are dominant (Belleflamme et al., 2014; De Buysere et al., 2012; Hemer, 2011). This motivational stance depicts the notion that depending on the specific type of crowdfunding model, being it forms, purposes and operations, a crowd investor can be differently rewarded.

**Laws and Regulations**

Regulations in terms of legal and ethical considerations are needed for smooth and fair operations of crowdfunding for all stakeholders. Since crowdfunding is an online universal activity, some complex occurrences are possible. For instance, founders, backers and website providers may find themselves in different jurisdictions. Generally, mobilising for equity in a company is only the sole prerogative of public listed equity companies. Indeed, there is a limitation on the number of investors that a company can accept within a certain defined jurisdiction. This phenomenon brings on board an essential legal problem to crowdfunding, given that the investors contribute their money for investment instead of idea or time (Griffen, 2012). Consequently, most crowdfunding initiatives fail to provide equity ownership but rather provide alternative rewards such as membership, the product and appreciation. It is important to note that different countries and states laws and licensing authorities may also regulate crowdfunding (Gelfond & Foti, 2012). However, importantly, it is certain to expect some legal and ethical issues. Before the introduction of crowdfunding, venture capital firms have addressed numerous problems in their selection processes, which originate from legal and ethical concerns.
Figure 1. Crowdfunding Ecosystem

Interpretation

A= a founder idea posts on crowdfunding website.
B= crowdfunding website platform.
C= backer decision to be made based on idea posted at crowdfunding website.
D= secure payment processing system made available by website provider for the backer to contribute.
E= legal and ethical setting within which crowdfunding ecosystem operates.

Literature Review

Crowdfunding is an innovative source of entrepreneurial funding. However, there is no doubt that the extant related literature is nascent. Conversely, there are limited studies regarding the economic prospect literature on this phenomenon, particularly concerning small and medium enterprises. Empirically, limited research relating to crowdfunding phenomenon has been identified. Most of these studies are found in the domain of marketing, management, information systems, and entrepreneurship. These empirical studies are centred on topical issues such as crowdfunding success (Belleflamme et al., 2014; Zvilichovsky et al., 2013), contribution behaviour (Agrawal et al., 2011; Burch et al., 2013; Garber, et al., 2012), crowdfunding design (Cumming & Johan, 2013; Ordanini et al., 2001), privacy in crowdfunding (Burtch et al., 2013), venture capital financing (Bains et al., 2014), viability of crowdfunding (Braet et al., 2013; Levy & Weaven, 2011), and the impact of crowdfunding (Mutengezanwa et al., 2011). Limited support and inconclusive findings have been revealed,
most often because of the newness of the crowdfunding phenomenon. Admittedly, our observations with the recent literature indicates a lack of consensus, or limited awareness of the fundamental crowdfunding ecosystem.

Agrawal et al. (2011) study the geographical origin of crowdfunding players on the SellaBand platform and found the average distance between artist-founder and backer is within the range of 3000 miles, indicating the lesser importance of spatial nearness. Nevertheless, they did establish that distance plays a consequential role as local backers contribute earlier than other backers. Additionally, under the same geographical context, Mollick (2014) operated with data from Kickstarter.com to identify the determinant factors of successful crowdfunding initiatives and revealed a major geographical aspect related to the nature of the project brought by the founder. He found that there is a relationship between the cultural product and their geographical context.

In another development, Kuppuswamy & Bayus’s (2013) study on some invested projects on Kickstarter.com platform indicated that social network information displays an important role in the success of a crowdfunding initiative, and specifically emphasise the importance of information moving from founders to the crowd. Depending on data from Australia, they examined the equity type of crowdfunding. In the final analysis they concluded that crowdfunding projects or ideas that are successful normally depend on the venture’s commercial viability and the efficient dissemination of information.

An important area of uncertainty in reference to the existing crowdfunding literature is the subject of the operating models. By operating models, this study focuses on the various mechanisms put in place by crowdfunding website providers in managing crowdfunding initiatives. For instance, circlueup.com runs-through an equity crowdfunding model, where investors are rewarded as part-owners of the project having voting rights which yield them interest per their contribution at the end of the year. Kickstrater.com practises an entirely different model whereby the founder pays rewards in the form of products to the backers for their contribution. Accordingly, Ordanini et al. (2011) indicate that until now, several types of crowdfunding models are in operation. Few studies examine which kind of model is suitable and applicable for crowdfunding success. Relying on existing literature, this study attempts to describe a suitable crowdfunding model applicable to SMEs in raising funds to support their operations in Ghana.
Types of Crowd Funding Models

*Equity Crowd Funding*

Several motivational factors, related to financial interests, recognition, appreciation, social reputation, among others, play a significant role for investors to contribute into crowdfunding projects (Lin et al., 2014). In other words, the driving force that compels both actual and potential backers to join crowdfunding project is heterogeneous and is contingent on the type of crowdfunding model in question (Ordanini et al., 2011). Indicatively, equity crowdfunding operates under circumstances whereby a founder relinquishes part ownership of the project in exchange for the investor’s contribution. Here, backers hold voting rights and are entitled to own shares which yield them dividends. It is highly documented in academic discourse that equity crowdfunding continues to grow rapidly. This is as a result of the flood gates for private companies to solicit investors opening under the Jumpstart Our Business (JOBS) Act 2012 in the United States of America. The law permits contributions to non-accredited investors, hence encouraging founders of private business to share ownership with the general crowd. The promulgation and the implementation of the JOBS Act significantly increases most private companies’ equity by the use of the crowdfunding mechanism. Equity crowdfunding has several merits compared to the conventional equity form of raising funds. Admittedly, equity crowdfunding has a wider scope to solicit funds and these funds can be accumulated easily, which go a long way to support the founder to stay focused in running the project effectively. On the other hand, the demerits come from the inability of the founder to benefit from essential services such as connection, experience, advice and other important resources that are obtained to support the project from venture capital firms. Moreover, the equity backer bears higher risk should the business fail or collapse (Ordanini et al., 2011). Although the role of SMEs in Ghana is essential and strategic in nature, they face very keen competition, particularly against large scale firms and other corporate entities in terms of raising finances from the traditional financial institution such as banks, venture capital firms, and business agents. It is therefore argued that one plausible funding solutions to SMEs is equity crowdfunding, which operates with the assistance of internet technology particularly using social media sites to speed up the mobilisation rate of funds to support the founder’s project.

*Peer-to-Peer Lending Crowd funding*

Peer-to-peer lending (P2P) is a debt form of investment provided by backers to founders. With this form of investment, backers expect to retrieve their principal contribution with accrued interest. This type of crowdfunding model is often applied to close the gap where conventional banks fail to operate in giving direct credit to entrepreneurs. P2P lending-based crowdfunding explains a situation where backers or investors lend money to founders with the ultimate expectation of getting back their principal deposit together with accrued interest. This type of crowdfunding model shares identical principles with microfinance and rotating savings and
credit association (ROSCA). There are several P2P lending websites on which founders post their ideas in order to consolidate funds. For example, prosper.com and lendinclub.com. These two websites have jointly facilitated in raising over 112,000 individual loans which is estimated at over US$ 1billion for founders (Barth, 2012). In P2P lending, founders usually post their project ideas on the website associated with statement detailing the amount of money needed, interest rate to offer and their state of credit worthiness. Once this information is disclosed actual and potential backers can analyse and make decision as to whether to lend or not. Recently, a new phenomenon is evolving on P2P lending website whereby institutional lenders such as pension scheme funds, hedge funds, and asset managers are exponentially expressing interest to make investments to support this kind of crowdfunding model (Lin et al., 2013). However, since SMEs in Ghana face significant challenges in accessing funds from traditional finance sources, paucity of capital calls for entrepreneurs to look for alternative funding sources.

**Reward Crowdfunding**

Generally, another phenomenal type of crowdfunding operates around reward. Normally founders resort to reward crowdfunding when they have existing projects ongoing or have an idea for a potential commercially viable project. Reward crowdfunding is considered when it is envisaged that a founder may have an idea for a project or product in question and may also have a sample of the product hoped to be manufactured. In the reward crowdfunding model contributors are assured reward benefits in exchange for their monetary commitment to the project. Such rewards could be in the form of souvenirs having contributor’s name like a t-shirt, coffee mug, recognition and an invitation to a special event. However, it is important to note that in reward crowdfunding founders have the right to specify distinct rewards for different categories of backers. The reward crowdfunding model is strategic and fascinating in the sense that it promotes and enhances innovative business ideas. The type of project created marks significant difference between the reward crowdfunding model and other forms of crowdfunding models. Also, another distinction with reward model is that investors or contributors to the project do not gain any form of debt or equity. This suggests that the backers’ concern ends at the completion point of the project, which usually is on a short-term basis. Nevertheless, since most SMEs in Ghana are fledglings and are confronted with finance constraints, it is prudent to consider reward crowdfunding as an alternative means to combat the financial predicament of SMEs.

**Donation Crowdfunding**

Donation crowdfunding model regards investors of the project as unique philanthropists who do not demand anything tangible in exchange for their contribution other than gratitude or a thank you from the founder (Mollick, 2014). Most entities that depend on donation
crowdfunding model are social and humanitarian enterprises that embark on essential projects considered to be of the public good. However, it should be noted that various charitable organisations and other humanitarian non-governmental organisations rely on donation crowdfunding model in the quest of fulfilling their initiated projects. A typical example of the donation crowdfunding model is seen in the light of Scripps Research Institute, with crowd capital directed towards the sole objective of securing an antidote for Ebola. This model denotes a very small percentage of the entire crowdfunding activity. Figure 2 illustrates a compendium model for crowdfunding schemes.

**Figure 2. Crowdfunding model**

![Crowdfunding model diagram](image)

**Discussion**

In this research we first outlined the various players in crowdfunding ecosystem, which consists of website providers, founders, backers, and the legal regulation environment. The interrelationship among these players demonstrate how crowdfunding operates in a specific community. Additionally, with the aid of social capital theory we explain the specific roles played by the various actors in crowdfunding ecosystem to successfully support the implementation of crowdfunding campaign. Second, we propose a crowdfunding model that serves as an alternative source of finance to provide a comprehensive solution to the challenges face by SMEs when it comes to a lack of funding. The crowdfunding ecosystem is applied with the aid of internet to exploit the capability of social capital network theory, which guides and explains how capital can be accumulated from contributors with common interest in a specific project within a relatively short period of time.

Comparatively, with reference to prior studies, it is evident that crowdfunding meets SMEs financial needs in a more flexible manner than the traditional sources of finance, particularly a bank’s financing (Belleflamme et al., 2013; Shiller, 2013). The crowdfunding form of
financing is clearly devoid of cumbersome application processes and procedures and highly stringent requirements demanded by banks. Moreover, crowdfunding contributors willingly invest into projects directly in anticipation of dividends, interest, the product itself, or even just recognition (Belleflamme et al., 2013). The democratic nature of crowdfunding initiative supports the mobilisation of funds irrespective of the individual background and geographical context to facilitate SMEs operations, which is rarely seen in the traditional sources of finance (Shiller, 2013). Arguably, prior literature had extensively addressed this phenomenon of crowdfunding variously. An important matter that is limitedly addressed in the literature is how and what form of model is suitable for entrepreneurs to select in order to satisfy a specific SME project. Based on the four models identified in this study entrepreneurs have the capability to generate funds from any model, where equity is not evident it is appropriate to resort to a reward crowdfunding model. Entrepreneurs whose project is unable to mobilise sufficient capital are advised to adopt the reward model, while SME projects which are philanthropic in nature should depend on donation crowdfunding model. Our review suggests that none of the crowdfunding models is better than the other. However, SME entrepreneurs can identify both success and failure with each crowdfunding model during the implementation process. It is evident that there is a dearth of empirical studies that seek to address these issues. Indicatively, what matters is for SMEs entrepreneurs to choose the model that is appropriate for a particular crowdfunding initiative or project. One of the idiosyncratic characteristics of the crowdfunding source of finance that emerges is the opportunity for contributors or backers to test the project idea posted by founders at crowdfunding website, as to whether it is commercially viable before investing their capital. This evolving and unique phenomenal finance source can greatly influence the total amount of funds raised by SMEs entrepreneurs to support their various initiated projects.

**Contribution**

Our study makes significant contribution to the body of knowledge by identifying crowdfunding models that can support SMEs in raising finance in Ghana. Based on the evolving nature of crowdfunding as alternative and innovative way of funding enterprises, it is understandable that SMEs entrepreneurs can depend on it and mobilise funds from the crowd to support their respective projects. Also, we demonstrate each crowdfunding model having a common aim of mobilising funds from the crowd to support projects based on the internet is exceptionally different. We further explain these distinctions by highlighting features that define each specific crowdfunding model. Moreover, our paper examines the unique and dynamic nature of each crowdfunding model identified and highlighted its effect on crowdfunding initiative over time. Additionally, we contribute to the literature by clearly identifying the various players in the crowdfunding ecosystem. We further enunciate the role of the website provider as the hub of the ecosystem, highlight the generational role of founders, and provide information for backers on crowdfunding websites to make decisions as to whether
to contribute to the project or not, and to eventually determine the entire legal and ethical framework in which crowdfunding operates. Furthermore, we add to the extant literature by positioning the present study into a framework and providing a bigger research paradigm. As crowdfunding is an emerging phenomenon, it is necessary to provide checks and balances from time to time where ideas are analysed and put together to provide new insights. On this front we are highly convinced that our current research moves the existing research in a very systematic, cohesive, and comprehensive manner for future research.

**Conclusion**

Based on our study, it is evident that crowdfunding brings to existence a novel way where new idea developers are able to meet with fund contributors to jointly discuss an idea and turn it into commercially viable business. With the continuing growing and emerging entrepreneurial economy, funding sources such as debt and equity structures are better restructured to provide support for the said economy, which hitherto calls for unique and innovate ways of financing at much lower costs when compared to the conventional sources of finance. In this present study we examine the crowdfunding ecosystem and propose that it can be applied in Ghana within the SME context to support and promote entrepreneurial finance. In conclusion, this present research argues that crowdfunding access to funding by entrepreneurs could be increased, thereby lowering the constraints in entering the capital market.
REFERENCES


Helmer, J. (2014). 8 ways to cut through the crowdfunding clutter. Journal of Entrepreneur, 42(6), 86-90


