E-leadership ecosystem in higher education: Building and sustaining an effective educational environment

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Abstract

The article regards the concept of e-leadership and its components, connections, conditions, approaches and issues, within an ecosystem applied to the higher education environment. The information examined by this article is built on the base of the selected references, some existing recommendations and initiatives from European institutions and governments pertinent to the development of e-leadership skills and the theoretical research regarding the contextual vision of e-leadership ecosystem in education.

In order to propose an up-to-date scenery of approaches for an effective e-leadership ecosystem in higher education, the paper pays particular attention to the combination of leadership strategies, pedagogical insights and supporting and enhancing conditions for teaching and learning through technology, which can be beneficial in ensuring e-leadership success and most its effects. As highlights, an e-leadership ecosystem encloses a group of components that influence an environment. In the case of an educational e-leadership ecosystem, these components could be split up as human resources on one hand and all other resources that affect the functional and transformational changes of the entire ecosystem on the other hand.

Defining a clear understanding of educational change through the practice of e-leadership applied to educational technology, the article provides empirical results based on literature relevant case studies and research questions in case survey. The key results from the presented experiences and empirical studies ensures that e-leadership ecosystem needs new competences and innovative capacity in order to deal with technological advances that rapidly influence systemic changes of higher education.

The paper suggests that, as a component of the instructional, shared, and technology-mediated environment, today more attention requires to be focused on the development and sustain of the e-leadership ecosystem in higher education. The authors bring out the lack of research of e-leadership applied to educational technology in the Republic of Moldova and propose a paradigm, that blends conclusive, selective, strategic e-leadership principles within an ecosystem.

Keywords: *e-leadership skills, e-leaders, collaboration in an e-leadership ecosystem, e-leadership competency model.*

1. Introduction

Creating a contextual vision and some empirical methods for an effective e-leadership ecosystem in higher education were the first goal of this research. The study presents the description of developing and implementing a leading process mediated by ICT based on leadership issues, pedagogical perception and understanding for teaching, learning and managing through technology, which can be beneficial in ensuring an e-leadership ecosystem with particular attention on a higher institution framework. To attain this purpose, we managed a literature review of the selected references and analysed research questions in case survey.

Within less than a decade, digital technologies become more integrated across all sectors of our economy and society, generating specific procedures and approaches such as e-banking, e-business, e-government, e-education, e-healthcare, e-transportation, e-leadership and others. Digital systems based on specific infrastructure, applications, data, and interaction of human resources offer wide opportunities to different social sectors and imply the organization of people and means in order to solve the problems of growth and development, as well making society more inclusive.

The digitalisation of all sectors largely defines the challenges at the levels of leading, managing, content, knowledge and skills. To perform their activities and share all the resources needed, many organisations adopt the Information and Communication Technologies (ICT) opportunities. E-leadership is a key component of the leading process mediated by ICT. Like leadership, e-leadership produces changes in approaches, thinking, understandings, behaviour, and performance with individuals, groups or organizations to drive them toward reaching a particular goal.

According to the recommendations of European Commision (2015), the development of e-leadership skills have benefited from the launch of a dedicated initiative and it was declared that e-leadership skills content should be developed and built into all general management training and educational programmes. These skills empower people to lead staff by identifying and harnessing vital opportunities of an ICT environment and offering advantage and importance to their organisations. In higher education system e-leadership skills require the knowledge and competences necessary to start and guide digital innovations at every level of this system. Skills related to ICT or e-skills promote, first of all, the quality of education delivery, strengthen competitiveness and increase professionalism among principals and university staff.

One of the main problems of the e-leadership as an ICT leading process in a higher institution, in our opinion, is the complexity of integrating all components and contents in a supportive educational and managerial network, facilitating and setting up whole processes. Several factors decide the strategy, positioning and importance of this network. Positioning could focus on user-end expectations, educational model quality, and interconnected approach of the resources involved, thus developing a reliable e-leadership ecosystem. Understanding the way in which the value of an e-leadership process is recognised and got at each stage of the system is a process that is performed over time. Therefore, an ecosystem needs to be set in a realistic possibility of achieving improvement, and the exploitation of e-leadership nature should be an important part of the overall process.

2. Methodology of study

Association between e-leadership and information and communication technology applied in education is a recent concept, still ambiguous, that's why it needs to be carefully considered. The study represents a conceptual research of e-leadership ecosystem created in education fields, in which technology-mediated environments put an important accent on the ability of leaders to manage behavioural difficulty, to communicate with group members, to establish a suitable social climate, to operate e-learning practice and to be able to lead in an ICT associated environment. The focus is on the e-leadership components, connections, conditions, issues, leaders and groups' activities that occur within this ecosystem. As more examples of these systems are elaborated in educational scenery, e-leadership will become an important part of the large spectrum of managing and teaching responsibilities.

Research by Garcia (2015, p.36) indicates that „to successfully manage anything, there must be people who are willing to take on leadership roles, especially when the concept being managed is an innovation which should be spread in society". Since information technology affects leadership across the entire organization, traditional skills like motivation, communication, needs and expectations are necessary to be developed complexly, taking into account continuous shifting between team-based activities and nature. In this context, we will point that to conduct and guide an educational organization and its members, relying on the strategic insight of the management and leadership in technology-mediated environment, a leader should possess broader skills, including digital ones, correlated to the purpose, objectives, outcomes and expectation of the organization. There are significant differences in leading through ICT skills, e-collaborative and team-working practice, in our view. Searching the importance of e-leadership for the successful achievement of outcomes in technology-mediated ecosytem, a theoretical model of components' interconnection deriving from theoretical analysis and quantitative and qualitative data of the survey were discussed and drawn up. For this theoretical study the main questions addressed are:

- what are the e-leadership issues for the educational technology-mediated environments;

- how does the social process influence the e-leadership to produce a change in thinking, behavior, and performance with individuals, groups, or organizations;
- how should the e-leadership ecosystem occur at any hierarchical level in an educational organization, involving interactions over a technology-mediated environment;
- what model outputs are useful for building an e-leadership ecosystem.

3. Contemporary e-leadership aspects through of literature review

E-leardership as a holistic approach has become important for the educational process and applied digital innovation. The competencies both didactic-savvy and ICT-savvy of teachers are critical for fostering an e-leadership ecosystem through innovation and growth, as well as self-generated new climate, culture, communication and attitudes that could involve challenges to build a trustful and secure virtual team. The model of work in a cyberspace becomes in some situations more prevalent than traditional one and the pressure is on the virtual team collaboration and leadership skills. Research by Cascio and Shurycailo (2003) asserted that to be qualified as a team, members must work and interact toward common aim and must adapt to circumstances to reach the established goals and objectives. In this context, e-leadership plays a significant contribution in team performance and modelling a successful teamwork process. Virtual teams could consolidate functions and relationship across an organization, increase working opportunities of organization structures, facilitate the right skills of team members, relying mostly or totally on technology-mediated communication.

Another dimension to be considered is the leadership style. The changes of leadership are amplified by ICT-based collaboration and contribute to competitive advantage and innovation. Additionally, ICT provides many opportunities for organizations in both knowledge management and information dispersion, for this reason, each manager needs to analyze the impact of virtual team working on leadership styles and adapt accordingly (Cascio and Shurygailo, 2003). Also, Lilian (2013) stated, “even though research on traditional teams may account for some of the behaviours in virtual teams, there are several essential differences because of the strong technology-reliance in virtual teams, accentuating the need for a specific definition”. However, some researchers specified that leaders of successful virtual teams engaged in innovative problem-solving are no different from the face-to-face leaders, which spend time mentoring the team members, establishing the right norms of behaviours, fostering internal communications, and recognizing contributions of all members (Malhotra, Majchrzak, and Rosen, 2007). Even though, we determine that the leadership within a virtual team needs to realise and adjust its own leadership style by identifying associated issues and challenges to be modified in order to be more effective in the virtual environment. More, e-leadership differs from the standard approach of perceiving and describing leadership, as well as the model of leadership applied in traditional teams where managing and leadership are based on face-to-face interactions.

E-leadership is broadly discussed as a phenomenon of leadership facing new kinds of challenges in the context of technology impact. It is obvious, e-leadership is occurring as a reaction to global changes produced by information technology (IT) progress. Kahai and Avolio (2010) defined e-leadership "as a process of social influence that takes place in an organizational context where a significant amount of work, including communication, is supported by IT (…) producing a change in attitudes, emotions, thinking, behavior, or performance" (p.239). They consider e-leadership can impact and could occur in five areas: (1) fundamental human processes that include basic affective, cognitive, interpersonal, group, collective and communication psychological processes; (2) leadership core processes that covers what a leader does to exercise leadership; (3) leadership outcomes, that represents the ways in which leadership core processes are put together like team building, delegation and participatory decision making; (4) second-level leadership outcomes that covers the effects of leadership core processes on performance, satisfaction, and other variables; (5) substitutes for leadership core processes. While existent researches suggest a core basic requisite of leadership functions linked to virtual work, there is lack of evidence of how technological communication context affects leaders' behaviour and the success of virtual teams (Lilian, 2013).

Similarly, e-leadership can be established as a solution to perform virtual activities. For Pulley, Sessa, and Malloy (2002) the greatest e-leadership challenge is how to make individuals work collectively to create a culture that allows all the voices of leadership to be heard in a technological-integrated workplace. The authors stated that technology represents a complex challenge for leaders, analysing the impact of digital technology on leadership from the point of view of the following key paradoxes: (a) swift vs mindful; (b) individual vs community; (c) top-down vs grassroots; (d) details vs big picture; and (e) flexible vs steady (pp. 36-37). In this case, translating on an educational organisation, ICT could generate great organizational and leadership changes, facilitating the creation of new mechanisms for coordinating work, new collaborative models and educational practices.

The ICT alters both old leadership perceptions and the ability to communicate, motivate, and evolve within the organization. A study by Pulley and Sessa (2001) argues that e-leadership development involves skill-building at both the individual and organizational level: (1) individual development is oriented to learn perspective-taking skills, that are different from your own and no single point of view holds the only truth, networking and coalition-building, based on reciprocity, and story-telling – linking data and information together in a narrative structure; (2) organizational development is oriented to learn using dialog and co-inquiry, managing networks – not individual, and protecting voices from the fringe. E-leadership implies managing e-skilled professionals as well as other professionals. E-leader has the ability to initiate change by convincing others to collaborate and support the transformational processes driven by technology. After Hüsing et al. (2015) e-leadership skills include the competences which enable an individual to initiate and guide ICT-related innovation at all levels of enterprise, from the start-up to the largest of corporations, from private to public. "E-leadership is thus a type of leadership that is distinguished by the type of goal that needs to be accomplished

and by the resources a leader must coordinate and align. Both the goal and the resources involve using ICT. E-leaders are both business and ICT savvy" (Hüsing et al. (2015), see fig. 1). The authors explain that business savvy are the specific knowledge of the domain and industry the company operates, strategic leadership skills are a set of intrapersonal and interpersonal skills that effectively drive tactical actions, strategic thinking and decision making. As a result, e-leadership skills comprise skills from all three domains.

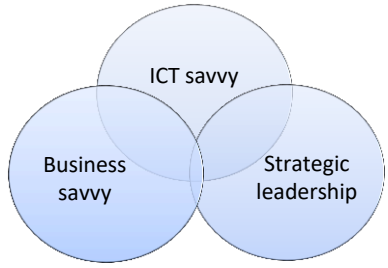

Figure 1. e-Leadership competence areas
Source: *Hüsing et al. (2015)*

In compliance with Deloitte Digital presentation (2015), there are industries that experience a deep impact from new technologies and digital savvy competitors. Digital disruption is influenced by two dimensions, as presented in the disruption map, *degree of impact* and *timing*, forming four clusters: (1) short time and big impact, (2) long time and big impact, (3) short time and small impact, and (4) long time and small impact. Those industries facing impact, either in short or long time, should consider digital transformation as their most vital upcoming challenge. The field of "Education" is placed on the map in the first cluster, for which the digital disruption points the strongest need for immediate action. In this case, educational organisation leaders must be aware of the changes digitization will bring, realize the specific impact and outline urgent steps to transform and enable changes and innovations. The critical success factors in virtual "reality" lie on a cultural shift of the organisation and its members. In some cases to define and follow the successful model of e-leadership, it is enough to have a consecrated digital leader who understands and respects traditional processes and has the power and knowledge to adapt its organisation for new digital challenges.

Aftermath, the concept of e-leadership refers to the processes that involve generic responses, behaviours, discretion and choice in what would be appropriate in particular domains via information technology, and whose interaction with team members as well as the collection and dissemination of information essential to keep up organizational work is facilitated by information technology. The central premise of the e-leadership understanding is that virtual team conditions prescribe certain necessary leadership activities for success relying on information technology when communicating with team members and when coordinating teamwork. Indeed, effective team e-leaders often possess specific leadership skills that respond to particular situations and can meet new challenges. As a result, the e-leadership

processes integrate the context necessary to the potential benefits and challenges, and extend the technology to map a collaborative process of working through relationship building.

4. Moldovan policies in front of management provisions

In the Republic of Moldova during the last five years, a range of national strategic policies was launched concerning the ICT implementation in the field of education and the management requirements to address new challenges. These documents mostly specify the national problems regarding the priorities of the growth and extension of the education system of the republic and indicate the lacks in this domain. The Education Development Strategy for 2014-2020 „Education 2020" (2014) (Strategia de dezvoltare a educaţiei pentru anii 2014-2020 „Educaţia 2020"), states clearly that "Limited application of interactive ICT methods and devices for didactic and management purposes does not afford the achievement of quality objectives" and "Communication at school management level is dominated by classical methods of gatherings information through paper-based information, and others. The use of ICT in the management of the education institutions would allow time efficiency and cost reduction. At the same time, it would allow the transparency of the educational process and organise the electronic books, the development and placement of digital contents and home works in electronic format so that they can be viewed by students and parents" (p.22). To ensure further solving and development of the stated problems, the Strategy establishes seven strategic development directions, here, it is highlighted "the efficient integration of information technologies in education". Accordingly to this direction the specific objectives were set up, namely: "Increasing the efficiency of school management through information technologies" that submits the necessity of the implementation of an Education Management Information System and the requirement of school managers' training with some specific software applications (accounting, budget planning, etc.) (p.49).

The Public Policy Proposal on Computerization of General Secondary Education Institutions (Propunerea de Politică Publică privind computerizarea instituţiilor de învăţământ secundar general) also revealed some aspects of the education policy regarding the introduction of ICTs in the student-oriented education system and training of teachers skilled to effectively apply technology in teaching and managerial processes. It was specified that introduction of information technology in the education system would require the principle of tight cooperation and coordination between stakeholders involved in this process, namely representatives of the management system, teachers, parents, children. As well the introduction of ICT in the teaching process involves the assumption of administrative responsibilities related to the teachers' training.

Another key document, The Code of Education (2014) is aimed at modernising the education system and aligning it with European standards, having the care of learning and teaching, research and development, management, internationalization, employability, student development, lifelong learning, quality assurance, accessibility,

stakeholder-academia connection, and others. The current Code of Education contains the following disposals related to the principles of management in higher education in Moldova:

- Article 7. Fundamental principles of education (with referring to management issues) – the principle of unity and completeness of the educational space; the principle of managerial and financial efficiency; the principle of decentralization and institutional autonomy; the principle of participation and responsibility of the community and other interested social actors; the principle of supporting and promoting education staff.
- Article 8. Partnership in the education system – the social dialogue and partnership of the educational institutions with the research institutions, trade unions, business environment, civil society and media, are encouraged according to the legislation in force.
- Article 18. Management of the education system – the managerial competencies in the higher education sector are established by the University Charter and the institutional regulations approved under the law. Quality management is provided by the managers of general education institutions.

Thus, legal normative framework, despite the numerous external and internal challenges, offers a bold vision of the education management that should contribute to the institutions' success. Likewise, the national policies have so far concentrated on promoting the level of basic ICT skills among the teachers and students. However, e-leadership skills are not being discussed yet, and policies focusing on modern skills required for e-leadership have not been conceived.

5. E-leadership ecosystem in higher education: changing the mind-set

We noted at the onset of the research that leading an academic organisation with the means of information technology represents a complex process of integrating all components and contents in a managerial and educational network. A number of factors influence the impact and functional aspects of the education system and follow strict expectations to improve the quality of the delivered educational model within an authentic ecosystem.

The word "ecosystem" has its roots in theoretical concepts regarding the organisation and dynamics of natural systems. An ecosystem of the education organisation could be defined as a community or structure including individuals, teams, and schemes, as well all associated common efforts, relations and values, like: open data, shared knowledge, mutual respect for shared benefits, ethics, culture and others. First of all, we put the stress on a trusted and transparent academic environment based on collaboration and cooperation arrangements. Here, we have to underlay the exerting influence of information technology on education by transforming the needs of learning and expanding the way of learning, too. The authors Hannon, Patton, and Temperley (2011) stressed the new resource of digital technologies, which have the potential to radically transform learning (…) and addresses learner ownership, because when learners feel ownership of their learning, they are able to apply their own insights about how they learn best, and become "co-producers" of learning rather than just "consumers" (p. 2).

A set of tools and activities, taken together within an ecosystem, is planned to assist leaders to experience between the necessity to keep continuous improvement of educational activities and the necessity to find new educational methods. In accordance with an e-learning ecosystem, managers and leaders need to place themselves in a different position so that rather than being primary suppliers of education, they could deliver a platform for a diversity of suppliers. Also, the ecosystem of the academic institution represents a complex and cooperative network whose efforts resulted in educational services, evolving collaborations for the benefit of students, teachers and managers. The ecosystem of an institution could be and, today is absolutely necessary to be a part of another ecosystem of stakeholders in a particular industry, in order to establish tight collaborations and generate new ideas and services from their partners. The increased connections between higher institutions and society partnerships may be merged with the contribution that technology can render in encouraging student engagement and enabling pedagogical and organizational innovation. Applying the ICT framework, it is clear that education systems have much to gain by fostering connections between formal and informal learning, between teachers and students, and between stakeholders/community and university.

The perspective of the e-leadership ecosystem in higher education as a functional structure of solving and linking the basic dimensions could be drawn upon the base of the taxonomy of leadership performance functions (Zaccaro, Rittman, and Marks, 2002, pp.5-6): (a) *information search and structuring*; (b) *information use in problem-solving*; (c) *managing personnel resources*; (d) *managing material resources*. Information search and structuring refer to the leader's systematic search, evaluation, and organization of information regarding team goals and operations. Information use in problem solving refers to the leader's application of acquired information to problem-solving in the service of team goal attainment. Managing personnel resources and managing material resources, include leadership activities involved in the actual implementation of developed plans and solutions. These activities are perhaps the most prominent responsibilities of organizational team leaders.

A research by Bolden (2007) of the development process of leadership/ management challenges in small and medium enterprises, discovered four main conditions necessary for good managerial processes: strategic concerns, human resource concerns, leadership concerns, and external issues concerns. It could be analysed as a classical approach and transposed on e-leadership processes as well. In such a case, the strategic change in an ICT based environment is the positive concerns dependent on accepting change. The resource concerns include preoccupation for professional, digital-skilled and motivated employees. The leadership concerns revolve around the leaders and their focus on strategic outcomes from the technology perspective. And, the external concerns regard on interaction with various stakeholders and society via technologies.

The way that digital technology is harnessed within an education institution influences digital competences of e-leaders. The leaders should realise everything that is needed for digital transformation and innovation. A leader is aware of its

organisation and has the influence to bring the changes, provide a digital vision, guide and involve the team actively in the transformation process. In line with Deloitte Digital presentation (2015), the key success factors for digital leaders are: (1) executive and supervisory board visibility that have the power and standing to drive change top down; (2) focus on digital as core of the role that perform the transformation within a time of 2-5 years; (3) profit and loss control that connect digital transformation with tangible goals (p.10). Thus, e-leaders face varied challenges, but being adaptive and effective they might be able to transform these challenges into opportunities. Given the challenges associated with leading an education institution that support teaching and learning with information and communications technologies, we could distinguish some specific factors regarding e-leadership success:

- developing critical competencies needed to lead virtual teams – practice and skills of working in virtual teams;
- understanding and developing approaches of linking and organising pedagogy and technology – how students learn and how ICT can be embedded in teaching and learning;
- developing collaborative norms and knowledge sharing – concerning the relationships of members as well as links between pedagogy and technology.

Garcia (2015) clarified attributes concerning the relationships between pedagogy and technology, and what leaders are capable of (p.35):

- credibility and authority among their peers;
- a future perspective;
- a global perspective;
- a student-centred view of what makes for good learning and good classroom practices;
- a good understanding of the likely impacts across the school of the ICT decisions they make;
- incorporating ICT into their own work;
- being personally productive with technology;
- using ICT to solve problems;
- engaging with others outside of teaching;
- having a broad understanding of people's lives outside school;
- accepting that they don't know everything but are willing to have a go anyway;
- • enjoying a challenge.

For the reason that technology creates more tools for collaboration and connectivity, and the processes of e-leadership already happen in higher education in one way or another, constraint remains to find more effective approaches to face alteration and increasing complexity that distinguishes the activities of higher education e-leadership and management. A study by Davis and Jones (2014) foregrounded the importance of three key lenses through which higher education leadership can be observed: *context*, *relationships* and *activity* (see fig. 2). The context is a central factor in which it is placed leading leadership skills, considering

to explore the changing context of the work of leadership in higher education management. The importance of relationships and making use of university professional staff, are important leadership skills to be developed. A significant core point for the work of leadership is how to recognise, establish and plan a complex of leadership actions in changing contexts. The authors also stressed that "challenge for higher education, in developing new approaches to leadership are more shared, distributed and relational and this requires a change in mindset even greater than that required when moving from the 'industrial era', with its emphasis on machines with individual managers controlling employees, or even from the 'information age', with its emphasis on networks and leaders controlling information flows" (Davis and Jones, 2014, p.9).

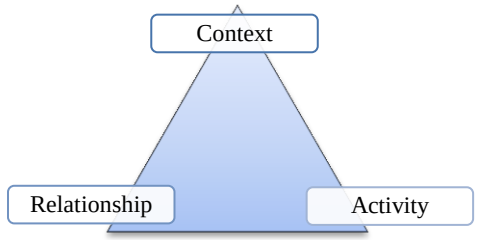

Figure 2. Framing the work of leadership in higher education
Source: Davis and Jones (2014)

Finally, in analysing leadership change through technology, with particular attention to learning technologies in higher education, institutions must realise the key elements of change are *strong leadership* and *critical self-reflection* that should begin with experiences of teaching, learning, management handled within an efficient ecosystem, expressed as a collection of tools, activities, values, relations, conditions, culture. These challenges are fundamental in order that the logic transition from the old paradigm to advanced one, on both a personal and community level, represents the systemic perspective of the style of leadership leading to collective transformation. To solve these issues, managers of higher education institutions can take an ecosystem perspective in order to reveal the possibilities that technology offers for teaching models.

6. Establishing an e-leadership ecosystem paradigm

Conditions for a successful ecosystem of leading within an educational institution should be organized and adapted adequately to the opportunities for change. In the world of digital technology ecosystems naturally arise. The essential element of an ecosystem is a platform that allows to build relationships within a community. Since educational technology has complexly expanded in the last years, the services and structures of higher education such as management, quality assurance, educational leadership, human resources, information system management, public relations and many others need specific adaptation to operate properly in favour of learning and teaching technologies. In this case an entrepreneurial networking approach to knowledge generation and transfer is the main background condition for success.

The e-leadership framework for higher education was analysed by Jameson (2013), that grouped the key successful school organisational leadership categories and terms such as: purposes, people, structures and social systems, sense-making in complex adaptive systems, virtual team leadership, collegiality, trust, academic freedom, diversity and equal opportunities, gender issues, finance, speed of response, change management, research and enterprise management, presence, emotional intelligence, empowering others, innovation, risk-taking, distributed leadership, quality management, monitoring, human resources, and training. To achieve the objective of implementing high quality e-leadership in schools, the researchers Chua and Chua (2017, p.113) drawn attention on effective strategies and practices that include e-competence training, effective curricula, enhancing lifelong learning, building long-term relationships among users, developing positive mindsets, developing a compelling mission and vision for networking. Furthermore, school leaders need to adopt appropriate e-teaching and learning models to increase effectiveness, encourage an effective way of using ICT and act as role models for e-teaching and learning and for active participation. They also stressed that "to improve the quality of e-leadership practices, schools must take action to embrace and reward self-e-learning initiatives, stimulate e-cooperation between staff and clients (education department, parents and students), create a better e-teaching and learning environment for a better workplace, create pathways for networking among users, make networking an incentive and a basic for the performance rating of staff and create a conducive infra-structure for e-teaching and learning".

Derived from the above analysis and concepts, a model of e-leadership ecosystem should describe how to collect relevance from technology built on the heuristic meaning that connects technical potential with the realization of educational targets to perform value creation. A practical approach to build a digital ecosystem shown by Deloitte Digital communication (2017) proposed 3 stages, namely: map the ecosystem, design the model, drive the change. According to Paulus-Rohmer, Schattona, and Bauernhansl (2016), we need to start digitization by settling approaches for the relationship between ecosystem, strategy and business model of the different sectors of organization (see fig. 3).

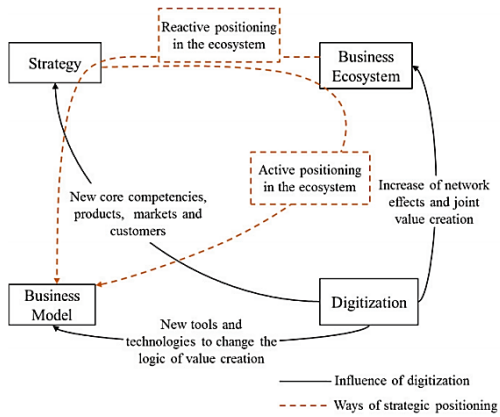

Figure 3. Interaction between ecosystem, strategy and business model influenced by digitization
Source: Paulus-Rohmer, Schattona, and Bauernhansl (2016)

This paper investigated the e-leadership aspects and factors related to the correlation between styles and ICT of leadership in educational institutions. Data has been collected from a single group of participants who attended the course of leadership and instruction at the department of continuos education of the university. The survey included 20 questions that contained items concerning e-leadership roles and issues of using the -learning platform and ICTs in schools, functions and requirements of the digital skills, knowledge and attitudes of management procceses.

This qualitative study helps us to ensure a greater level of understanding the leading process mediated by ICT based on leadership issues and pedagogical perception of this process and to enhance the reliability of the research. Based on our research findings, we developed a model of e-leadership ecosystem taking into account the impact of digital trends. Figure 4 illustrates a visual graphic for strategic positioning of the digitalisation processes within an ecosystem. In our opinion, the fore factors that influence the importance of successful digital implementation and alteration of a higher education institution focused on specific strategical directions should be revolved around the *action*, *content*, *collaboration* and *resources* of an academic organisation. To obtain a competitive position, to establish and extend an educational and managerial network of academic staff, students and social and other partners, is necessary to actively adapt the university's vision and strategy to reach the targets in the ecosystem.

The four central dimensions of ecosystem – action, content, collaboration and resources should consider the strategic initiative regarding the educational outcomes, value creation, social aspects and future position of a university. The perspective of leading digital transformation gives technology and pedagogy insights of a meaningful purpose oriented to specific touch-points and processes. The *action* dimension provides educational organizations to operate at the levels of change management and strategic leadership, internal resources and asset management, digitalisation and operating model, data driven and governance, users' satisfaction and education outcomes. The *content* are driving quality, digital e-skill development, access to learning content, continuos pedagogy improvement, right value and ethics, interpersonal intelligence, staff managing vision, e-norms, e-communication, e-culture and others. The *resources'* dimension focuses on the realization of the strategic functions related to new digital literacy and context, learning resources, Management Information System, software engineering, digital innovative solutions and technology integration. To improve working and surviving organizational life of the academic organization it is required to redesign the *collaboration* and cooperative aspects. Our study and analysis reveal the necessity of putting a big stress on collaborative and transparent managerial interaction, cross-department collaboration, users' collaboration, national and international research collaboration, university, community and stakeholders' collaboration and many other types of academic interconnections.

This e-leadership paradigm requires the leader to achieve these objectives via a computer-based approach with team members that could be distributed over space and time and delivers new interpretations, as well as a number of new challenges and strategies.

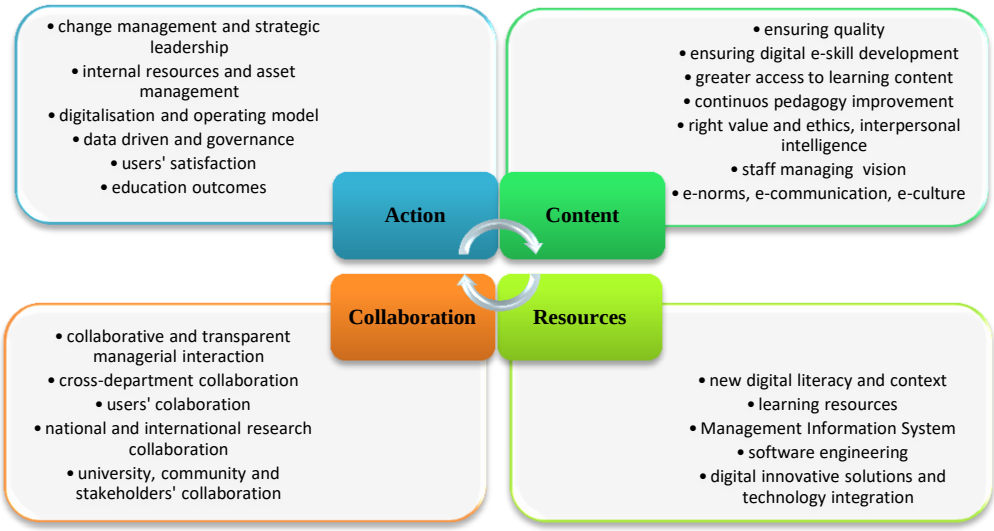

Figure 4. A model for supporting a sustainable e-leadership ecosystem

7. Conclusion

The rise of information and communication technology and the organizational and leadership paradigm alteration to virtual working insights represent a considerable challenge for leadership in higher education as illustrated in this study. The challenge for management in higher education is about to refresh the necessary skill-set and mind-set to move from traditional models of leadership towards more flexible models of e-leadership. Literature review revealed that educational e-leadership in higher education requests supplementary skills, understandings and innovative capacities to properly treat information at the different levels of an organisation. At the same time, ICTs have produced new leadership changes and are able to resolve some organizational and work-related problems of leadership in the context of clear settled e-leadership ecosystems. The effective e-leadership can face the challenges and transform them into opportunities by adopting additional skills and adapting their actions to the original virtual framework. The new attribute of leadership successful demands growth of interpersonal and intercultural skills involving both academic and managerial staff and students. One of the main challenges is to apply critical analysis, quality management standards and strong selective principles in discerning the most adequate institutional innovations, to adjust to the new trends and innovations and avoid possible risks. At the end, we can remark that an e-leadership ecosystem can be planned as a complex process mediated by information technology to produce a change in action, content, connections, and resources within educational organizations. The theoretical contribution of this article is to enlarge understanding of e-leadership and its environment, components and actions. The paper is not giving empirical findings from a larger research into e-leadership in higher education.

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