**Vesna Rašković Depalov** [1]

**Katarina Pavlović**

# ANALYSIS OF SPECIFIC IMPROVEMENT AREAS IN START-UP ACTIVITY IN SERBIA

*Abstract: Raising the level of knowledge is essential for start-ups pursuing growth and aiming at keeping their innovation potential high. Since innovation activity has been the driving force of economies worldwide, governments tend to focus on providing knowledge through various support programs in order to accelerate innovations. The aim of the study presented in this paper was to find out what types of knowledge and what factors contribute positively to this process. For this purpose, methodology used was based on interviews and questionnaire. 82 participants were selected for the study. Four hypotheses were tested and proven. One, related to the needed team knowledge, and three, related to digitalisation level, intellectual property rights protection, and gender influencing time-to-profit. The results of the study obtained are presented and discussed in the paper and these findings may be used as a guidance for further support to the Serbian innovation ecosystem.*

*Keywords: Accelerating innovation, Time-to-profit, Team knowledge, Digitalisation, Intellectual property rights, Gender equity.*

## 1. Introduction

Innovation is one of the most important factors contributing to any country's economic development through all levels of business activity and all types of organizations (Bristow & Healy, 2018). Due to high risks related to bringing innovative products and services to the market, start-ups have been recognized as the best vehicles for these activities. Even though they usually have high level of technical and scientific knowledge, research has shown that they lack market related and core business knowledge. This is why it is very important to raise the level of these kinds of knowledge and help them succeed in bringing their innovative products or services to the market, where they are expected to have a high growth rate. This is usually done through various incubation and acceleration programs, start-up schools, coaching and mentorship and networking. By constantly providing knowledge, countries accelerate innovations and economic development as well.

The Competition for the Best Technological Innovation has been one of the examples of such knowledge support in the Republic of Serbia since 2005. Besides educational, it has been providing promotional and small financial support as well.

The process entails 9 months of series of trainings and consultations, through which they face issues of their own & team obstacles, novelty, target customers, competition, problem-issue fit, product-market fit, business model fit, product vs. market orientation, scientific vs. entrepreneurship view, fixed vs. growth mind-set, with everything finalised with pitching preparation. The market related and

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[1] Corresponding author: Vesna Rašković Depalov
Email: raskovicv@uns.ac.rs

the core business knowledge for start-ups and methodology used has been changing over the years due to the needs of the contestants and the need for their better preparation for the market entry, penetration or growth. NTI Community, with NTI acronym standing for the Best Technology Innovation in Serbian language, was established in 2020, as the result of the five month research conducted, with some of the data gathered and the analysis presented in this paper. This is an additional contribution to the Competition from the part of authors of this study, since the community is seen as one of the best knowledge providers to start-ups offering the opportunity for networking and sharing the knowledge, not only between each other, but also with other members of the Serbian innovation ecosystem. The final aim was to identify types of knowledge that could accelerate their time-to-market rate and also identify factors that accelerate their time-to-profit, in the existing environment with available resources. Related to this, four hypotheses were tested and proven, which helped understand real needs of the former contestants, making this research highly applicable. The findings of structured empirical research conducted are presented in the sections to follow: 2. Literature review, 3. Experimental, 4. Results, 5. Discussion, 6. Conclusion, 7. References.

## 2. Literature Review

Literature review will be presented, first through conceptual framework, to be followed by theoretical and empirical one.

The conceptual part of the study and relevant literature reviewed referred to defining what can accelerate the innovation, meaning reaching the market faster and, also, once in the market reaching the profit faster. The main research questions coming out of these were:
1. What types of knowledge can speed up time-to-market?
2. What factors can speed up time-to-profit?

The concept, accelerating innovation, emerged due to time-based competition and globalisation, and gained scientific research interest in the late 1980's and early 1990's. (Ellwood et al., 2017).

This has remaind the focus of the contemporaty businesses ever since, especially, due to globalisation and necessity of efforts in developing competitive strategies. Researchers' findings have been showing the link between increased innovation speed with new product success, if measured financially, but also if measured according to technical quality and customer value (Ellwood et al., 2017).

Constructs related to accelerating innovation (Ellwood et.al) are time-to-market, speed-to-market, cycle time, innovation speed, new product development (NPD) speed, etc. (Chen et al., 2005).

The theoretical part of the study and relevant literature reviewed will support presented concept. When speaking about potential of innovations, timing is very important. The faster innovation reaches the market, the more successful it will be. This is why many academic researchers, professional innovation managers and policy-makers are interested in understanding what accelerate the innovation process.

Approaching innovation in general, the most cited definition of innovation is one provided by the The Oslo Manual, which emphasises three things: types of innovation, novelty – degree of innovation, and implementation (Rašković & Pavlović, 2021).

Referring to the type, two distinct groups can be found in the literature: technological and non-technological types of innovation (Bodlaj et al., 2018). Under technological types of innovation, there are product innovation and process innovation.

Under non-technological types of innovation, the range can be found from "marketing innovation, organizational innovation i.e. management innovation, business model innovation, supply chain innovation," until open innovation (Rašković

& Pavlović, p. 38, 2021).

For the purpose of this study, focus will be only on technological type of innovation which start-ups invented and implemented in the market.

Referring to the degree of innovation, i.e. how "new" is the innovation, the literature identifies degree from novelty perspective and degree from impact perspective (Amara et al., 2008, Kovacs et al., 2019). Under innovation degree from novelty perspective, there are incremental innovation, as lowest degree, and radical innovation, as highest degree (The Oslo Manual). In the middle of this spectrum, there are two more: modular and systemic degree of innovation (Henderson & Clark, 1990).

Under innovation degree from impact perspective, there are disruptive innovation for existing market, and disruptive innovation for new or emerging market segments (Christensen & Raynor, 2015).

This study will focus on innovation degree from the novelty perspective.

In order to have successful innovation, reduced time-to-market is one of the performance indicators in new product development (van der Pas, 2017), as well as reduced time-to-profit (Maital & Seshadri, 2012).

A faster time-to-market creates an opportunity of achieving profit earlier and possibility to outperform the competition (van der Pas, 2017).

Chen, et al. (2005) distinguish between two types of business environments and time-to-market, explaining a strong positive relationship between time-to-market and new product success in uncertain environments, while this relationship is only moderate in the environments of certainty. On the other hand, technological uncertainty has no effect on this relationship.

Ellwood et. al (2017), on the other side, focus their theoretical research on management interventions in order to accelerate innovation and reduce the time from "idea" to "time-to-market". In the case of this study, managing interventions would refer to providing additional support and knowledge.

The next three theoretical literature review findings are linked to factors chosen by study participants in relation to time-to-profit,

The important area for innovation success is digitalisation. In this study digitalisation was addressed through the basic level - web presence. In the age of digital revolution, the majority of businesses are aware that websites are significant component in establishing organizational online presence. They are faced with a very important task of determining the most viable strategy for setting up and managing their own website. This brings them visibility and allows them to compete with larger organizations, leading to their own improvements (Louw & Nieuwenhuizen, 2020).

Parida et al. (p. 397, 2019) defined digitalisation as "use of digital technologies to innovate a business model and provide new revenue streams and value-producing opportunities in industrial ecosystems".

All of the above mentioned does not happen without knowledge. Different studies, presented by the Parida et al. (2019), show the need for new capabilities, investments and skill development, co-creation with customers, and big data as an intellectual and economic resource, as an enabler of digitalisation and business models.

Next literature survey is in the domain of the intellectual property rights (IPR) protection. Having in mind that the reality in which today's companies operate is reflected by the fact that the benefaction of intangible capital (license, franchise, trained workforce, patents and specific knowledge, software, strong customer relations, brands, unique design and processes) to value creation is about 80%, unlike in the 1980s when it was 0% (Badawy, 2008), IPR options have become important strategic tools. Effective use of IPR by the company helps in

achieving profit and competitiveness through generating revenue, better negotiation position, increasing reputation, and accessing external source of finance (Munari & Oriani, 2011).

Patents are at the top of choices among IPR options, even though very costly and time consuming. With the patent, the value of the venture rises and may attract more financial opportunities. On the other hand, not all inventions can be nor are patented. A lot depends on the innovation and it varies across industries and across countries. These aspects affect the intent of inventors to apply for patent protection (Neely & Hii, 1998).

In the literature disagreement are found in the relationship between patent rights and economic growth (Ginarte & Park, 1997; Hudson & Minea, 2013).

Another important area explored through literature is gender equity in start-ups. Gender equity in business and economic decision making, politics and education is among the European Union's core values. The European Commission set the framework for aligning strategies and actions to promote gender equity in the period from 2016 to 2019. According to Skonieczna and Castellano (2020) the progress has been made, but it can be accelerated.

Different authors have shown the interest in explaining entrepreneurial success together with key drivers (Ayala & Manzano, 2014; Boyer & Blazy, 2014). It seems that men and women business owners perceive success differently (Kirkwood, 2016). At the same time, there is a new research stream, considering women in business, as aiming for different goals, compared to men and being more interested in achieving a work-life balance, workers' well-being, and community welfare with respect to mere corporate profit (Justo et al., 2015).

The literature considers knowledge, team work, and connectedness as fundamentals for any company but even more so for start-ups having to bring all the potential they have together, in order to implement the innovative product or a service in the market. Lack of business knowledge and skills, adequate team structure, collaboration in every aspect of business activities and communication, can be detrimental to their survival (Fritsch & Wyrwich, 2018). The core team serves as an accumulated diverse knowledge source. Knowledge emerges and develops over longer periods of time and this is why the team needs to have strong internal interactions and high level of motivation and awareness in order to be engaged in the processes of knowledge acquisition and creation.

Empirical literature review findings will provide data gathered by original experiments or observations.

Chen et. al conducted an empirical study on 692 new product development projects in order to show link between speed-to-market and new product success (NPS) in certain and uncertain conditions of the market.

The implication of this study was showing that successful strategies related to speed-to-market are needed in today's unfamiliar, uncertain and fast-changing markets.

Another scope of empirical studies shows that level of knowledge in different areas is very important both for short- and long-term survival and success. According Jiang and Murmann (2022) start-ups receiving both functional, meaning technical knowledge, and, also, strategic knowledge, generates long term success. Numerous studies, presented by Jiang and Murmann (2022), also mention survival, longevity, scaling potential, research and development strategies, and new market entry as dependent on the quality of knowledge provided to them.

Looking into the area of the IPR protection Ken et al. (2008) found out positive relationships between the indexes of patent impact and profitability such as return on equity (ROE) and earnings per share (EPS). Their empirical findings show the influence of patent on ROE after 4 years and on EPS after 5 years.

Regarding the influence of gender, many empirical studies have shown that women founders have a lower ability to achieve success and lower survival rates, sales, profits, and number of employees (Jennings & Candida, 2013).

According to the findings of Coleman and Robb (2009) one very important factor to be taken into consideration is the total amount of initial capital. The highest level of performance is directly linked to the highest amount of initial funding. Fairlie and Robb (2009) find that female start-ups start their activities with less capital, in terms of both equity and loans, compared to men, which may explain the lower level of performance of female founders.

In 2019, venture capital (VC) investments in all-female founded start-ups hit a record-setting $3.3 billion, representing 2.8% of funds invested across the entire United States start-up ecosystem (Clark, 2019). Currently, among Fortune 500 companies, .
Methodology used for the purpose of this study is based on structured interview and questionnaire. The first part, interviews, were conducted online, via Skype or telephone, over a period of 5 months, from March 2020 to July 2020. Interviews were conducted to find out directly the estimation of founders related to time-to-market and time-to-profit, and to the type and degree of technological innovation they have developed. It was necessary to have interviews in order to avoid mistakes related to these questions. The idea behind interviews was also to strengthen the relationships with the former contestants, make follow up upon the team functionality and market results.

The second part, questionnaire, was conducted after interviews. The questionnaire consisted of two parts, demographic questions and research related questions. Demographic questions presented are combined from the interview and questionnaire: gender, age of founders, degree of innovation, type of innovation, time-to-market, time-to-profit, industry, and market.

Besides demographics, 16 questions were directly related to this study, 9 of these having proposed answers on Likert scale (1-5) and 7 having proposed answers of "yes" or "no", all related to improvement areas but from different perspectives. Out of these 9, 5 questions related to the contestants' interest for knowledge, and out of these 7, 3 questions related to the influence of website presence, IPR protection, and gender on time-to-profit, were used for the purpose of this study.

## 2.1. Selection of participants in the research

Out of 660 teams from 2009 till 2019, the research sample of 214 teams was selected according to the predefined criteria: 1. teams who reached semi-finals, 2. teams who claimed to still pursue the invention they enlisted to the Competition for the Best Technological Innovation, and 3. teams who could be classify as start-ups or SMEs. In total, 214 former contestants (teams), some of them already members of newly established NTI Community, were interviewed.

Out of 214 interviewed, 82 teams passed the final selection criteria for participation in the research: being very close or in the market already. Founders represented their teams in providing answers during the interviews and by filling in questioner.

Out of 82, 15 teams were used for the face validation of the study, and those answers were included for data analyses.

These 82 teams who are close to it or have reached the market are the first final representative sample for data analysis in this paper.

Out of those 82 teams, 66 of them reached the market, and they represent the second final sample for data analysis in this paper (Figure 1.).
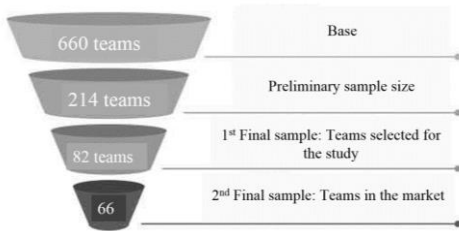
**Figure 1**. Sample size selection method

The strong point in this research is the fact that authors were engaged in closely working with the participants – teams, and also well acquainted with their work which improves validity of the answers.

Also, this representative sample coming out of the 11 years, may be seen as representative of the whole Serbian innovation ecosystem.

For the first hypothesis all 82 contestants' answers were relevant for the analysis (Figure 2.).
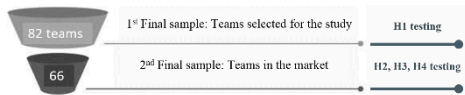


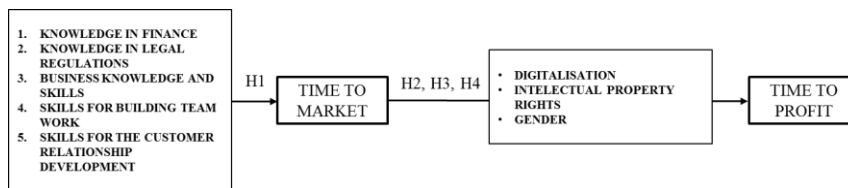**Figure 2**. Testing hypotheses on the two final samples

For three other hypotheses further selection had to be performed, and those, for whom it was found not to have brought Competition related innovation in the market yet, were excluded, meaning 66 teams remained in the sample.

### 2.2. Hypotheses

There are four hypotheses tested in the presented study, one being related to differences in types of knowledge they need and three of those being related to the factors that are assumed to be associated with the time to reaching the profit. These factors are digitalisation, IPR, and gender equity.

The following four hypotheses were tested in this study:

**Hypothesis 1**: There is a significant difference in the perception shown by start-ups of the importance of five team knowledge areas.

**Hypothesis 2**: The digitalisation of start-ups is in association with time to reaching the profit.

**Hypothesis 3**: IPR protection is in association with time to reaching the profit.

**Hypothesis 4**: There is an association between the gender and time to reaching the profit (Figure 3).



**Figure 3**. A research framework

## 3. Results

### 3.1. Descriptive statistics

All 82 participants answered to 8 demographic questions.

According to gender, only 19.5% of participants are female, while 80.5% of participants are male. The biggest group (48.8%) of participants belongs to the middle age group from 35 to 55, followed by those above 55 years of age (40.2%).

Concerning type of innovation that participants developed, 86.6% of them have product innovation. Concerning degree of innovation 62% participants have incremental degree of innovation. 42.7% participants have innovation in heavy

industries (energy, mining, metallurgy, chemical industry, and construction industry).

Out of 82 participants, 19.5% of them are not in the market yet with that specific innovation. Out of those who are in the market (66 of them), 45.5% needed 2 to 6 years to put their innovation into the market. 33% of them needed less than 2 years.

Out of 82 participants, 80.4% (66 participants) reached the market with their innovations, and 19.5% (16 participants) have the established venture and are very near the exit with that specific invention.

Out of those 66 in the market, 56% reached the profit. Mostly, 37.8% of them reached profit after 3 years and 35.1% in less than one year. 41.5% participants are present with their innovations in Serbian market.

The further data analysis and hypotheses testing are given in the next section.

### 3.2. Reliability and validity of data

A Cronbach's alpha coefficient of reliability, as a common test for internal consistency, was calculated for the scale of nine questions, which were supposed to point to the perception of respondents in relation to the knowledge and possible improvement areas in the future. For these 9 questions Likert scale (1-5) was used and Cronbach

alpha of 0.79 was obtained, which is considered good reliability of internal consistency. (Table 1).

**Table 1.** Reliability of internal consistency

| Scale | Cronbach's alpha | Number of items |
|---|---|---|
| Improvement areas | 0.79 | 10 |

Face validity was checked with the help of 15 respondents who agreed that all items correspond to the presumed object of measurement, or improvement areas in terms of knowledge and factors that contribute to the acceleration of innovations.

### 3.3. Hypotheses testing and verifying

Two tests were used in hypotheses testing, Pearson's Chi square and Friedman's test. Data collected was analysed with Statistical package for social sciences (SPSS) software, version 26.0.

Hypothesis 1 was proven using Friedman's test. Participants were asked five questions related to the perception of the importance of the specific knowledge the team needs, which points to the future activities with them, as well as to the possible improvements in the Serbian innovation ecosystem (Table 2). They answered on Likert scale 1-5, 1 being "strongly disagree", 5 being "strongly agree".

**Table 2.** Five questions related to the improvements area

| Questions | N | Min | Max | Mean | St.dev. |
|---|---|---|---|---|---|
| Q1: How strongly do you agree with the statement that you are sufficiently acquainted with currently available sources of finance in Serbia? | 82 | 1 | 5 | 3.17 | 1.275 |
| Q2: How strongly do you agree with the statement that you have often been solving problems related to legal regulation and that it presented a barrier to your business activities? | 82 | 1 | 5 | 2.84 | 1.271 |
| Q3: How strongly do you agree with the statement that new business knowledge and skills within your team would contribute to improvements in your business activities? | 82 | 1 | 5 | 3.88 | 1.070 |
| Q4: How strongly do you agree with the statement that development of skills related to team work would contribute to the improvements within your team? | 82 | 1 | 5 | 3.54 | 1.307 |
| Q5: How strongly do you agree with the statement that you put enough effort into customer relationship development? | 82 | 1 | 5 | 3.56 | 1.156 |

The Friedman test is the non-parametric alternative to the one-way ANOVA with repeated measures. It is used to test for differences between groups when the dependent variable being measured is ordinal. It was used here to prove that there is a significant difference in answers to five questions chosen to find areas for improvement. The question with the highest ranked mean in the Friedman's test is the question related to the interest of participants in raising the level of business knowledge and skills within their team (Table 3).

**Table 3.** Friedman's test mean ranks

| Friedman's test | Mean rank |
|---|---|
| Q1 | 2.68 |
| Q2 | 2.40 |
| Q3 | 3.54 |
| Q4 | 3.20 |
| Q5 | 3.18 |

Friedman's test showed the significant difference in the perception of the most important improvements areas. This finding is very important because it proves that means obtained from five different answers correspond to mean ranks in Friedman's test, presented in Table 4.

**Table 4.** Friedman's test

| No. | 82 |
|---|---|
| Chi-Square | 32.862 |
| df | 4 |
| Asymptotic significance | 0.000 |

Hypothesis 2 was proven using Chi square test of independence. The Chi-Square Test of Independence determines whether there is an association between categorical variables in terms of categorical variables being independent or related. It is a nonparametric test, chosen in this research to test hypothesis 2. In this case, categorical variables are website and time-to-profit, presented in Table 5. For this analysis authors used only two categories in profit for all 66 participants, as being "above" or "below" the breakeven point, meaning have reached the profit or not.

**Table 5.** Cross tabs for variables web site and time-to-profit

| | | | Website | | Total |
|---|---|---|---|---|---|
| | | | Have | Not have | |
| Profit | No profit | Count | 16 | 13 | 29 |
| | | % within Website | 35.6% | 61.9% | 43.9% |
| | With profit | Count | 29 | 8 | 37 |
| | | % within Website | 64.4% | 38.1% | 56.1% |
| Total | | Count | 45 | 21 | 66 |
| | | % within Website | 100.0% | 100.0% | 100.0% |

The presumption of Chi square test, shown in Table 6, was satisfied and none of the cells had expected counts less than 5. Yates's correction for continuity is included since this is a 2x2 table. This test shows that there is a significant association between having the website and time-to-profit ($\chi2(1)=3.037$; $p<0.05$).

Cramer's V shows the strength of association between having the website and time-to-profit (V=0.247; $p<0.05$). According to the result there is a significant association of low strength between these two categorical variables, as can be seen in Table 7.

**Table 6.** Chi square test of independence for variables web site and time-to-profit

| | Value | Asymptotic Significance (2-sided) |
|---|---|---|
| Pearson Chi-Square | 4.036[a] | 0.081 |
| Continuity correction[b] | 3.037 | 0.044 |

**Table 7.** Strength of association for variables web site and time-to-profit

| Symmetric measures | Value | Approximate Significance |
|---|---|---|
| Phi | -0.247 | 0.045 |
| Cramer's V | 0.247 | 0.045 |

**Table 8.** Risk Estimate for variables web site and time-to-profit

| Risk Estimate (95% Confidence) | |
|---|---|
| Odds (No profit/Profit) | 0.340 |
| For cohort Website=Have | 0.704 |
| For cohort Website=Not have | 2.073 |

The relative risk is a ratio of event probabilities. The relative risk of reaching the profit is the ratio of the probability for those with the website reaching the profit, to those without the website reaching the profit.

According to these results presented in Table 8, it can be estimated that the risk for those not having the website, not to reach the profit is 2.073 times greater than the risk for those who do have a website.

Hypothesis 3 was proven using Chi square test of independence. In this case, categorical variables are IPR protection and time-to-profit, presented in Table 9. For this analysis authors used only two categories in profit for all 66 participants, as being "above" or "below" the breakeven point, meaning have reached the profit or not.

**Table 9.** Cross tabs for variables IPR and time-to-profit

| | | | Intellectual property protection | | Total |
|---|---|---|---|---|---|
| | | | Have | Not have | |
| Profit | No profit | Count | 22 | 7 | 29 |
| | | % IPR | 55.0% | 26.9% | 43.9% |
| | With profit | Count | 18 | 19 | 37 |
| | | % IPR | 45.0% | 73.1% | 56.1% |
| Total | | Count | 40 | 26 | 66 |
| | | % IPR | 100.0% | 100.0% | 100.0% |

The presumption of Chi square test was satisfied and none of the cells had expected counts less than 5. Yates's correction for continuity is included since this is a 2x2 table. This test shows that there is a statistically significant association between having the IPR protection and time-to-profit ($\chi2(1)=3.967$; $p<0.05$), as it can be depicted in Table 10.

**Table 10.** Chi square test of independence for variables IPR and time-to-profit

| | Value | Asymptotic Significance (2-sided) |
|---|---|---|
| Pearson Chi-Square | 5.043[a] | 0.081 |
| Continuity correction[b] | 3.967 | 0.044 |

Cramer's V shows the strength of association between having the IPR protection and time-to-profit (V=0.276; $p<0.05$). According to the result there is a significant association of low strength between these two categorical variables (Table 11).

**Table 11.** Strength of association for variables IPR and time-to-profit

| Symmetric measures | Value | Approximate Significance |
|---|---|---|
| Phi | 0.276 | 0.025 |
| Cramer's V | 0.276 | 0.025 |

According to these results, it can be estimated that the risk for those having the IPR protection, shown in Table 12, not reaching the profit is 1.559 times greater than the risk for those who do not have IPR protection.

**Table 12.** Risk Estimate for variables IPR and time-to-profit

| Risk Estimate (95% Confidence) | |
|---|---|
| Odds (No profit/Profit) | 3.317 |
| For cohort IP=Have | 1.559 |
| For cohort IP=Not have | 0.470 |

Hypothesis 4 was proven using Chi square test of independence. In this case, categorical variables are gender and time-to-profit, presented in Table 13. Categorical variable "time-to-profit" was recorded for this analysis into only two categories in profit for all 66 participants, as being "above" or "below" the breakeven point, meaning have reached the profit or not.

**Table 13.** Cross tabs for variables gender and time-to-profit

| | | | Gender | | Total |
|---|---|---|---|---|---|
| | | | Male | Female | |
| Profit | No profit | Count | 16 | 13 | 29 |
| | | % gender | 32.0% | 81.3% | 43.9% |
| | With profit | Count | 34 | 3 | 37 |
| | | % gender | 68.0% | 18.8% | 56.1% |
| Total | | Count | 50 | 16 | 66 |
| | | % gender | 100.0% | 100.0% | 100.0% |

The presumption of Chi square test in Table 14 was satisfied and none of the cells had expected counts less than 5. Yates's correction for continuity is included since this is a 2x2 table. This test shows that there is a significant association between the gender and time-to-profit ($\chi2(1)=10.020$; $p<0.01$).

**Table 14.** Chi square test of independence for variables gender and time-to-profit

| | Value | Asymptotic Significance (2-sided) |
|---|---|---|
| Pearson Chi-Square | 11.936 | 0.001 |
| Continuity correction | 10.020 | 0.002 |

Cramer's V shows the strength of association between the gender of participants and time-to-profit (V=0.425; p<0.01). According to the result there is a significant association of medium strength between these two categorical variables, as it shown in Table 15.

Given the results in Table 16, it can be estimated that the risk for a female founder not to reach profit is 5.529 times greater than the risk for a male founder, not to reach the profit.

**Table 15.** Strength of association between variables gender and time-to-profit

| Symmetric measures | Value | Approximate Significance |
|---|---|---|
| Phi | -0.425 | 0.001 |
| Cramer's V | 0.425 | 0.001 |

**Table 16.** Risk Estimate for variables gender and time-to-profit

| Risk Estimate (95% Confidence) | |
|---|---|
| Odds (No profit/Profit) | 0.109 |
| For cohort Gender=Male | 0.600 |
| For cohort Gender=Female | 5.529 |

## 4. Discussion

Findings of this study have shown that knowledge in different areas is needed to start-ups and this complies with literature presented (Jiang & Murmann, 2022), but also, which is equally important it is coming from the perspective of founders in this study.

There areas suggested to them are more related to strategic types of knowledge, which can be provided to them in the current framework and according to available resources.

Five types of knowledge chosen are not perceived as equally important by the participants and these can be ranked. This is the proof of hypothesis 1. At the same time this ranking will be used to set priorities for the future work with them in terms of knowledge to be provided.

The most important areas for the improvement, as results show, are business knowledge and skills. These are followed by the needed skills related to building team work, and skills for the customer relationship development. The last needed areas for the improvement are knowledge in finance and knowledge in legal regulations. These findings are refreshing and show good start-ups awareness towards essential areas of knowledge needed to be successful. Commonly, start-ups when starting the business focus on financing and legal regulations and IPR, while in the late life cycle they are confronted with the lack of team work, overall business knowledge, and customers for their innovative product or services. It should be underlined, however, that financial, legal, and IPR issues are also very important for the scaling up. Having in mind that participants of this study have chosen more frequently organic growth in comparison to strategic partnerships, joint ventures, or investment rounds financed by VCs, and 62% of them having incremental degree of innovation, legal and financial knowledge were not as important to them. These are all specificities of the Serbian innovation eco-system for now and not in line with the literature (Jiang & Murmann, 2022) where fast growth is immanent to start-ups. Adding the facts that 45.5% of start-ups needed 2 to 6 years to put their innovation into the market and 37.8% of them gained profit after 3 years, it is expected that team work and business knowledge are ranked highest.

Participants of the study recognised three factors influencing their speed-to-profit. Three hypotheses were based on that.

In hypothesis 2 significant association of low strength, between the website and time-to-profit was proved. It is estimated that the risk for those not having the website, not to reach the profit is 2.073 times greater than the risk for those who do have a website. This hypothesis is in line with the study presented by Louw & Nieuwenhuizen (2020). There are two intriguing figures from the research, 35.6% of start-ups, who do have the website have not reached the profit and 38.1% of start-ups who do not have the website reached the profit. In depth analysis shows that out of 35.6% of start-ups who have the website but not reached the profit, 56.25% are female founders. All 38.1% of those who reached the profit and do not have the website are start-ups who have intensive direct sales.

Surprisingly, not many of them, particularly those in Serbia, know the importance of identifying and following what users are doing on their business websites. Today, web data analytics provide essential information regarding customer demographics, behaviour, and other relevant traffic details. Start-ups need to learn how to optimize their content based on customers' preferences and make market-oriented decisions. The faster start-ups adapt to using web analytics, the faster they may grow and reach the profit (Chitkara & Mahmood, 2020).

In hypothesis 3 significant associations of low strength, between IPR and time-to-profit was proven. There are two stimulating figures from the research, 45% of start-ups who reached the profit have IPR protection, and 73.1% start-ups who reached the profit do not have IPR protection. In depth analysis shows that out of 45% start-ups who reached the profit, with IPR protection, 44.44% have systemic degree of innovation. Out of 73.1% who have reached the profit without IPR protection, 100% of them have organic growth, and 36.84% of them have innovation in ICT industry for which it is believed not to be able to be patented. The research test results showed estimated risk for those

having IPR protection, not reaching the profit is 1.559 times greater than the risk for those who do not have IPR protection. These results are contradicting with the literature review (Munari & Oriani, 2011; Ken et al. 2008, Neely & Hii, 1998). but this is the showcase of the Serbian ecosystem which did not follow all the trends and due to that has its specificities. Another reason for this is in the fact that most of the questioned start-ups decided to proceed with organic growth, therefore not using IPR as a business tool, as Munari and Oriani stressed (2011) as important. Still poorly developed financial market in Serbia for the start-ups contributes to organic growth favouritism.

In hypothesis 4 significant association of medium strength between the gender and time-to-profit was proved. In findings related to risk estimates, it has been shown that the risk for a female founder not to reach profit is 5.529 times greater, than the risk for a male founder. Collaborating with the participants and being acquainted with their work, it can be seen that 100% of researched female founders reached the market, 31.25% of them developed systemic degree of innovation and 81.3% of them have not reached the profit yet due to the lack of funding. This hypothesis and findings are in line with the literature presented (Coleman & Robb, 2009, Clark, 2019), showing that women founders have less support to achieve success, but at the same time long lasting ability for building sustainable businesses. This may be due to the fact, as Crunchbase data shows, that the total funding to female-led start-ups fell in 2020, to 2.3%, compared to 2.8% in 2019 (Bittner & Lau, 2021).

## 5. Conclusion

It is a common fact that 90% of all start-ups fail. This study confirmed 82 out of 660, selected teams being very close or in the market, and 66 reaching the market, around 10% survival rate.

According to the results obtained several conclusions can be drawn:

The constant access to knowledge is needed. Participants of this study identified their required types of knowledge being: business knowledge and skills, team work, customer relationship development, financing sources, and legal regulations. Their first choice is to further work on business knowledge and skills, followed by team work, customer relationship development, financing sources and legal regulations.

The first factor contributing to time-to-profit is digitalisation, in the basic form of website, but not limited to, which was specifically found not to be on the satisfactory level, as shown in this study. In order to raise the growth potential, acquire customers, and open possibilities of financing, they need web presence and accompanying analytics.

The second factor contributing to time-to-profit is IPR protection, which in this case has not been but in the future should be used as strategic tool for achieving profit and competitiveness through generating revenue from strategic partnerships or accessing external source of finance.

The third factor contributing to time-to-profit is gender pointing to the need for further work on the improvements of gender equity, in the Serbian innovation eco-system, meaning promoting this opportunity among women founders, motivating them to participate in these kinds of activities, raising their awareness of potential benefits, and, also, developing more financial supporting programs for them.

Raising the level of knowledge, digitalisation of processes, IPR protection, and gender equity, are essential for start-ups pursuing growth and aiming at keeping their innovation potential at a high level.

The conducted study presented in this paper, opens the future research possibilities for in deeper analysis of each one of these relevant areas, in order to accelerate innovations in Serbia.

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**Vesna Rašković Depalov**
Faculty of technical sciences,
University of Novi Sad,
Novi Sad, Serbia
raskovicv@uns.ac.rs
ORCID 0000-0002-8566-4679

**Katarina Pavlović**
Faculty for project and
innovation management,
EDUCONS University,
Belgrade, Serbia
katarina.pavlovic@pmc.edu.rs
ORCID 0000-0002-2220-2418