Accounting education, technology and entrepreneurship: Current trends and future outlook

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Abstract: The present study explores current accounting and business research focusing on the accounting technology that leads the accounting profession in new directions. Also it discusses whether and how accounting education can support the development of employability skills of graduates and the creation of competent entrepreneurs through old and new technological advancements and applications. Research insight reveals that future entrepreneurs either in business or in accountancy should be aware of a number of additional elements such as human factors and emotions, communication strategy, safety issues, business structure, budget requirements, and other issues that may impact their decision making in a digitally transformed world. The paper aims to highlight current trends and future outlook of digital tools, processes and applications which are at the disposal of accounting and other practitioners and may allow for an interactive communication process between the interested parts.

Key words: accounting education, technology, developing professional skills, social media, entrepreneurship

1. Introduction

Researchers from various disciplines are exploring the relationship between skills, Higher Education (HE) curricula and employability (Harvey, 2001; Mason, Williams and Cranmer, 2009; Asonitou, 2015a). Higher Education Institutions (HEIs) are assumed to have increased responsibility for preparing graduates to become "employable". In this context, accounting education and entrepreneurship education have been gaining impetus since the 1980s (Russell et al., 1999; Von Graevenitz, Harhoff and Weber, 2010; Farhangmehr, Goncalves and Sarmento, 2016). Scholars have examined employability in relation to the enterprise skills that business owners should possess. They argue for a growing recognition of the difference between the "old" and "new" employability

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DOI: 10.25944/znmwse.2019.04.6578

skills sets required to compete in an increasingly flexible labour market, which seeks for capable entrepreneurs (Hartshorn and Sear, 2005). Rae et al., (2012) argue that leadership and flexibility are among the "new" employability and essential skills needed for entrepreneurship. Either through curricular changes that create interdisciplinary programmes or through the emphasis given on developing specific skills in a range of disciplines like accounting and marketing, the academic world recognizes the importance to build new talented entrepreneurs (North, 2015). The aim of this paper is to present an insight in the literature which shows how accounting education studies can make use of and accentuate technological tools which promote entrepreneurial spirit in accounting and business students.

2. Literature review

Accounting academics and accounting practitioners have repeatedly expressed the necessity to include into the accounting curricula diverse professional skills and competences that will create gifted graduates either as knowledgeable entrepreneurs or as skilled and promising future accountants to work in the strategic management teams of businesses. Among the professional competences the so-called entrepreneurial competences fall into 3 broad categories: (a) Business Readiness Skills that include communications, team skills, and critical thinking, information literacy and research skills, career or professional preparation; (b) Entrepreneurial Skills that include unique traits, behaviours and processes that differentiate an entrepreneur from an employee or manager; and (c) Business Functional Skills that include the traditional business activities performed in starting and running a business like Financial Management, Resource Management, Information Management, Marketing Management, Operations Management, Risk Management, and Strategic Management (Consortium for Entrepreneurship Education, 2004).

These standards explain in the broadest terms what students need to become successful self-employed or to create and grow a new venture. Evidently, entrepreneurship education coexists with the generalized business and accounting curriculum and with other skills deemed critical to entrepreneurial success, such as communication and teamwork (Freeman, 2012). Accounting Education Change Committee (AECC 1993), International Management Accountants (IMA, 1999), the Pathways Commission (2012), the American Institute of Certified Public Accountants (AICPA, 2017), and Chartered Global Management Accountant (Farrar, 2019) have long ago called for a broad accounting education that would prepare graduates for the highly competitive and digitally transformed business world of the future.

3. Research methodology

This is a study that explores literature and trends in three different sectors: (a) accounting education; (b) entrepreneurship; and (c) current technologies in accounting and business. The scope of the research, apart from presenting current research, has also been to create a list with elements that future entrepreneurs should focus with regards to the business and accounting technological tools. The authors searched related databases such as Science Direct, Scopus, Emerald and Eric for available literature and search engines such as Google Scholar and Science Direct. The specific key words under examination were the ones which were as-

sociated with entrepreneurship, accounting technology, accounting education and business communication channels, spanning a period approximately from 2012–first quarter of 2019. Textbooks, doctorate and master thesis and working papers were excluded from this analysis for two reasons: firstly, academics and practitioners alike most often use journals and conference papers to acquire information on new projects and disseminate new findings, and secondly, for purposes of manageability. In phase one of the study 230 articles were chosen for satisfying the initial criteria. In phase two these articles were carefully reviewed and 42 of them were finally approved for further content analysis as agreed by both authors. Results and conclusions were drawn based on the analysis of the literature review of these 42 papers. Further analysis of the relevant literature revealed that the papers were published steadily since 2012 and onwards with a considerable increase in 2015 (Table 1). It can be concluded that there is a continuous research interest on how technology affects business, entrepreneurship and accounting practice. The analysis revealed four broad emerging themes: "Technology influence on business, accounting practice and entrepreneurship", "Processes and Digital applications", "Communication channels in business and accounting" and "Accounting education and employability skills" (Table 2). The specific research focus of each study is found in Table 3.

Table 1. Year of publication

Year	Author
2012	1. Chandler, R.
	2. Mahdi, S., Palmer, G.
2013	3. Boedker, C., Chua, W.
	4. Goretzki, L., Strauss, E., Weber, J.
	5. Ross, P., Blumenstein, M.
2014	6. Alexander, R., Gentry, J.
	7. Dimitriu, O., Matei, M.
	8. Prasad, A., Green, P., Heales, J.
	9. Villiers, C., Rinaldi, L., Unerman, J.
	10. Whitehouse, T.
2015	11. Curran, Ch., Puthiyamadam, T., Sviokla, J., Verweij, G.
	12. Rao, A.
	13. Parham, A. G., Moorney, J. L., Cairney, T. D.
	14. Asonitou, S., Vitouladiti, O.
	15. Alamin, A., Yeoh, W., Warren, M., Salzman, S.
	16. Alon, A.
	17. Asonitou, S. (a)

2015	18. Asonitou, S. (b)
	19. Babaei, M., Gholami, Z., Altafi, S.
	20. Bititci, U., Cocca, P., Ates, A.
	21. Earley, C.
	22. North, A.
	23. Pries, K., Dunnigan, R.
	24. Prokofieva, M.
	25. Tysiac, K.
	26. Uyar, A., Boyar, E.
	27. Vasarhelyi, M. A., Kogan, A., Tuttle, B.
2016	28. Coyne, J., Coyne, E., Walker, K.
	29. Erevelles, S., Fukawa, N., Swayne, L.
	30. Farhangmehr, M., Goncalves, P., Sarmento, M.
	31. Singh, K., Best, P.
2017	32. van Laar, E., van Deursen, A., van Dijk, J. A. G. M., de Haan, J.
	33. AICPA (American Institute of Certified Public Accountants)
2018	34. Al-Htaybat, K., von Alberti-Alhtaybat, L., Alhatabat, Z.
	35. Bandera, C., Collins, R., Passerini, K.
2019	36. Farar, M. (for CGMA—Chartered Global Management Accountant)
	37. Asonitou, S., Hassall, T.
	38. AACSB
	39. IFAC
	40. Kotb, A., Abdel-Kader, M., Allam, A., Halabi, H., Franklin, E.
	41. Asonitou, S., Kottara, C.
	42. Rebele, E. J., St. Pierre, K. E.

S o u r c e: Authors' own elaboration.

Table 2. Assigned papers to emerged themes

Emerging theme	Author
Technology influence on business, accounting practice and entrepreneurship	1. Goretzki, L., Strauss, E., Weber, J. 2. Curran, Ch., Puthiyamadam, T., Sviokla, J., Verweij, G. 3. Parham, A. G., Moorney, J. L., Cairney, T. D. 4. Tysiac, K. 5. van Laar, E., van Deursen, A., van Dijk, J., de Haan, J. 6. Bandera, C., Collins, R., Passerini, K.
Processes and digital applications	1. Chandler, R. 2. Boedker, C., Chua, W. 3. Ross, P., Blumenstein, M. 4. Dimitriu, O., Matei, M. 5. Prasad, A., Green, P., Heales, J. 6. Alamin, A., Yeoh, W., Warren, M., Salzman, S. 7. Alon, A. 8. Babaei, M., Gholami, Z., Altafi, S.
Communication channels in business and accounting	1. Mahdi, S., Palmer, G. 2. Alexander, R., Gentry, J. 3. Villiers, C., Rinaldi, L., Unerman, J. 4. Whitehouse, T. 5. Rao, A. 6. Bititci, U., Cocca, P., Ates, A. 7. Earley, C. 8. Pries, K., Dunnigan, R. 9. Prokofieva, M. 10. Uyar, A., Boyar, E. 11. Vasarhelyi, M. A., Kogan, A., Tuttle, B. 12. Erevelles, S., Fukawa, N., Swayne, L. 13. Singh, K., Best, P.
Employability skills in business and accounting	1. North, A. 2. Asonitou, S., Vitouladiti, O. 3. Coyne, J., Coyne, E., Walker, K. 4. Asonitou, S. (a) 5. Farhangmehr, M., Goncalves, P., 6. Asonitou, S. (b) 7. Sarmento, M. 8. AICPA (American Institute of Certified Public Accountants) 9. Al-Htaybat, K., von Alberti-Alhtaybat, L., Alhatabat, Z. 10. Farrar, M. (for CGMA—Chartered Global Management Accountant) 11. Asonitou, S., Hassall, T. 12. AACSB 13. IFAC 14. Kotb, A., Abdel-Kader, M., Allam, A., Halabi, H., Franklin, E. 15. Asonitou, S., Kottara, C. 16. Rebele, E. J., St. Pierre, K. E.

S o u r c e: Authors' own elaboration.

Table 3. Specific focus of research

Author	Focus of research
Chandler, R.	Cloud accounting
Mahdi, S., Palmer, G.	Social media and investors
Boedker, C., Chua, W.	Employees' emotions
Goretzki, L., Strauss, E., Weber, J.	Changing role of accountants
Ross, P., Blumenstein, M.	Cloud computing and strategy
Alexander, R., Gentry, J.	Social media and communication
Dimitriu, O., Matei, M.	Cloud computing—directions for accounting
Prasad, A., Green, P., Heales, J.	Cloud computing and corporate governance
Villiers, C., Rinaldi, L., Unerman, J.	Integrated reporting and applicability
Whitehouse, T.	Big data and auditing
Curran, Ch., Puthiyamadam, T., Sviokla, J., Verweij, G.	Digital leaders
Rao, A.	Social media and market needs
Parham, A. G., Moorney, J. L., Cairney, T. D.	Big data transform accountancy
Asonitou, S., Vitouladiti, O.	Core Skills for the tourism sector
Alamin, A., Yeoh, W., Warren, M., Salzman, S.	Human factors and adoption of technology in accountancy
Alon, A.	Accounting and business communication through IAS
Asonitou, S. (a)	Employability skills of accountants
Asonitou, S. (b)	Barriers to the teaching of skills in accountants
Babaei, M., Gholami, Z., Altafi, S.	ERP and challenges for large organizations
Bititci, U., Cocca, P., Ates, A.	Visual performance management systems
Earley, C.	Data analytics in auditing—skills required
North, A.	Skills required from entrepreneurs

Pries, K., Dunnigan, R.	Big data and management
Prokofieva, M.	Social media and business communication
Tysiac, K.	Internal audit and technology risk
Uyar, A., Boyar, E.	Social media and decision making of executives
Vasarhelyi, M. A., Kogan, A., Tuttle, B.	Challenges and obstacles from big data use by accountants
Coyne, J., Coyne, E., Walker, K.	Incorporation of technology development issues in accounting curricula
Erevelles, S., Fukawa, N., Swayne, L.	How big data affects marketing
Farhangmehr, M., Goncalves, P., Sarmento, M.	The responsibility of entrepreneurship education in developing employability skills
Singh, K., Best, P.	Visual analysis supports business
van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., de Haan, J.	Digital and employability skills for young entrepreneurs
AICPA	Core competencies for accountants
Al-Htaybat, K., von Alberti-Alhtaybat, L., Alhatabat, Z.	Accounting education in developing employability skills
Bandera, C., Collins, R., Passerini, K.	ICT affects students' entrepreneurial characteristics
Farrar, M. (for CGMA—Chartered Global Management Accountant)	Accounting education in developing knowledge and employability skills
Asonitou, S., Hassall, T.	Accounting education in developing knowledge and employability skills
AACSB	Employability skills required by the accreditation process
IFAC	Accounting education in developing knowledge and employability skills
Kotb, A., Abdel-Kader, M., Allam, A., Halabi, H., Franklin, E.	Accounting education in developing knowledge and employability skills
Asonitou, S., Kottara, C.	Soft skills requirements for the tourism sector
Rebele, E. J., St. Pierre, K. E.	Barriers to the teaching of skills in accountants

S o u r c e: Authors' own elaboration.

4. Findings

This section aims at a thorough presentation of the papers assigned to the four emerged themes, namely: "Technology influence on business, accounting practice and entrepreneurship", "Processes and digital applications", "Communication channels in business and accounting" and "Accounting education and employability skills".

Technology influence on business, accounting practice and entrepreneurship

Organizations are nowadays struggling to digitize their operations and according to Price Waterhouse Coopers (Curran, Puthiyamadam, Sviokla and Verweij, 2015) the Digital IQ (intelligence quotient) leader businesses are those that are more thoughtful in their digital strategy, innovation and execution. Technological trends are evolving, like intelligent systems, data mining, BYOD (Bring Your Own Device), predictive analytics, social media and crowdsourcing which transform the operational and the interpretative elements of accountancy (Parham, Moorney and Cairney, 2015). Opportunities from social media do not come without risks. The first step for firms in order to protect themselves is to reconsider how and who shares information within the firm and, secondly, they should consider who will be responsible for social media activities and whether, how, and which executives will actively participate. The ten top risks related to technology according to the Institute of Internal Auditors are: cybersecurity, information security, IT systems development projects, IT governance, outsourced IT services, social media use, IT skills among internal auditors, emerging technologies, board and audit committee technology awareness (Tysiac, 2015). Technology has transformed both the everyday practicing of the accounting profession (Goretzki, Strauss and Weber, 2013) as well as the image and the talents of the accountants (AICPA, 1999). Most accounting systems are now computerized and thus, accountants must understand software and system processes to effect and evaluate systems of internal control while at the same time, to be able to report and communicate financial results.

Business administration and accounting (BAA) students after their graduation will be employed either as business executives or as self-employed entrepreneurs. In both cases they will need a set of skills to help them survive in a highly technological environment. They must be able to use computing technologies to perform standard business tasks effectively and competitively, including promoting tasks (e.g., maintain a web and social media presence) and basic accounting activities (e.g., maintain a digital ledger with invoice, payroll, and tax accounting). Young entrepreneurs should be able to use effectively a range of tools for computing, online communication and business clouding technologies (van Laar et al., 2017). Research has shown that students' entrepreneurial characteristics positively impact their willingness to take risks, and this relationship between learner characteristics and risk is moderated by students' perceptions of the usefulness of Information and Communication Technology (ICT) (Bandera, Collins and Passerini, 2018).

Processes and digital applications

This category presents the most up-to-date tools, processes and applications which are at the disposal of accounting and other practitioners and may allow for an interactive communication process between the interested parts.

A major challenge that is under way is the compilation of IFRS which is a continuous procedure due to the new transaction processes in the evolving business environment. Since globalization has intensified the need for effective communication between businesses, the International Accounting Standards Board (IASB) has been issuing appropriate accounting standards aiming at the creation of a common business language for interpreting and presenting financial transactions (Alon and Dwyer, 2014). Traditional Accounting Information Systems (AIS) include three main parts: (a) Transaction Processing Systems (TPS) that support daily business operations; (b) Gen-

eral Ledger System and Financial Reporting System (GLS.FRS) and; (c) the Management Reporting System (MRS) that offers internal stakeholders the necessary financial reports needed for decision-making such as variance or budgeting reports. AIS may be incorporated into Enterprise Resource Planning (ERP) systems that support in an integrated manner all essential functions of an enterprise. More and more accounting software interoperates with other functions of the business such as Human Resource Management, Customer Relationship Management (CRM) and Supply Chain Management, Dashboards and other reporting applications (Alamin et al., 2015).

Technology rapid advancements, globalization of trading and the need for standardization have created the new concept of "cloud computing". Cloud computing enables the Information Technology Outsourcing (ITO) whereby computing resources are purchased over the Internet using a pay-per-use model (Ross and Blumenstein, 2013). The main characteristic of the "online accounting" is the use of the accounting service without the cost of buying and installing any software or hardware infrastructure. Cloud accounting allows users to store data and use applications through different devices located in several locations (Dimitriu and Matei, 2014). Some benefits of the cloud accounting include reduced costs for equipment and expert staff, online instantaneous access for managers having access to documents from any device (mobile, ipad), sharing of information in real time and making use of automated backup to secure data (Chandler, 2012). Proper use of cloud computing suggests the need for proper corporate governance structure. Proper structure should have a chief cloud officer, a cloud management committee, a cloud service facilitation centre, and a cloud relationship center (Prasad, Green and Heales, 2014).

Human factors are very important since they may influence technology adoption decisions and therefore should be well investigated before final decisions are reached. Recent studies focus on the human or emotional factors that may affect the adoption of new technology (Alamin et al., 2015), the impact of technologies on the emotions of employees (Boedker and Chua, 2013), and the lack of human resources that may prevent the successful implementation of an ERP system in developing countries (Babaei, Gholami and Altafi, 2015).

Communication channels in Business and Accounting

Social listening is about social space and should become the focus of finance people. Social listening is to hear what people say publicly in the entire online social space (sites like Twitter, Facebook, or LinkedIn and others). Companies should think critically what the words mean for the business. Social media can help executives to exploit opportunities to better respond to customers' needs or identify a competitive niche, to identify political moves that may indicate risks (Rao, 2015). Executives may get instant feedback from stakeholders and change accordingly their decision making process (Uyar and Boyar, 2015). An interesting issue for corporate reporters is that around 50% of professional investors in the US regularly use blogs and follow each other on Twitter and Stock Twits, and more than 60% of institutional investors say that social media will become increasingly important to them (Mahdi, Palmer, 2012). Firms should be aware that they will need to budget for increased personnel, IT support, training, and legal fees to ensure ongoing compliance with Regulation Fair Disclosure, the rule that aspires to prevent selective disclosure by public companies to market professionals and certain shareholders. Use of social media enhances transparency and accessibility and will add credits to firms' executives who will be seen as media relevant and

knowledgeable, as well as to the firms themselves in terms of reputation and market value (Alexander and Gentry, 2014). Prokofieva (2015) argues that while corporate announcements are publicly available, dissemination of corporate announcements through Twitter allows companies to attract investors' attention and further decrease information asymmetry.

Big data is associated with high volume of information processing and management systems that contribute so that information is categorized, managed and distributed (Pries and Dunnigan, 2015). Big data; volume, variety, velocity, value and veracity are the "V" notions that define big data (Erevelles, Fukawa and Swayne, 2015). Big data influences both the financial and the auditing part of accounting and accountants need to learn about the potential benefits as well as the expected challenges and obstacles from the utilization of non-traditional sources of data (Vasarhelyi, Kogan and Tuttle, 2015).

Visual management systems can serve effectively the businesses strategy development and implementation, can enable peoples' engagement and largely improve internal and external communication (Bititci, Cocca and Ates, 2015). The graphic representation of accounts, transactions and information flows with the contribution of visual analytics can offer better support of business and finance management (Singh and Best, 2016). Big Data and the related field of data analytics (DA) is affecting also the tax, advisory and audit practices of public accounting firms (Whitehouse, 2014). In relation to auditing practices more issues present challenges due to the high regulatory environment of audits. These issues are related to the exact role of DA in risk analysis, the implications of testing 100% of the population, the interpretation and the consequences of using DA, as well as the skill sets and characteristics of auditors performing DA work (Earley, 2015).

According to International Integrated Reporting Council (IIRC) definition, integrated reporting is "a concise communication about how an organization's strategy, governance, performance and prospects, in the context of its external environment, lead to the creation of value in the short, medium and long term. IR is a relatively new domain of research and many questions regarding its applicability need to be answered (Villiers, Rinaldi and Unerman, 2014).

Accounting education and employability skills

Accounting education is among the sciences that should teach the above computing tools through various teaching methods like case studies, role playing and experiential learning with the scope to prepare future accountants and possible entrepreneurs to appreciate the risks and the management of their profession. Employers, clients and public's rising expectations regarding professional accountants' contribution at work and to society generally have prompted an increased emphasis on professional (transferable) skills including communication and interpersonal skills, interdisciplinary and strong ethical orientation as well knowledge of information technologies (IFAC, 2010; Montano et al., 2010; Asonitou and Vitouladiti, 2015; Asonitou and Kottara, 2019; Asonitou and Hassall, 2019). Regarding accounting education a fairly widespread view is that technological developments represent an important area that should be covered across accounting curricula, to expose changes in the marketplace and to enhance the employability of graduates (Coyne, Coyne and Walker, 2016; Al-Htaybat, Alberti-Alhtaybat and Alhatabat, 2018). However, Kotb et al. (2019) argue that it is still a peripheral component in accounting curricula, with no clear agenda for change. Major inhibitors seem to be the professional accounting bodies through accreditation requirements along with the lack of competent/

interested staff and lack of time/ space in already overloaded syllabi. Given the limited time in the accounting curricula programmes (Asonitou, 2015b), Rebele, St. Pierre (2019) argue that it is impossible to meet all of soft skills and technology skills demands, so priorities must be set as to what can be covered and what must be left to "on the job" training.

Current trends and future outlook

The above analysis revealed an intense interest of researchers on the applications of technology that can enhance entrepreneurship, create new business areas and facilitate accountants' work. These applications include: Accounting Information Systems (AIS), International Financial Reporting Standards (IFRS), cloud computing, big data, visual performance models, social media and Integrated Reporting (IR). All these technological applications and related knowledge should be incorporated and developed together with other employability skills in the business curricula. Future outlooks include a vast area of technology issues which can further advance businesses such as robotics, artificial intelligence, Blockchain, and other fascinating tools.

5. Discussion and conclusions

Executives and accounting researchers already work towards the future innovations and applications that will further transform the businesses. They have realized that globalization and transformational innovation will be the overriding global themes for the decade ahead and they strive to develop the "business radar" in order to anticipate changes and capitalize on new opportunities. New entrepreneurs either in accountancy or in any other professional field, should be in position to acknowledge, to use, and to comprehend the enormous potential that new technologies can offer to them. These technologies can be treated either as tools to evolve new venture and increase any customer base or to be included in their product line and gain market share in a fascinating field. Prospective executives and entrepreneurs as well as future accountants should be aware of both the opportunities and the risks associated with the new digital applications and processes through attending practitioners' studies and scholars' research.

Accounting education is important to address new information and communication technologies and technological applications and to ensure that graduates and future entrepreneurs acquire work-place relevant knowledge, especially as global accreditation standards (AACSB, 2019) and global professional qualifications (IFRS), International Standards on Auditing (ISAs) and International Standard on Quality Control (ISQC) require such updates and adjustments (IFAC, 2019).

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Kształcenie w zakresie rachunkowości, technologii i przedsiębiorczości – aktualne trendy i perspektywy

Abstrakt: W artykule przedstawiono badania dotyczące problemów związanych z rachunkowością i biznesem, skupiono się przy tym na wykorzystywanych w rachunkowości technologiach, które wytyczają nowe kierunki jej rozwoju. Zaprezentowano, czy i jak edukacja w zakresie rachunkowości może wspierać rozwój umiejętności zatrudnienia u absolwentów oraz kształtowanie kompetentnych przedsiębiorców poprzez stare i nowe osiągnięcia technologiczne i aplikacje. Z przeprowadzonych badań wynika, że przyszli przedsiębiorcy prowadzący działalność gospodarczą lub księgową powinni być świadomi wielu dodatkowych elementów, takich jak czynniki ludzkie i emocje, strategia komunikacji, kwestie bezpieczeństwa, struktura biznesowa, wymagania budżetowe i inne kwestie, które mogą mieć wpływ na ich decyzje w cyfrowo przekształconym świecie. Celem artykułu jest prezentacja obecnych trendów oraz perspektyw wykorzystania cyfrowych narzędzi, procesów i aplikacji, które mogą służyć pracownikom rachunkowości i praktykom gospodarczym, umożliwiając interaktywną komunikację pomiędzy wszystkimi stronami procesu gospodarczego.

Słowa kluczowe: edukacja księgowa, technologia, kształtowanie umiejętności zawodowych, media społecznościowe, przedsiębiorczość