

## Application of Credit Scoring Model for Women Entrepreneurs in Turkey

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### Abstract

*The place of women in society has changed throughout the process of industrialization eras and they have increasingly contributed to labor market employing their skills and talents, hence, highly improved the standards of their life. However, women entrepreneurs are subject to several social, economic and bureaucratic challenges as they would like to initiate a startup business and afterwards. These challenges vary across sexes and women entrepreneurs have to deal with more challenges than men just because they are women. A number of banks in Turkey provides loans to support women entrepreneurs. However, reaching sufficient amount of capital for woman businesses is still a critical problem because a viable model for evaluating the credit worthiness of woman entrepreneurs is not in use of Turkish banks. This paper suggests a credit scoring model for woman entrepreneurs the banks may use. The empirical findings strongly support that the model successfully scores the credit worthiness of woman entrepreneurs.*

**Keywords:** women entrepreneurs, z scoring, credit scoring model, micro loans.

### 1. Introduction

The economic system of the twenty-first century is based on innovation and initiatives with a holistic background. As the fundamental objective of the economic systems, economic growth is driven by production and the forces behind it. Among these forces which are *natural resources, capital, labour and entrepreneurship*, qualified labor and entrepreneurship are critical (Bayraktar and Bilgic, 1995). This is because human mind and innovative applications are the natural resources of economic development (Sappin, 2016).

In particular, entrepreneurship lies at the very heart of competitive economy as a growth source. As written in the United Nation's article called *Entrepreneurship and Economic Development: The Empretec Showcase* (2004), entrepreneurship are all activities in order to turn ideas into economic opportunities (2005). Moreover, these activities aim to take responsibility for the establishment, sustainability and extension of a profit-oriented business unit (Kent et al., 1982). Thus, it is a dynamic process for fulfilling unmet needs and demand in the market. This explains why an entrepreneur initiates the necessary action that economic goods and services by combining production factors. However, it also includes coordination, creativity, uncertainty, capital supply, allotment of resources, possession, and decision-making (Frijis et al. 2002). As a result of the generation of creative ideas and the implementation of innovative attempts in the dynamic process, enterprises lead an economic growth, a decrease in unemployment, and a substantial profit.

Enterprises are the core of economic power due to their impact on personal wealth and competitiveness. Furthermore, they are formed by a process including functions, activities and movements related to the realization of organizations for perceiving and evaluating opportunities (Bygrave, 1994). According to Wennekers and Thurik Model (Carree and Thurik, 2002), its performance is affected by individual forces and macro forces. In detail, individual forces are individuals, the entrepreneurs; on the other hand, macro forces induce market dynamics and competition. For instance, individuals try to establish their own business to be independent as behavioral characteristics of a person and have support in individual forces; skills and attitudes. Accordingly, Lumpkin and Dess (1966) claim that while competitive, self-reliant and active decision maker personality is the main requirement of an entrepreneur, its gender has no impact its success.

In Turkey, women take on active roles in business life, aspired to focus on specific tasks and struggle for reaching independence has taken a long time. The reasons for the low number of women entrepreneurs are that the women are late to take an active role in their working life and the percentage share of working women in the female population is low (Atalay, 1993). According to the results of the Turkish Statistical Institute, the proportion of females as an employer in total number of employers is about 8% in Turkey in 2014. Taking this information into account, there is a significant gap in Turkey's labor market which may be explored as an economic opportunity.

Social, technological and industrial changes have been attracting more and more women into business life, and more women would like to start up their own business. In recent years, women have moved beyond these roles by

solving the problems arising from their traditional roles in developed and developing countries. Women have stepped in higher roles such as leaders, managers, entrepreneurs in society (Peterson and Weiermair 1988, Sirageldin et al. 1990, Liman 1993). These steps are helping and encouraging women to improve their entrepreneurial skills and attributes in order to cover the gap in the labor market.

In principle, what triggers women to establish their own businesses and involve in the labor market more root in a variety of reasons. In fact, entrepreneurship is an alternative way for women who want to earn economic and social dependence. Furthermore, the most important factors that motivate women as entrepreneurs are economic needs, ownership of the workplace and salary compensation (Goetting and Muggli 1988, Liman 1993). Not just reasons to become an entrepreneur, the way how they become an entrepreneur is also different from male entrepreneurs. According to the research of Hisrichve Peters (1989) on differences women and men entrepreneurs, how women get benefit from financial sources and which sectors women would like to participate and what level of education women had are significantly different. For instance, women entrepreneurs are mostly located in the retail and service sectors (Goffee and Scase 1987). On the other hand, male entrepreneurs tend to work in finance, technical specialties or manufacturing more than women (Arikan, 2002). Taking all requirements and ways of entrepreneurship for different gender into consideration, it obviously creates common and uncommon results for them.

Woman entrepreneurs can be defined as a woman or a group of women who initiate, organize and operate a business enterprise (Kumar, 2006). Furthermore, these women bear all risk factors, e.g. being creative, discovering rational projects and reaching the capital. These factors give a critical responsibility to women entrepreneurs and reveal some fundamental characteristics. Then, nine characteristics of woman entrepreneurs may be identified as visionary, diligent, innovative, instinctual, flexible, knowledgeable, confident, risk-taker and rejecting "No" as an answer (Hisrich and Brush 1986, Fortenberry 1988, Lee-Gosselin and Grise 1990, Pickle and Abrahamson 1990, Ozcan 1993). In addition, Gulec (2011) argues that women entrepreneurs are a minor group in the entrepreneurship ecosystem facing a lack of access to opportunities which is largely available to others.

The problems women entrepreneurs generally face are to reach capital, find a workplace and rent, deal with the suppliers, contact to official organizations, have sufficient inexperience, incur a lack of trust in customers, thoughts and beliefs in society (Hisrich and Brush 1988, Leo Gosselin and Grise 1990). Although these issues seem common issues for all entrepreneurs, particularly reaching the capital is the biggest cumbersome for woman entrepreneurs. While male entrepreneurs are likely to reach loans from banks or other investors or use own savings, women entrepreneurs' capital is mostly and singularly own savings (Gurol 2000). Women's access to economic resources is more limited than that of men. Hence, women entrepreneurs are negatively affected in both the startup and growth phases (Stevenson 1988). That's why collecting investable capital and reaching loans are critical factor for women entrepreneurs (Yıldız Ecevit, 1993).

In spite of rising number of women entrepreneurs and their active roles in the entrepreneurship ecosystem in recent years, there is still a significant gap. Thus, some government agencies have taken lead in creating and implementing projects supporting women entrepreneurship and its growth in the ecosystem in order to fill the gap. Furthermore, Small and Medium Industry Development Organization (KOSGEB), Directorate General on the Status of Women (KSGM) and Turkish Labor Agency (ISKUR) are exemplified for this action in Turkey. In particular, KOSGEB is a key actor supporting small-scale loans in the manufacturing and technology sectors. KOSGEB Entrepreneurship Development Institute's target group is also women entrepreneurs. Moreover, they have been setting networks and running special programs for women, e.g. training, counseling awareness raising, career guidance and funding. Their women-only program COSME aims to encourage women to take a more active role in the business life and turn their ideas into a business. Furthermore, international WEF network, *a global network for women encouragement*, and their mentorship programs are a part of common training (Yıldız Ecevit, 2007). In doing so, they not only boost women entrepreneurs in Turkey but also contribute to the entrepreneurship ecosystem by creating new ideas and women entrepreneurs. Hence, these governmental organizations developed a credit scoring model to manage their support and funding activities. In this study, a new credit scoring model is developed to measure credit quality of women entrepreneurs. The following section covers the related literature. The later section establishes a credit scoring model and presents the empirical results for woman entrepreneurs. The final section summarizes the model employed and restresses the findings.

## **2. Literature Survey on Women Entrepreneurship**

In this section of the study, the current situation and the importance of women entrepreneurs are reviewed to properly explain why a such scoring model is needed. In particular, the needs and struggles of women entrepreneurs are manifested and searched since they face gender discriminations in workplaces more than males.

### **2.1. Women Entrepreneurs**

Entrepreneurship comes from a French word "entreprendre" which means "doing or creating something" (Westhead and Wright, 2000). On the other hand, entrepreneurship is perceived as an innovation and creation at risk in the

twenty-first century (Cetindamar, 2012).

In general, entrepreneurship is a process which entrepreneurs chase the opportunities, take risks and then create innovation or production in order to contribute to economy. Entrepreneurship is obviously a course of action and understanding. That's why its roles and characteristics have been shaping and affecting economies prominently over centuries. In particular, the entrepreneur is who lives in the future and has the potential to turn every little detail into an important value. They not only take advantages of opportunities but also put them into practices with the help of business plans and feasibility studies. These motivations have a close relationship with their intuitions and perceptions. Furthermore, their intuitions and perceptions are shaped by knowledge and their capabilities. For these reasons, entrepreneurship is evaluated as a personality. Concordantly, it is also influenced by society and its values. Yetim (2002) claimed that entrepreneurship is the most ideal profession to create prestigious and indicate a show of force in most Eastern societies. Thus, gender is not of one of the characteristics of entrepreneurs despite the fact that gender roles in societies affect entrepreneurship.

As patterns of societies affect entrepreneurs and entrepreneurship, entrepreneurs have an impact on societies. When taking these impacts on women into consideration, they give more autonomy, independence, self-realization, and reaching future goals for women in societies since perception of individuals' opportunities and entrepreneurship capacity have increased with the help of corporate support and knowledge transfer to women. In doing so, women can use resources more optimally, achieve success in human relations, and transfer their experiences to various channels. Moreover, women can offer the opportunity to determine their own destiny and overcome dependencies.

Women have recently shown their power in many different fields such as the economy, art, science, politics, social life, media, local governments, law, various associations and foundations. In addition, the number of women in professional business lines has kept increasing. Many women have been at the top of the decision mechanisms and have created their own power and communication networks at places they are in. They have proven themselves as successful entrepreneurs. Further, they have supported the other potential women entrepreneurs and invested in other women 'businesses to boost the number of woman in the working environment.

### **2.1.1.Characteristics of Women Entrepreneurs**

Entrepreneurship and women entrepreneurship are interbedded. However, the relationship of women entrepreneurship with "gender roles in societies" is inevitable. Good communication, problem-solving and a tendency to compromise may be exemplified characteristics of woman entrepreneurs (Ufuk and Ozgen, 2001).

Basically, entrepreneurs have many common character traits bursting into prominence. Beyond establishing their own business, these characteristics accelerate their success. Their desire for independence triggers and increases their tendency to take risks. It does not only differentiate them from others but also makes them more optimistic. One of the main characteristics of entrepreneurs which makes it important for the status of women entrepreneurs is to stand against the status quo. It is quite crucial for women to overcome the status quo with their ideas and success. Moreover, it creates a vicious circle for self-confidence. While they boost their self-confidence, their self-confidence increases their success. That's why self-confidence of woman is a key player for success. Women-owned businesses have qualities in parallel to their personal characteristics. Women entrepreneurs show an approach that focuses on quality of work emphasizing creativity, flexibility, humanitarian approaches in business management. Motivation is the power that provides the initiation and pushes for the first step. Then, it leads to more directions and helps stay in the game. This might be defined as the energy that activates the resources in the direction of a specific goal. Motivation is also meaningful with the words that are enthusiasm, desire, impulse and passion. An entrepreneur has to be a risk taker. Risk appetite (economic, psychological, social relations, career development and health) is one of the key characteristics of successful entrepreneurs. Indeed, the basic condition to become an entrepreneur is that they can take risks and have the ability to carry that risks. It is also the determinant for entrepreneurs for their success. Furthermore, the risk is the possibility of not reaching a targeted result and incurring the loss in a certain period of time. It points the potential problems, threats and hazards that may arise in the future. The risk usually varies depending on the time when it is unclear or unpredictable. There are negative effects on the result. As a negative result of risk, failure is seen as an ending. This is a life changing point for entrepreneurs to overcome issues and expanding their knowledge and skills since the risk is a manageable phenomenon. It should be viewed as an opportunity to gain income. In particular, when entrepreneurs have a strong supportive network, they can comply better with the business obstacles. Thus, women entrepreneurs have to focus on their supportive network and foresee possible risks factors from a broad angle. For instance, the possible risk factors affecting women entrepreneurs can be listed as market conditions, difficulties for collection of receivables, controlling operating expenses, making payments to the government, managing debt to third parties. In addition, a woman entrepreneur can reduce the risk factors with the help of successful cash flows and well financial planning. Foresight on entrepreneurs' business is very critical to estimate its future. Foresights of growth and expansion should be considered in these plans. In particular, woman entrepreneurs see growth as a concurrent business strategy. Self-control and controlling emotions are important themes for entrepreneurs when making decisions since they play a key role in risky situations.

Hence, entrepreneurs have to increase their emotional intelligence in order to improve their managerial skills and create trustworthiness for their supportive network. Additionally, an emotional intelligence can be defined as the ability to monitor and edit what he or she feels and to use his or her feelings to guide thought and action. Emotional intelligence is the ability to recognize, motivate and manage the feelings of ourselves and others.

According to some researchers, emotional intelligence is the main determinant of success in family, business and social life. It is also a power in business life since it may be possible to establish a relationship beyond the same type of thinking, appropriate opinions, and similar pleasures or close intelligence levels. Women entrepreneurs can reflect their emotional intelligence in business life with a difference and sensitivity.

Women entrepreneurs come into prominence with their characteristics due to their gender roles. Even though gender is not a determinant for describing an entrepreneur, this may seriously affect their success stories and reliability. How they turn these characteristics into a success and how they deal with challenges in risks problems could change their position in the entrepreneurship ecosystem.

**Table 1. Characteristics of Women Entrepreneurs**

Characteristics	Explanation
Standing against the status quo	Women entrepreneurs deal with their gender perception and stand against the status quo with their ideas.
Having self-confidence	Self-confidence makes women feel better what they are doing and triggers them to do more.
Broader approach and focus	Women entrepreneurs have an approach that focuses on quality of work and emphasizes creativity, flexibility, humanitarian approaches in business management.
Diversified goals	Women entrepreneurs can handle social, cultural and financial goals altogether.
Self-actualization motivation	Even though motivation is a common characteristic for all entrepreneurs, the need of proven yourself increases the motivation of woman entrepreneurs.
Having a work-loving and success-oriented motion	Women entrepreneurs believe in their own success, not luck. They can overcome all doubts inherited in their gender roles.
Supporting network and foreseeing possible risks	Women entrepreneurs are risk-takers. They invest in their foresight and tend to minimize their risks with the help of their network.
Creating growth-focused business plans	Women entrepreneurs pursue continuous growth on a business.
Self-control	Women entrepreneurs present a good self-control by managing their emotions.
Stress on emotional intelligence	Women entrepreneurs can reflect their emotional intelligence in business.

### 2.1.2. Reasons to Support Women Entrepreneurs

Potential of entrepreneurship should be evaluated by the origin of their countries (Fettahoglu, 2014). This statement is also valid for women in different countries considering differences in social values and roles in economic contribution. In Turkey, the employment rate of woman and their economic contribution are quite low. Additionally, the Turkish Statistics Institute states that these values are less than the half of men's (Karadeniz, 2017). Taking the importance of entrepreneurship in economic development into account, it is important to involve women more in entrepreneurship and also encourage them. (Turko and Kadiroglu, 2017).

The values of women entrepreneurship may be summarized in four issues. The first is about economic development and growth. Women establishing a number of small businesses are important for economic development. Second, women as entrepreneurs are active participants in the labor market reducing high unemployment rate. The third is about improving the welfare of families escaping from poverty. Women receiving an income from a small business can ensure that their family are protected from poverty. Micro-finance which supports small businesses by enhancing the economic and social status of the poor turns them into a productive part of the labor market. The last is to help ensuring gender equality. Women's becoming entrepreneurs is important in the process of gaining strength and standing against the injustices and inequities in patriarchal families and marriage above all. All these encourage women to become powerful in society and be part of the movement to ensure gender equality (Ecevit, 2006).

The increase in women entrepreneurship reduces gender inequality and enables women to increase social cohesion. Especially in rural areas, the participation of women in the labor market brings more vitality and mobility for the whole economy. Women in rural areas can also have a stronger self-esteem and women's status in society (Cici, 2014).

### 2.1.3. Institutional Supports

In the last decade, institutional support to women entrepreneurs is prominent due to considerable effects of low women employment in the economy. According to the Turkish Statistics Institute, Turkish women entrepreneurs are only 15% of entrepreneurs in Turkey (Workif, 2018). Determinants of entrepreneurship demonstrate that government and institutions take a significant place in the entrepreneurship ecosystem. Additionally, these determinants are financial support, the convenience of government policies, proficiency programs, education, research and development, the infrastructure of commerce and professionalism, dynamics of the domestic markets (Karadeniz, 2017). Therefore, the development of entrepreneurship is subject to these activities which are able to change under government and institutions. In fact, entrepreneurship is evaluated as an economic behavior and entrepreneurs' behaviors and frame of mind are formed by regulations, norms and cognitive institutional systems.

Through their self-efficacy for a successful business, there are several models and ideas due to the variable code of conduct. These models are required to use limited resources wisely to increase venture performance by getting supports from institutions which have enough experiences and vision to support more women in employment.

Based on Kawai and Kazumi's *Proposed Conceptual Model* (2017), the institutional environment includes two different supports; formal and informal institutional support. While formal institutional support affects their confidence and vision, informal uses social norms and encourage them for learning from their failures owing to the availability of tangible and intangible resources. In order for women entrepreneurs, formal institutional support aims to develop women's reactions to uncertainty. Moreover, they provide funding, training and guidance. From an institutional support angle, financial grants, technical and legal advice, and counselling are benefits of formalized version for women. It does not only leverage the resources they can reach but also help their personal development. Further, it minimizes the gender gap in entrepreneurship due to gender roles in societies with legal assistance, counselling and funding. As a result, women's self-confidence and determination are boosted. On the other hand, informal institutional support influence entrepreneurs in individual level and provide a kind of approval of their attempts in the society or community since the lack of a normative support to women entrepreneurs is likely to distract them and change their behaviors such as giving up. Clearly, informal institutional support embraces "one-is-not-alone" perspective for women with emotional security and minimizing their self-doubts.

Both institutional supports to women affect their outcomes, particularly venture performance. The aspects of formal and informal institutional supports are quite different. As women entrepreneurs are reinforced for their credibility with government support policy and reach funds easier by formal institutional support, they can build cooperative relationships with fundamental stakeholders and create a better access to strategic opportunities.

As a consequence, the fulfilment of the needs of women entrepreneurs with institutional supports is very critical due to resource constraints. When women entrepreneurs' needs are examined, lack of capital is in the lead in contradistinction to male entrepreneurs. Therefore, it is crucial to fund woman entrepreneurs with the help of formal institutional supports and encourage in line with informal institutional guidance, encourage and cooperation. In order to enhance women's ambition and goals in the entrepreneurship ecosystem, institutional supports must provide experiential knowledge and financial support (Kickul et al., 2007). Taking this statement into account, it is inevitable that government and institutions will clear an economic hurdle and contribute to women, as well as the society.

In Table 2, the main institutions and their support for women entrepreneurs are explained by Kawai and Kazumi's Proposed Conceptual Model.

**Table 2. Supporting Institutions for Woman Entrepreneurs in Turkey**

Formal / Informal	Institutional Support	Institutions
Formal / Vision and confidence Informal / Regulations and learning from failures	Providing trainings and mentorships for entrepreneurs	Women Entrepreneurs Association of Turkey (KAGIDER)
Formal / Vision and confidence	Consultancy and marketing	The Foundation for the Support of Women's Work (FSWW) Women Entrepreneurs Association of Turkey (KAGIDER)
Formal / Vision and confidence	Financial support	Turkey Grameen Micro-Finance Program Commercial Banks Maya Microcredit Support Institution The Foundation for the Support of Women's Work (FSWW)
Formal / Vision and confidence	Trainings for financial empowerment	Investor Groups

## 2.2. Financial Problems of Women Entrepreneurs

An increasing number of women participates in business life with the expansion of opportunities and development of economic sources. The women employment rate in Turkey is 46% while it is in European Union countries 60% (Karadeniz, 2016). Moreover, 25.4% of private companies are owned by women in Turkey and only 3% of them is dominated by women executives (Uyar, 2018). Understanding contribution of women and its positive impact on economy are quite determinant for the future of countries. Therefore, it is required to examine their activities and expectations well. Expectations of women entrepreneurs are shaped regarding their needs and struggles. When competitive business environment is considered, women can enter this ecosystem by enhancing their education and becoming financially strong (Beduk, 2005). Therefore, financial needs are forming a significant level of their needs. On the other hand, their needs are not fulfilled fully by one source. Therefore, they need other source of supports from banks, government and other institutions. Most women entrepreneurs try to benefit from more than one source (Erdun, 2011). Financial challenges are determinant for woman entrepreneurs. Notably, capital is the only challenge they face owing to their gender (Çakıcı, 2004). As Baris and Askin (2016) stated that gender issue for women is not only pushing them to become an entrepreneur but also pulling them from becoming one. When all these struggles combined with the lack of information, women entrepreneurs go on facing off financial problems after establishing their business as well. Ozkaya (2009) states that almost 85% of women entrepreneurs face financial problems at the beginning of their entrepreneurship journey. Among their financial problems, lack of information about microloan system, rejection or low scoring in microcredit scoring system may be listed. Moreover, the credibility of business and belief of financial support to business also affect women entrepreneurs' financial status.

Clearly, there are many reasons underlying why women entrepreneurs are struggling financially more than men do. As the main reason, women are not able to prove their financial reliability due to the lack of financial documents (Ozyilmaz, 2016). For instance, properties are generally registered to men. While 65% of men in Turkey has a registered property, the ratio for women is only 35% (Dunya, 2014). This reduces the possibility of qualifying for a loan or getting support from authorities or banks. In fact, this high risk has a high monetary cost for banks. As a result, they have to use their own savings in order to create their own business.

According to Garanti Bank's research called *Kadın Girişimciler Araştırması* (2015), 24% of women entrepreneurs apply banks for a loan. Thus, bank loans come in first for supporting women businesses. On the other hand, 23% of woman gets help from husbands and 19% gets support from families. The support from husbands or families is obviously contrary to their independence goal. However, owing to their education level and wage gap in their previous professional life, women may not have an opportunity to save money as much as men have (Bugra, 2018). For this reason, the microloans of banks play a very important role in the financial problems of women entrepreneurs since 71.4% of women entrepreneurs asserted that they had significant financial constraints while founding their business (KSSGM, 2000).

Due to the fact that most women applying banks for microloans, a half of women entrepreneur complaints for difficulties of banks loans procedures, in particularly, application process, collaterals and high bank interests (Kadın Girişimciler Araştırması, 2015). Banks should embrace all women entrepreneurs in order to provide a balance to this ecosystem. Moreover, banks should improve on how they can support micro or small scaled businesses (Yalçın, 2017).

## 2.3. Micro Loans for Women Entrepreneurs

In some countries where the involvement of women to economic activities are quite high since women entrepreneurship and micro-finance are emphasized more than other countries. According to Muhammed Yunus who highlights importance of microloans in Bangladesh, *"if the goals of economic development are targeted at reducing poverty, improving economic status and creation of honorable jobs, then it only seems natural to begin these reforms with the emphasis on women."* (Soyak, 2010). Thus, the notion of microloans and improvement of microfinance have very critical roles for women entrepreneurship.

The inequality that women face in wages and financial support is observed in microloans as well. In parallel, Ryan (2015) highlights that women entrepreneurs have slightly fewer credit scores than men. Thus, their need of capital forces women to fund their business attempt by their personal savings offering more risks and struggles.

In general, microloans are a financing tool which is given to people as a beginning capital. People who utilize are generally liable to pay it back, yet it is guaranteed by social and group pressure or responsibility. Due to its low cost of supporting a group, it creates a financial deepening. In fact, microloans are not based on what an individual has already as a property, yet it is based on an individual's potential and future plans. For providers, the credibility of these plans and the determination of these individuals are important.

In entrepreneurship, microloans are generally given to women in order to implicate them into the market economy and develop the socio-economic structure. In that case, gender is excluded as an obstacle and becomes a benefit for women because it is not only a monetary support but also a training for financial literacy. Further, they are also supported by micro insurance which is a system given to individuals and businesses for risk division.

While ensuring that they focus on their own and business development, microloan providers help them reduce risks of their properties, health and capabilities.

Microloans for women can be explained as small capital which provides an opportunity to low-income women so as to establish their revenue-generating business or projects. Then, these loans do not require warranty or security deposit (Turkey Grameen Microfinance Program). Mainly, it is a mechanism for creating an empowering experience. The mechanism delivers a financial service in two ways: a relationship based individual banking model or a group-based model bringing several entrepreneurs to apply for loans.

In Turkey, microloan providers evaluate candidates and require several conditions. For instance, at least five women from the same neighborhood should come together and they should not have any lines of descent. However, they do not face any age limitations. While evaluating these women's applications, they examine their economic background and criminal records as well. All reasons behind these examinations are pieces of training and monetary support without any collateral. The vision of micro providers plays a very strategic role for economies. Therefore, they try to increase the wealth of societies, as well as reducing social inequalities. Nevertheless, in financial support, their financial return expectations and capacity of risk-taking are differentiated in spite of dynamics of the microfinance sector.

When the Microfinance sector has been evaluated, it has been formed by classical banks and micro-credit institutions. According to Grameen, classical banks focus on male candidates, micro-credits institutions focus on women candidates. Indeed, an increase in women's status is one of their goals. Encouraging people to produce and become more innovative are in the nature of these institutions. It is obvious that the risks they get are quite serious and complicated. This is why they support individuals based on macro and micro drivers after several risk analyses.

### 3. Credit Scoring Model

Market conditions put a price on the risk which institutions or banks take. Hence, the assessment of these risks is crucial. Therefore, they implement several models to reduce their risk taking, so they assign rating grades to entrepreneurs after the assessments. By doing so, subject to minimum requirement and optimum conditions, banks evaluate and estimate risk components for the capital request (Central Bank of Malaysia, 2013). Furthermore, they get help from statistical methods called *Credit Risk Models*. The main reason behind these models is the need of developing quantitative estimations and foreseeing the support for risk taking activities.

The first model was developed fifty years ago for utilizing in administering and underwriting credit debt, residential mortgages, credit cards and indirect and direct consumer installment loans. However, according to Fay, these models are based on a great degree of subjectivity rather than statistical analysis. Even though many proper methods have been developed in the 20th century, modern statistics created opportunities to examine the likelihood of individuals' payment defaults, given the approximation of the characteristics to whose had already faced the similar default in the past (Chatterjee, 2015). As one of them, a credit scoring model is just one of the tools implemented in examining a credit application or credit risk evaluation.

In particular, banks lead their decision-making process of approving or rejecting a credit request according to credit scoring models which gives information about who and how trustworthy the individual or entrepreneur is (Skantzos and Castelein, 2016). Basically, this model classifies applications by distinguishing explanatory variables such as salary, age, education, etc. Additionally, this model helps estimate default probability and gives bank more accurate and predictive details about their risks.

Credit scoring model is a statistical analysis tool to understand a person's or an entrepreneur' creditworthiness (Lopes, 2005). It is demonstrated in form of a credit score. In detail, this scoring system assigns a number from a range which is calculated with multiplied variables. In general, this scoring gives a number in between 300 to 850, in which 300 is the lowest and 850 is the highest score (Kenton, 2018). If the score gets higher, the probability of default decreases.

Despite a number of common credit elements in credit scoring models, there are diversified types specific to the credit characteristics. For instance, while the credit elements for a credit card are likely to check payment background, age, account number and use of the credit card, the credit elements for a mortgage are likely to check occupation and its history, amount of credit and down payment. Thus, the variables and structure of the model are determined regarding to type of credit. In this study, a credit scoring model formed for Turkish women entrepreneurs is demonstrated. The variables of the model are selected specific to this model by considering the profile of Turkish women entrepreneurs.

#### 3.1. Scoring Model Applied in the Study

Microcredit programs contribute empowerment to women and their status in the society. Therefore, this study aims to contribute in a faster and fair loan evaluation of banks for Turkish women entrepreneurs. The risks of woman entrepreneurs' banks face are taken into consideration and 17 factors are identified to measure these risks. These factors are determined considering the status of women's business idea and professional background.

These variables have been demonstrated as below:

- Operating period
- Number of employees
- Workplace ownership
- Duration of operation in the current address
- Major shares of ownership
- Is there anybody who can takeover the management, except the partner?
- Experience of the company within the sector
- Business partner age
- Business partner education background
- Home ownership
- Residence period in the current address
- Marital status
- Total work experience
- Has she used any financial instrument before?
- Sector / subject of activities
- Security deposit
- Business address / region

In the model, each variable has its own reference range so as to score women's business and their background. These ranges are determined according to the profiles, requirements and segments in Turkey.

**Operating period** - The operating period of the business provides information about how structured and trustworthy the business is. The more years, the more structured team and finance. This is divided into four parts as 0-2-year, 2-5-year, 5-10-year, and 10+ year.

**Number of employees**—The number of employees provides information about how big the company is and how the roles are divided. Moreover, it draws the scheme of activities. The size of this number might be an indicator of the capital requirement since the business may be a tech start-up with a small operation team or a production-based business with a big facility. It is divided into 4 parts as 1-5 employees, 5-15 employees; 15-30 employees and 30+employees.

**Workplace ownership** - Workplace is a significant cost for business owners. Women with no revenue yet earned are likely to struggle with finding a workplace to startup. In the model, five different types of ownership evaluated. In the model, workplace might be company's property, business partner's property, family's property, leasing or rent.

**Duration of operation in the current address** - Duration of the operation in the current address is important for trustworthiness and sustainability of the business. This is divided into four parts as 0-2 years, 2-5 years, 5-10 years, and 10+ years.

**Major shares of ownership** - Understanding who is leading the company and which partner has which role is very important for banks. This is because business partners' domination and their background give information how much risk they will take by supporting them. The model has two options for this variable; a main partner with more than 51% share and no main partner with more than 51% share.

**Is there anybody who will takeover the management, except the partner?** Availability of someone who can take over the management gives information about the dynamics of the business. For banks it is important to understand how much and who they are investing in business.

**Experience of the company in the sector** - Experience of the company in the sector gives information to banks about how much the business proceeds and how mature it is. It is important to understand its sustainability and importance in the sector. This is divided into four parts as 0-5 years, 5-15 years, 15-20 years, and 20+ years. These years are determined according to the firms' life cycles changing based on sectors.

**Partner age** - Business partner age is taken into the account in this model to understand the entrepreneur's background.

**Partner education background** - Educational background might be convincing to banks telling how suitable and capable the entrepreneur is for this business. It increases the trustworthiness.

**Home ownership** - Home ownership gives information about the financial situation of the entrepreneur. This variable is considered in the model for understanding financial background as well as education. In the model, home might be entrepreneur's or in rent or in lodgment or family property.

**Residence period in the current address** - Residence period in the current address is important for reliability. This is divided into four parts as 0-2 years, 2-5 years, 5-10 years and 10+ years.



**Marital status** - Marital status is seen an important indicator of women entrepreneurs. In the model, married women entrepreneurs are likely to have more support from husband regarding a risk reducing effect for banks.

**Total work experience** - Total work experience is involved in the model to understand background and financial situation of the entrepreneur. The more experience, the more chance to get support.

**Financial instruments use** - The previous financial instruments use may be traced and this highlights how trustworthy business or entrepreneur is. In the model, using any financial use is considered advantageous.

**Sector and subject of activities** - The potential of each sector and sectoral activities may be quite different. Whilst taking risks, banks must evaluate which sector the business is and what kind of activities they do. The activities explain how involved they are. In the model, infrastructure, wholesale/retailer, motor vehicle service, real estate, hotel- restaurant/food and other sectors are included.

**Security deposits** - Financial risk of the banks is the main reason of this scoring model. Banks aim to minimize their risk. Security deposits directly have a positive effect in that case since availability of the deposits is an indicator of a low risk.

**Business address/region** - Business location is very important due to changing potential of each region in Turkey. While East and Southeast have low potential for success, other regions may have more.

In Table 3, all factors of the model listed with scores by ranges.

**Table 3. Reference Ranges of Factors**

Factors	Reference Range
<b>Operating period</b>	
0-2 year	0
2-5 year	25
5-10 year	70
10+ year	100
<b>Number of employees</b>	
1-5	0
5-15	50
15-30	75
30+	100
<b>Workplace ownership</b>	
Company's property	100
Partner's property	60
Family property	30
Rent	0
Leasing	30
<b>Duration of operation in the current address</b>	
0-2 years	0
2-5 years	25
5-10 years	70
10+ years	100
<b>Major shares of ownership</b>	
There is a main partner with more than 51% share	100
There is no main partner with more than 51% share	0
<b>Is there anybody who can takeover the management, except the partner?</b>	
Available	100
Unavailable	0
<b>Experience of the company in the sector</b>	
0-5 years	0
5-15 years	30
15-20 years	70

20+ years	100
<b>Partner age</b>	
18-25	0
25-40	30
40-55	100
55-65	60
65+	0
<b>Partner education background</b>	
Elementary school	10
Highschool /technical school	30
University degree	100
None	0
<b>Home ownership</b>	
Owner	100
Rent	0
Lodgment	0
Family property	50
<b>Residence period in the current address</b>	
0-2 years	0
2-5 years	25
5-10 years	70
10+ years	100
<b>Marital status</b>	
Married	100
Single	0
<b>Total work experience</b>	
0-5 years	0
5-15 years	20
15-25 years	60
25+ years	100
<b>Has she used any financial instrument before?</b>	
Yes	100
No	0
<b>Sector / subject of activities</b>	
Infrastructure	0
Wholesale/retail	0
Motor vehicle service	0
Real estate/commission	0
Hotel- restaurant / food	70
Other	100
<b>Security deposit</b>	
Available	100
Unavailable	0
<b>Business address / region</b>	
East / Southeast	0
Other	100

As seen in the table, scores are determined regarding their importance level to understand trustworthiness for the loan program. In following section, the use of these scores and their effect on decision-making are presented.

### 3.2. Application of Credit Scoring Model

Scoring models are beneficial for economic decisions in examining the creditworthiness of individuals and legal identities. In order to provide fair, effective and efficient decisions, financial institutions often apply credit scoring models. Particularly, these models are shaped to eliminate bias and human errors with the help of objective metrics. In this study, objectivity, fairness and effectiveness are quite important to deal with women’s social status and its economic circumstances. Therefore, these factors are taken into consideration in the following model.

The most common demonstration of mathematical scoring model is as follows:

$$\text{Score } Z = Di_1 t_1 + Di_2 t_2 + Di_3 t_3 + Di_4 t_4 + \dots + Di_n t_n$$

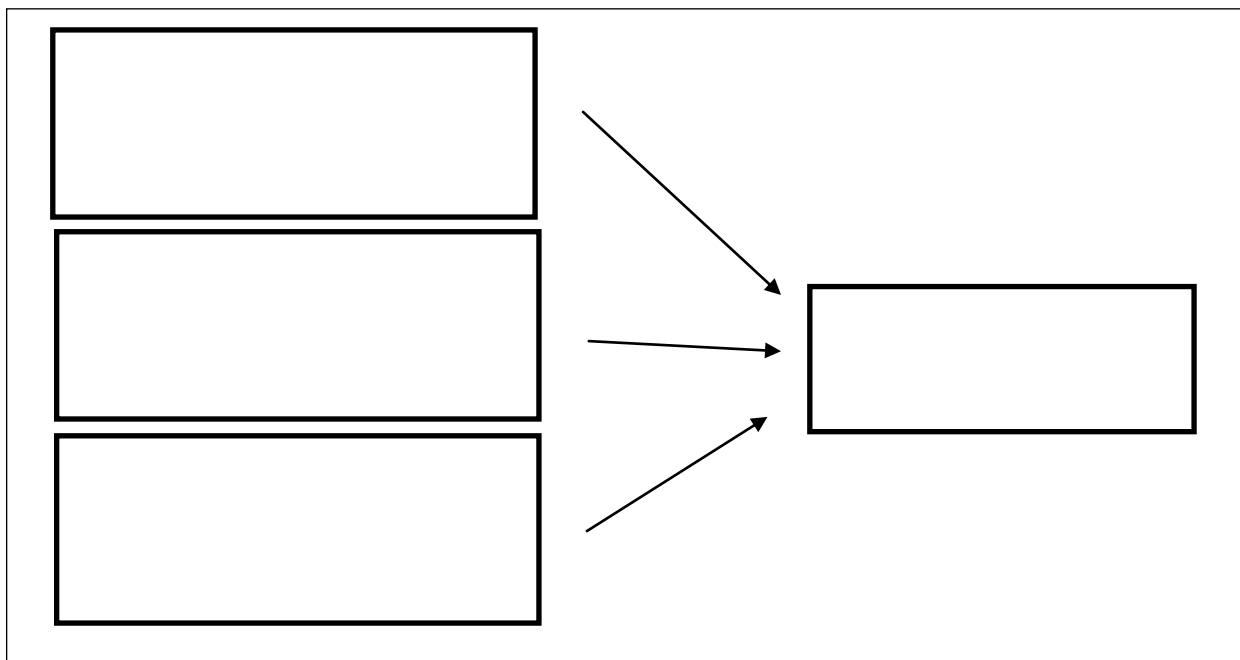
where Z is the generalized estimated value of the object;  $t_1, t_2, \dots, t_n$  are normalized value of the variables that influence the object;  $D_1, D_2, \dots, D_n$  are weights that indicate the importance of the relevant variables. Even though there are a number of different econometric applications used in credit scoring, the most common one is the linear regression.

In the proposed model, the relative importance of factors/variables is determined and the power of scorecard is discriminated. Then, a lean and mean score card is created by the questionnaire for Turkish women entrepreneurs. All questions are prepared as women entrepreneurs can answer clearly to avoid confusion. For instance, a woman can consider herself widow and single at the same time. This kind of confusions may distort and mislead the decisions. Additionally, evaluation process of these kind of data may take a long time. Therefore, the questions are prepared in a way, hence, data can be evaluated very quickly.

While designing the study, a common process is used. First, the scorecard is created. Then, it was implemented, and data are collected regarding to the questions in the scorecard. The model is also tested for its validity providing positive feedback for the main goal.

To score the woman entrepreneurs, the scorecard is interrogated in three different areas to measure women empowerment. These sub areas are “Background/ Demographic” about women’s marital status, age, and wealth, “Partner” about the partner of the entrepreneur, and “Financial/ Business Background” about the entrepreneur’s past financial background and business’ situation. One of the main difference in application of this model among others is the weights of these areas. The weighs in this model are determined by a statistical methodology.

**Figure 1. Concept of the Model**



The model derived for Turkish women entrepreneurs is based on discrete choices. Furthermore, this model is parametric. In the model, linear regression analysis is used to understand relationship in between creditworthiness and seventeen independent variables. This is because linear functions use characteristics in a best way for discriminating the groups. Moreover, this model measures the goodness of fit by considering sum of absolute errors and the maximum error. Application of the model is indicated below:

$$\text{Score} = Di_1 t + Di_2 t + Di_3 t + Di_4 t + Di_5 t + Di_6 t + Di_7 t + Di_8 t + Di_9 t + Di_{10} t + Di_{11} t + Di_{12} t + Di_{13} t + Di_{14} t + Di_{15} t + Di_{16} t + Di_{17} t$$

where Score is estimation of trustworthiness of the women entrepreneur;  $t_1, t_2, \dots, t_n$  are values which women entrepreneur got for a particular variable;  $D_1, D_2, \dots, D_n$  are weights that indicate the importance of variables mentioned in the previous section. The values for a woman entrepreneur are separated into certain groups for each variable.

Credit scoring models generally use three-digit scores (Irby, 2018). In this model, score is ranging from 0 to 1700. 1700 is the highest possible score while 0 is the lowest score an applicant can have. The higher score is on the scale, better chance for loan an entrepreneur can have. A higher score represents a lower risk. Thus, applicants must score more than a certain amount to qualify for a loan. The risk grades are used in the model to classify the applicants according to their scores. In detail, credit scores of this model fall in the below range:

**Table 4. Classification of Risk Scores**

Scoring	Range	Creditworthiness Level
A	1700-1450	Excellent
B	1450-1200	Very Good
C	1200-950	Good
D	950-700	Fair
E	700-450	Bad
F	450-0	Very Bad

The scores are grouped from excellent to very bad. In this way, 40 different Turkish women entrepreneurs' applications are evaluated in the sampling.

**Table 5. Results of the Credit Scoring Model**

VARIABLES	E1/ Scores	E2/ Scores	E3/ Scores	E4/ Scores	E5/ Scores	E6/ Scores	E7/ Scores	E8/ Scores	E9/ Scores	E10/ Scores
Operation Period	25	100	70	70	100	70	70	70	25	25
Number of Employee	0	0	0	0	0	50	0	0	0	0
Workplace Ownership	0	0	100	0	100	0	0	0	0	100
Duration of Operation in the Current Address	0	100	70	70	100	25	70	70	25	25
Major Shares of Ownership	100	100	100	100	100	100	100	100	100	100
Is There Anybody Who Will Takeover the Management, Except the Partner?	0	100	0	0	100	100	0	0	0	0
Experience of the company in the sector	0	100	30	100	30	30	30	30	0	0
Partner Age	30	60	100	100	100	100	30	30	30	30
Partner Education Background	30	30	100	30	10	100	100	30	30	30
Home Ownership	100	100	100	0	100	0	0	0	0	0
Residency Period in th Current Address	70	100	70	25	100	70	25	70	25	70
Marital Status	100	100	100	100	100	100	100	0	100	100
Total Work Experience	0	100	20	60	20	20	20	0	100	0
Has She Used Any Financial Goods Before?	100	100	100	100	100	100	100	100	100	100
Sector/ Subject of the Activity	70	100	100	100	100	0	100	100	100	100
Security Deposit	0	0	100	0	100	0	0	0	0	0
WorkplaceAddresses/Region	100	100	100	100	100	100	100	100	100	100
<b>TOTAL SCORE</b>	<b>725</b>	<b>1290</b>	<b>1260</b>	<b>955</b>	<b>1360</b>	<b>1065</b>	<b>845</b>	<b>720</b>	<b>635</b>	<b>780</b>

VARIABLES	E11/ Scores	E12/ Scores	E13/ Scores	E14/ Scores	E15/ Scores	E16/ Scores	E17/ Scores	E18/ Scores	E19/ Scores	E20/ Scores
Operation Period	70	25	100	100	70	25	100	70	70	25
Number of Employee	0	0	0	0	0	0	0	0	0	0
Workplace Ownership	0	0	100	100	0	30	100	0	0	0
Duration of Operation in the Current Address	25	25	100	100	70	25	70	70	70	25
Major Shares of Ownership	100	100	100	100	100	0	100	100	100	100
Is There Anybody Who Will Takeover the Management, Except the Partner?	0	0	100	0	0	0	0	100	100	100
Experience of the company in the sector	30	0	30	30	30	30	30	30	30	30
Partner Age	30	30	100	100	30	100	60	30	100	30
Partner Education Background	30	30	30	30	100	30	30	30	30	30
Home Ownership	100	0	100	100	0	0	0	0	100	0
Residency Period in th Current Address	70	25	100	70	70	25	100	70	25	25
Marital Status	0	0	100	100	0	0	100	100	100	100
Total Work Experience	20	0	20	20	60	0	100	60	60	20
Has She Used Any Financial Goods Before?	100	100	100	100	100	100	100	100	100	0
Sector/ Subject of the Activity	100	70	100	100	100	100	70	100	100	100
Security Deposit	100	0	0	0	100	100	0	0	0	0
WorkplaceAddresses/Region	100	100	100	100	100	100	100	100	100	100
<b>TOTAL SCORE</b>	<b>875</b>	<b>405</b>	<b>1280</b>	<b>1150</b>	<b>830</b>	<b>735</b>	<b>860</b>	<b>960</b>	<b>1055</b>	<b>685</b>

VARIABLES	E21/ Scores	E22/ Scores	E23/ Scores	E24/ Scores	E25/ Scores	E26/ Scores	E27/ Scores	E28/ Scores	E29/ Scores	E30/ Scores
Operation Period	100	70	70	70	70	70	100	25	25	70
Number of Employee	0	0	0	0	0	0	50	0	0	0
Workplace Ownership	100	0	0	0	0	0	100	0	0	100
Duration of Operation in the Current Address	100	70	25	70	70	70	100	25	25	70
Major Shares of Ownership	100	100	100	100	100	100	100	100	100	100
Is There Anybody Who Will Takeover the Management, Except the Partner?	0	0	0	100	0	0	0	100	0	0
Experience of the company in the sector	30	30	30	30	30	30	30	30	0	30
Partner Age	100	100	30	100	100	100	30	100	100	100
Partner Education Background	100	30	0	30	30	30	100	30	30	100
Home Ownership	100	0	0	0	100	0	100	0	0	100
Residency Period in th Current Address	100	70	70	70	70	70	100	25	70	70
Marital Status	100	100	100	100	100	0	100	100	100	0
Total Work Experience	60	20	20	20	60	20	20	0	0	20
Has She Used Any Financial Goods Before?	100	100	100	100	100	100	100	100	100	100
Sector/ Subject of the Activity	100	70	100	0	100	0	100	100	0	100
Security Deposit	0	0	0	0	100	0	0	0	100	100
WorkplaceAddresses/Region	100	100	100	100	100	100	100	100	100	100
<b>TOTAL SCORE</b>	<b>1290</b>	<b>860</b>	<b>775</b>	<b>890</b>	<b>1130</b>	<b>690</b>	<b>1230</b>	<b>805</b>	<b>650</b>	<b>1160</b>

VARIABLES	E31/ Scores	E32/ Scores	E33/ Scores	E34/ Scores	E35/ Scores	E36/ Scores	E37/ Scores	E38/ Scores	E39/ Scores	E40/ Scores
Operation Period	100	100	100	0	25	100	100	100	70	100
Number of Employee	0	0	0	50	0	0	0	0	0	0
Workplace Ownership	100	100	0	0	0	0	100	0	0	100
Duration of Operation in the Current Address	70	100	100	0	25	100	100	70	70	100
Major Shares of Ownership	100	100	100	0	100	100	100	100	100	100
Is There Anybody Who Will Takeover the Management, Except the Partner?	100	0	0	0	0	100	100	0	0	100
Experience of the company in the sector	30	70	30	0	0	70	100	70	30	30
Partner Age	30	100	100	100	100	60	0	30	100	60
Partner Education Background	30	30	100	30	30	30	100	10	30	30
Home Ownership	100	100	0	0	0	0	100	0	0	100
Residency Period in th Current Address	100	100	100	25	25	100	100	100	70	70
Marital Status	100	100	100	0	100	100	100	0	0	100
Total Work Experience	20	60	20	0	0	100	100	60	20	20
Has She Used Any Financial Goods Before?	100	100	100	100	100	100	100	100	100	100
Sector/ Subject of the Activity	100	0	100	100	100	0	100	0	100	100
Security Deposit	0	0	0	100	0	0	0	0	0	0
WorkplaceAddresses/Region	100	100	100	100	100	100	100	100	100	100
<b>TOTAL SCORE</b>	<b>1150</b>	<b>1160</b>	<b>1050</b>	<b>605</b>	<b>705</b>	<b>1060</b>	<b>1500</b>	<b>840</b>	<b>790</b>	<b>1110</b>

Random selection technique is applied for the sampling portfolio of entrepreneurs. Even though these scores create ranges themselves, they were appointed to a creditworthiness level according to these women’s status for financial institutions and banks since their evaluation is generally based on these levels. The model formed a chart indicating these women’s trustworthiness distribution.

Whilst implementing the scoring system, each answer is scored according to the reference ranges and applied to the model. For each woman entrepreneur, a final score is assigned to place woman entrepreneurs into a trustworthiness level. These levels are determinant for financial institutions and banks to make decisions about their micro credits need.

**4. Empirical Results**

The model is created by calculations of statistical variables of Turkish women entrepreneurs in a way of measuring trustworthiness for loaning. Additionally, it is a 3 or 4-digit number indicating the likelihood that Turkish women entrepreneurs will succeed for the credit support.

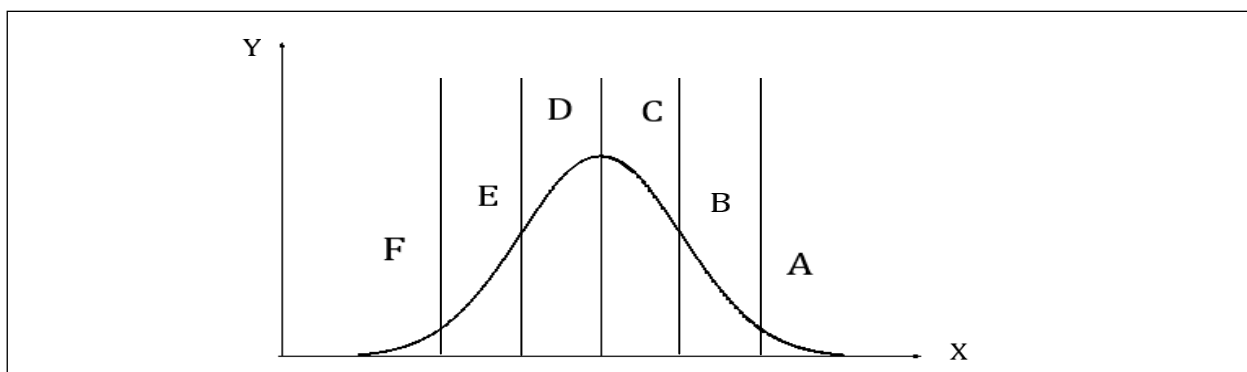
The model insists of seventeen characteristics used according to the applicants’ profile before arriving at its final score. The final score is determined with the statistical methodology because there is no judgmental factor such as previous payment status, relationship banks and references as involved in the model. Thus, the variables are considered according to multiple factors where the weights can be assigned and correlation coefficients can be computed. In the model, forty applicants are evaluated and assigned scores. The range of forty applicants is between 720 and 1360. Moreover; distribution of the applicants is differentiated for each scoring grade. While three applicants receive a grade of B (very good), an applicant receives a grade of C (good), and four applicants receive a grade of D (Fair).

**Table 6. Results of Scoring Model**

Result	Reference Range	Number of Entrepreneurs
A	1700-1450	1
B	1450-1200	6
C	1200-950	12
D	950-700	15
E	700-450	5
F	450-0	1

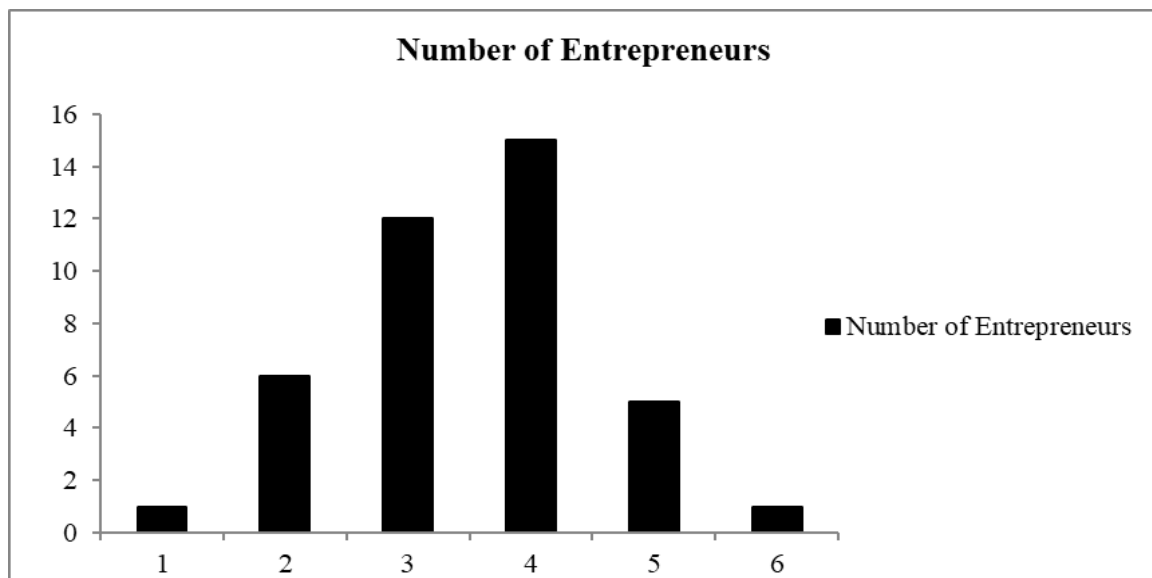
The number of women entrepreneurs scoring in the very lowest score range trends downward. On the other hand, the number of women entrepreneurs scoring in the very highest score range trends downward as well. When the sample is expanded, the grade distribution of Turkish women entrepreneurs seeking capital is non-linear. As shown in the chart below, the creditworthiness of women entrepreneurs in Turkey has a normal distribution.

**Figure 2. Distribution of Number of Entrepreneurs**



The scores vary from 605 to 1500 in the study. The mean is 948 showing the “Fair” level in trustworthiness. In the application of this model, the women entrepreneurs demonstrated a normal distribution regarding their trustworthiness. In the Figure 4, this distribution is presented. X-axis shows trustworthiness score and Y-axis shows the number of entrepreneurs assigning the level. In the model, the sample dominates C and D areas. More than half or these women have good and fair trustworthiness implementing the potential of loaning. Further, the number of women scored badly, then these women should be supported with trainings and mentorship programs.

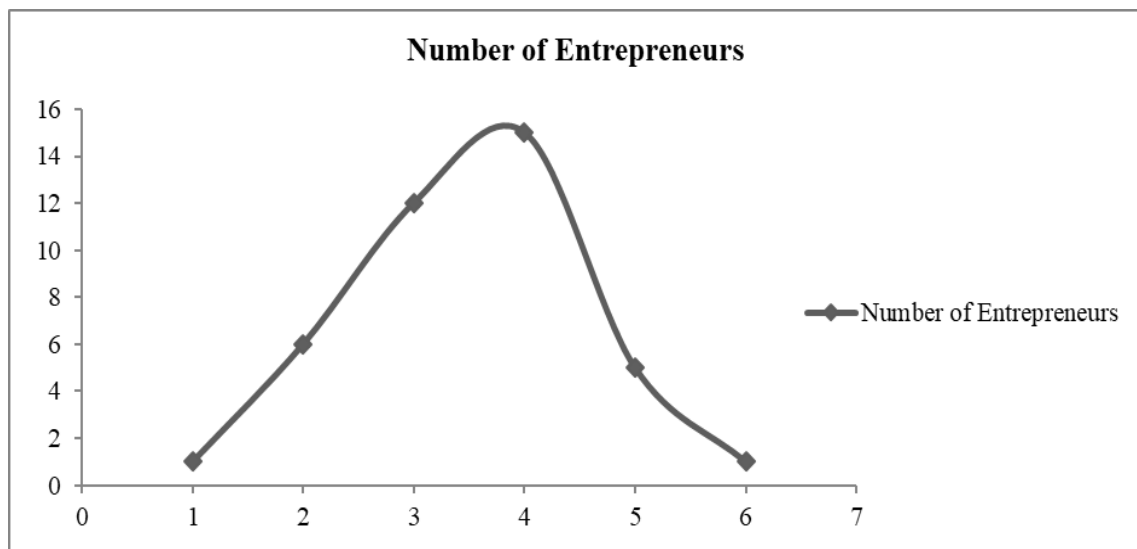
**Figure 3. Normal Distribution of Creditworthiness**



In the chart below, X indicates the score ranges forming of the credit grades and Y indicates the number of women entrepreneurs. Moreover, Figure 4 is the general demonstration of a normal distribution for creditworthiness. The results show that the graph below skewed to the left even though the majority of women entrepreneurs had fair and good results. This skewness supports the aim of the study providing that these women have potential and should be encouraged by institutions and banks to produce better solutions. According to the chart below, it can be stated that women applied for a loan have average creditworthiness. When scores are considered, their partner’s age, operating period, experience and workplace ownership are their weak components. This result also explains why they need a loan and training to use it properly.

**Figure 4. Number of Entrepreneurs Distribution of the Model**

The model demonstrates the weaknesses and credit worthiness of these women entrepreneurs which affect



the risks of corresponding banks.

**5. Conclusion**

In the study a simplified credit scoring model is constructed for evaluating the credits of Turkish women entrepreneurs.

Supporting women entrepreneurs has been more important for an economy and the society because of the role of women. When the number of women involvement in the economy is reviewed, it is clear that there is a large room to progress. In order to achieve it, pushing women entrepreneurs is a good way to make it faster. It is possible to create a system which understands the needs and evaluate by their potential. Availability of investable capital is the main shortage of women entrepreneurs. Financial and governmental institutions may be prominence in this game. Many banks have recently started to introduce loan evaluation systems to boost woman employment and women entrepreneurs. Development of a scoring model can have an impact on reaching the capital by women

entrepreneurs and their success. This model includes methodological steps with a supportive framework and descriptive characteristics. Then, these characteristics are weighted according to their importance in trustworthiness. These measurable characteristics actually shape the results of credit scoring. The results of the study show that the applicants generally dominate the good and the fair grading for loaning.

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