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Give MOOCs some credit: a system-divergent innovation accrediting an AI mass-market MOOC at a Swedish university

Hugo-Henrik Hachem[a], Mattias Wiggberg[b], Tanya Osborne[c], Jan Gulliksen[d] and Fredrik Heintz[a]

[a]Department of Computer and Information Science, Division of Artificial Intelligence and Integrated Computer Systems, Reasoning and Learning Lab, Linköping University, Linköping, Sweden; [b]Department of Industrial Economics and Management, School of Industrial Engineering and Management, KTH Royal Institute of Technology, Stockholm, Sweden; [c]Science, Technology and Society, Department of Technology, Management, and Economics, Chalmers University of Technology, Göteborg, Sweden; [d]Department of Media Technology and Interaction Design, School of Electrical Engineering and Computer Science, KTH Royal Institute of Technology, Stockholm, Sweden

ABSTRACT

Lifelong learning in higher education (HE), epitomised by Massive Open Online Courses (MOOCs), is valuable for re-skilling and upskilling Sweden's industry workforce in (advanced) digital competencies to remain globally innovative and competitive. Meanwhile, Sweden's non-regulatory approach towards MOOC deployment in HE meant that their accreditation by universities faces strenuous systemic challenges. However, since 2019, one university began accrediting an AI mass-market MOOC following a nationally unique system-divergent innovation, which this case study unpacks by responding to three research questions. First, what were the underlying processes of this system-divergent innovation, and how and why did it occur? Second, what were its key success factors? Furthermore, how sustainable is it? This reflexive case study draws on eight semi-structured interviews with university staff and faculty, which were deductively analysed based on topical literature and concepts from system-divergent innovation and structuration theory. Generated themes were called *challenges-as-opportunities* and spanned bureaucracy, finances, technological infrastructures, deroutinisation, internal conflicts and external pressure. These themes and their discussion inform policy on three tiers: governmental, sectoral, and institutional. This original work highlights that mmMOOCs' accreditation by universities can play a significant role in bridging lifelong learning and HE in Sweden, and calls for digital maturity and national contagion.

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1. Introduction

Sweden, the 'country of engineers' (Regeringskansliet, 2023), has set a digitalisation strategy in motion, aiming to modernise its higher education (HE) sector and address labour and skill shortages in the green and ICT industry workforce through distance lifelong learning opportunities (see Regeringskansliet, 2017; SOU, 2016). MOOCs, massive open online courses, present significant potential in that direction. From an initial hype to a 'phase of normalisation' (Tømte et al., 2020, 236), MOOCs have been popularised in HE institutions (HEIs) worldwide and in Sweden, too. MOOCs, in principle, make education and learning available to anyone, anywhere, at any time. They follow various models and instructional approaches: Expert (xMOOCs) or connectivist (cMOOCs), as well as those that blur the boundaries between them (Michael Spector, 2017), not to mention a difference in scale. Some are global or mass-market, hereafter referred to as mmMOOCs, while others address a local audience, denoted as LOOCs (Tømte et al., 2020).

CONTACT Hugo-Henrik Hachem Hugo-henrik.hachem@liu.se Department of Computer and Information Science, Division of Artificial Intelligence and Integrated Computer Systems, Reasoning and Learning Lab, Linköping University, Sweden

Regardless of nature and scale, MOOCs serve formal, non-formal, and informal learning; their completion is conventionally rewarded with a certificate or badge, but seldom, if ever in Sweden, with HE credits. This is because MOOCs' integration into existing administrative and bureaucratic processes in Swedish HEIs presents myriad challenges (Dalipi et al., 2018). These challenges form an underexplored research area, but they also reveal examination-worthy insights into the readiness of the Swedish HE system to gestate and deliver urgent, at-scale, future-oriented, flexible and innovative lifelong learning-based solutions (Bjursell, 2022; Ljungqvist & Sonesson, 2022; Santandreu Calonge et al., 2019; UNESCO, 2023).

1.1. Problem statement and research questions

If minor commonalities in MOOC systematisation and accreditation by HEIs are expected, these processes are essentially complex and not uniform. Not so across geographical regions when comparing (1) the Anglo-Saxon MOOC hype to the more toned-down adoption in Scandinavia (Tømte et al., 2020), (2) national systems, e.g. Sweden, Norway and Denmark (Dalipi et al., 2018), and (3) implementations within Swedish HE, for example, when zooming in on the experiences of Chalmers University of Technology and the Royal Institute of Technology (KTH) with MOOCs (Barman et al., 2019). This is no surprise since transnational, national, institutional and individual factors hinder any attempt at imitation in innovation (Haase & Buus, 2020; Schneckenberg, 2009).

Literature shows no Scandinavian model can account for MOOC systematisations in HE (Tømte et al., 2020), and that it is impossible to talk about a Swedish model outside its unavoidability but lack (Barman et al., 2019; UKÄ, 2016, 2017a). Meanwhile, Sweden chose not to systematise MOOC-related activities on a national level, but this has not prevented the expansion of distance HE to include MOOCs (Barman et al. 2019; Dalipi et al., 2018; Tømte et al., 2020). This approach to MOOCs has encouraged what Tømte and colleagues describe as a global disruption path 'connected to international providers and offered in English, thus reaching a global audience' (241). Between 2014 and 2019, sixty unique MOOCs, mainly in the fields of engineering, medicine, and natural sciences, were offered at Karolinska Institutet, KTH, Chalmers, Uppsala University, Mid Sweden University, Karlstad University, and Halmstad University. Other younger universities have either deployed or had plans to run MOOCs (Barman et al., 2019; Dalipi et al., 2018; UKÄ, 2017b). Despite that, this non-regulated approach to MOOCs led to significant diversity in MOOC-related activities (Tømte et al., 2020), which remain hindered by deep-rooted systematic challenges impacting institutions and agents (teachers and staff) alike and possibly preventing a more effective digitalisation of Swedish HE (Norberg et al., 2015; Schneckenberg, 2009), itself premised on some initial level of digital maturity (see Fernández et al., 2023).

While the Swedish Higher Education Ordinance (1993:100, chapter 11) allows public funding to create and offer (mm)MOOCs and Local Open Online Courses (LOOCs), their open nature is restricted by Swedish HEIs' admission procedures. These procedures create ample space for translucency and 'grey areas' around issuing 'certificates or the validation process for recognising individual students' MOOC certificates as part of their HE studies' (Barman et al., 2019, 127). MOOC students are usually not formally registered at a University, impacting both universities' business models understood in a broad sense (Ossiannilsson et al., 2016), and students' livelihoods. Until recently, MOOCs at HEIs in Sweden could not be truly open when obeying 'routines related to formal education, such as admission, assessment, and accreditation procedures' (Tømte et al., 2017, 221). As a consequence, no mmMOOC in Sweden has yet targeted a 'broad group of international students and which provide formal recognition through course credits' (Dalipi et al., 2018, 199). To summarise, the ties between MOOCs and Swedish HE administrative and bureaucratic procedures remain weak (Dalipi et al., 2018), but that would soon no longer be the case.

In 2019, one Swedish HEI introduced and accredited a mmMOOC on artificial intelligence (AI), transforming it into an undergraduate-level single-subject (*fristående*) and credit-yielding course. The ensuing process to develop a systematic way to accredit a mmMOOC is a system-divergent innovation (Berg & Östergren, 1979) with potential national, even regional, contagion (Olsson, 2017). Given (1) the paucity of works investigating MOOC-related innovation in Swedish HEIs from an organisational perspective (Tømte et al., 2020), (2) the systemic, structural and functional peculiarities of Swedish HEIs

(Schneckenberg, 2009), (3) the potential for agents to be creative in designing educational solutions despite structural limitations (Wiggberg et al., 2022), and (4) the opportunity to further anticipate and clarify the relationship between MOOCs and the institutions racing to develop or deploy them (Barman et al., 2019; Hollands & Tirthali, 2014), this study affords a unique and fresh angle.

In this paper, we answer three research questions we believe contribute to the theory on and practice of system-divergent innovations in Swedish HE and that also carry implications for HE policy, thereby filling a gap in the literature that would otherwise inform 'us about the context of MOOCs' emergence in Sweden (Tømte et al., 2020, 237). First, what were the underlying processes of this system-divergent innovation, how did it occur, and why? Second, what were its key success factors? Furthermore, how sustainable is it? In-depth interviews with eight university faculty and staff heavily involved in this MOOC-based innovation were deductively and reflexively analysed using concepts from system-divergent innovation in Swedish HE (Berg & Östergren, 1979) and structuration theory (Giddens, 1984; Gynnild, 2002). Our findings describe *challenges-as-opportunities* and are subsequently packaged into governmental, sectoral, and institutional-level policy implications. This study offers the first documented case of the organisational and innovation processes involved in accrediting an mmMOOC within Swedish HE.

2. Opportunities *and* challenges of MOOC-based innovation in HE

Digital innovations in HE, including MOOC-based innovations, are understood as part of the digital maturity of institutions, defined as the capacity to remain innovative and competitive with technology. Digital maturity is a learned process rather than instinctive and entails that institutional agents have the skills and the tools to find digital solutions quickly and act upon the institutional 'business' needs (Fernández et al., 2023). Even if MOOC-based innovations are indeed a business need, they face challenges, reveal opportunities, expose enablers and hindrances (Ali, 2024), and help probe an institution's level of digital maturity. This section summarises the opportunities and challenges from the perspectives of institutions and agents in international and Swedish literature.

2.1. Opportunities

The literature on MOOC-based innovations in HE centres on the benefits for teachers and institutions. For teachers, these are evident: MOOCs help them reach a wider audience, become more active in the public domain, remain up-to-date in their discipline, reflect higher academic competence levels, and strengthen their position at respective institutions as part of a small and exclusive community of MOOC teachers (Olsson, 2017, 2020). MOOCs free up more time for teachers to lead interactive problem-solving sessions with their students (Dalipi et al., 2018; León-Urritia et al., 2018). Teachers who use MOOCs often have a positive attitude towards institutional engagement in innovation and have significant experience in digital education (León-Urritia et al., 2018).

Benefits to institutions are also noted. HEIs deploy MOOCs for publicity and to enhance their competitiveness nationally and globally, to elevate their standards in research and education, and to recruit needed talents (Hollands & Tirthali, 2014; Olsson, 2017; Tømte et al., 2017). MOOCs eliminate distance boundaries and attract non-traditional student groups, including those with a disability, distance-bound, or employed (Dalipi et al., 2018; Tømte et al., 2017). HEIs also benefit from increasing revenues (Hollands & Tirthali, 2014) via, for example, brand MOOCs, which 'promote awareness of and could increase applications to a postgraduate program in which an institution has research excellence' (Burd et al., 2015, 47; Hachem & Heintz, 2024). HEIs assume that MOOCs can counter lagging productivity, reduce soaring costs of education (Tømte et al., 2017) and help HEIs enhance their reputation based on the exclusivity of their campus-based LOOCs (Burd et al., 2015). Finally, MOOCs enable cooperation between HEIs and private-sector enterprises (Tømte et al., 2017); the mmMOOC in this case study exemplifies such cooperation.

The success of MOOC-based innovations depends on several optimal conditions, also known as enablers (Ali, 2024). Studies have shown that a certain level of ownership of MOOC-related innovations by teachers is crucial (Naylor & Nyanjom, 2021). The more enthusiastic they are to keep up with the changing teaching requirements in HE, the more likely they will want to experiment with future-oriented changes (Olsson, 2017). As such, agents with experience in innovation are more likely to propose or be receptive to change (Hietanen & Svedholm-Häkkinen, 2023; Smith, 2012). Practitioners with different innovation roles, including owners, teachers, learners, designers, negotiators and developers (Olsson, 2017), should show interest and belief in MOOCs (Smith, 2012). Additionally, the uptake of innovations by practitioners within a specific discipline increases the likelihood of success compared to innovations implemented centrally across a whole HEI, noting that collaborations between disciplines and central departments play a significant role in that success (Smith, 2012). One of the most noteworthy institutional enablers is the availability of resources and the know-how to mobilise them. These include strategic external funding to design and produce MOOCs (Olsson, 2017), technological tools, centralised infrastructure, human resources and appropriate skills and competence development; in short, digital maturity (Anthony et al., 2022; Fernández et al. 2023; Hietanen & Svedholm-Häkkinen, 2023; León-Urritia et al. 2018; Smith, 2012). Finally, innovations' chances of success increase, for one, in the presence of supportive nets and positive peer pressure and, second, if the innovation is relevant to its context or discipline: 'Innovations that sit well within a specific context spread better' (Ali, 2024; León-Urritia et al., 2018; Smith, 2012, 176).

2.2. Challenges

HEIs face a double bind when innovating with MOOCs. They disrupt the very systems that should supposedly embrace them (Hollands & Tirthali, 2014; Thomas & Nedeva, 2018) and pre-require digital maturity (Fernàdez et al., 2023). MOOCs cause teachers to reconsider their professional identity: reevaluating what a proper teacher is and how they measure up to that definition. Teachers who identify as classroom performers find it challenging to commit to digital or online teaching (Ali, 2024; Olsson, 2017). They may experience distance education as stressful as they did during the COVID-19 pandemic phase of forced online teaching. Many lack knowledge about new learning technologies and how to produce MOOCs (Dalipi et al., 2018), and the quality of learning and teaching is often at stake (Hietanen & Svedholm-Häkkinen, 2023; Hachem & Heintz, 2024).

Teachers are also concerned about sustaining high-quality interaction with learners (Billington & Fronmueller, 2013; León-Urritia et al., 2018) and skipping nuances in MOOCs they would have otherwise emphasised if developing them in their native language. Teachers are hesitant about disregarding national cultural connotations to cater to an international audience (Olsson, 2017) and simultaneously have less control over knowing their target audience (León-Urritia et al. 2018) and over their published material; they are unnerved about copyright and intellectual property. In Sweden, their Union could not relieve their worries about copyright: it 'was a bit doubtful and didn't really want to have anything to do with that issue' (Olsson, 2017, 293). Time and timeliness are also challenging (León-Urritia et al. 2018): it takes plenty of time to change practices in HE (Smith, 2012), having 'timely "at the elbow" specialist technical support' is crucial (Naylor & Nyanjom, 2021, 1247), and time and space are needed to experiment with innovations (Smith, 2012).

With MOOCs, Billington and Fronmueller (2013) name a few common institutional challenges: grading, cheating, credit-giving, prerequisites, and admission. Universities hesitate to accredit MOOCs because of a lack of clarity on the equivalence of MOOCs in credit hours (Billington & Fronmueller, 2013). In Sweden, scarce funding schemes for initiating and sustaining MOOCs are only one facet of the problem (Dalipi et al., 2018). Nevertheless, when funding is secured, there is a 'lack of procedures and processes that would enable a student that has finished a course in MOOC platform to include that in their regular curricula' (Dalipi et al., 2018, p. 196). Until recently, MOOC-based courses have not been considered regular HE in Sweden, and MOOC students have not gone through the regular admission process. *De jure*, they do not qualify as university students, but if they were, MOOCs would not count toward their degrees (Dalipi et al., 2018).

If MOOCs are not accredited, then universities are not compensated for offering them. Considering the dropout rate of MOOCs (Hachem & Heintz, 2024), the problem becomes worse after an adjustment in the state compensation model, favouring course completions over registrations (Norberg et al., 2015). Olsson (2020) also describes a management lag in understanding the potential of digitalisation in HE, translating into a less-than-optimal digital maturity (Fernández et al. 2023) since senior management's engagement level effects the initiation, spread, and support of digital innovations (Smith, 2012).

Although international and Swedish literature clearly accounts for opportunities—benefits and enablers—and challenges accompanying MOOC deployment in HEIs, it leaves room for examining structural challenges and agency-related opportunities not as two separate and opposing phenomena (Giddens, 1984) but rather as one with dialectic manifestations. Such a task demands pertinent analytical frameworks capable of capturing the interplay between agency and structures, which we flesh out in the following section.

3. Analytical concepts: structuration and innovation

This paper cross-fertilises elements of structuration theory (Giddens, 1984) with system-divergent innovation in Swedish HE (Berg & Östergren, 1979) to (1) cater to the Swedish context and (2) to transcend, via a reflexive anchoring, the overly mechanistic depictions of innovation processes afforded by, for example, the popularised Rogers' innovation diffusion theory (Ali, 2024; Berg & Östergren, 1979; Gynnild, 2002; Haase & Buus, 2020; Smith, 2012). Innovation and (re)production of systems constitute a complex political process fueled by interactions between agents, subsystems and systems. HE is an example of one such system, and at HEIs, 'we are faced with *organizations consisting of people* and with *people in an organisational context*' (Christensen et al., 2020, 2, italics in original text). An HE system groups agents for specific purposes and is made up of HEIs, providing tertiary-level education as organisational subsystems. HE system protects itself and its agents, and resists change that may impact its 'membership, ideology, technology, organisational structure and relations to the environment' (Berg & Östergren, 1979, 264). Within this (sub)system, agents maintain routine operations, i.e. knowledgeability, and clearly understand who they are and how they fit in to sustain the system, i.e. ontological security (Giddens, 1984).

System-divergent innovations are negotiated rather than forced. They result from disturbances and, if successful, bear subsequent changes over three phases: *unfreezing, moving* and *refreezing*. The first phase is preceded by a crack or conflicts within the system, rendering the socio-political context visible. This conflict allows 'impulses from the outside to flow into the cracks and to break the system by creating a potential for moving or implementation' in the second phase (Berg & Östergren, 1979, 365). The third phase follows when a new system reality becomes business as usual. Innovation embeds complex processes with *system-specific internal and external relations* (Berg & Östergren, 1979). The level of *conflict, visibility* and *personnel changes* define internal relations. *Conflicts* emerge from perceptions of threats within (sub)systems and are affected by the intensity of the innovation driving force. Should intensity be high, so will the level of conflict; it is lower if fewer restraints are exercised. The visibility of an innovation rises when there is more resistance, while mild visibility is optimal to rally support. *Personnel changes* also influence the introduction of innovations and their sustainability. Besides internal factors, *external relations* and environmental changes are also consequential.

Systems and agents move to self-realise. Berg and Östergren (1979) list *gain/loss, ownership, leadership*, and *power* as four factors framing the political process of innovation. First, *gain/loss* entails the competing needs and interests of subsystems and agents. Their sense of competence, security and role stability within the (sub)system influence the intensity of goal-oriented actions enacted considering ideological needs, gains or losses. Agents may wish to protect the (sub)system's ideology and mission but are simultaneously driven by the need to create something that satisfies them. The second factor is *ownership,* which can be direct or indirect. Direct ownership is when agents introduce the innovation and see it through, also called innovation leaders. Indirect ownership belongs, among others, to more senior and formal institutional leaders who exhibit favourable attitudes towards the innovation in question. The third concept is *leadership,* divided into three types: formal (management level), innovation (agent leading the innovation), and secondary leaders (agents helping move the innovation). The last factor is *power* in the form of power-mobilising resources, facilitating or inhibiting innovation by causing 'other components of the system to increase or reduce the force they exercise, or even persuade them to change sides in the field' (266). Obeying the *dialectic of control,* power can be mobilised to overcome challenges of constraining but simultaneously enabling features (challenges-as-opportunities) since reflexive action having a dualistic nature within HE systems (re)produces structure but is at once bound by it (Giddens, 1984). This analytical framework is further armed with a reflexive methodological design, elaborated next.

4. Methods and methodology

This work describes and analyses the systematisation processes of a mmMOOC covering the basics of AI at a Swedish University (SU) and its accreditation as a single-subject credit-yielding (2 ECTS) course. The mmMOOC was first launched in Finland in 2018 and is managed jointly by a Finnish University (FU) and a Finnish digital consultancy company (CC). The mmMOOC is available in 25 languages (including Swedish) and can be completed in around 45 hours. It attracted over 1 million users from 170 countries, with a current global completion figure of 12.4% (Heintz & Roos, 2021; Hachem & Heintz, 2024). Until March 2024, 17,927 students were admitted to the course at the SU, and 8,207 have received HE credits for it (see Figure 1). Student self-study on the mmMOOC platform, enrolment, and accreditation of the course at the technical faculty of the SU are illustrated in Figure 2.

This paper consists of a reflexive and retrospective case study (Baskarada, 2014; Gynnild, 2002; Harland, 2014; Priya, 2021), which, according to Creswell (2014), enables researchers to explore in depth a 'program, event, activity, process, or one or more individuals' (241). This design facilitates effective unpacking of the system-divergent innovation, revealing opportunities and challenges for agents in/and HEIs. It also affords a deeper rather than broader understanding of said processes in Swedish HEIs (see Barman et al., 2019; Dalipi et al., 2018), conserves resources (Priya, 2021), and avoids interfering with the innovation processes. This design does not warrant mechanistic replicability but forges educability (Harland, 2014) over a hitherto unique event in Sweden (Barman et al., 2019; Dalipi et al., 2018), eventually signalling the need for policy reforms and promoting informed contagion.

4.1. Data and ethical considerations

A case study design can build on various data types; in this case, we used in-depth semi-structured interviews (Priya, 2021), responding directly to the aims and research questions of this study. 'Armed with sociological imagination' (97), our case study leverages literature and social theory as analytical lenses (Gynnild, 2002), providing power and flexibility in studying this system-divergent innovation. The accreditation of the mmMOOC into a single-subject university course represents our unit of analysis N = 1. Our data collection followed the snowball approach, starting with the innovation leader and reaching seven other agents with various roles designated as formal, innovation, and secondary leaders (see Table 1; Berg & Östergren, 1979). The number of interviews was limited to agents who contributed on the ground to move this innovation based on their involvement in the unfreezing until the refreezing phases. Therefore, it is safe to assume all those who drove the innovation were interviewed. The trustworthiness of this study is elaborated via credibility and dependability. The fact that interviewees share

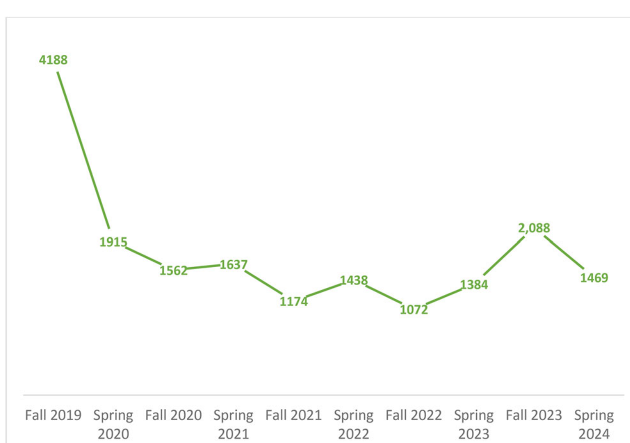

Figure 1. Number of admitted students (y-axis) per semester (x-axis) (data until March 2024).Heintz & Roos, 2021

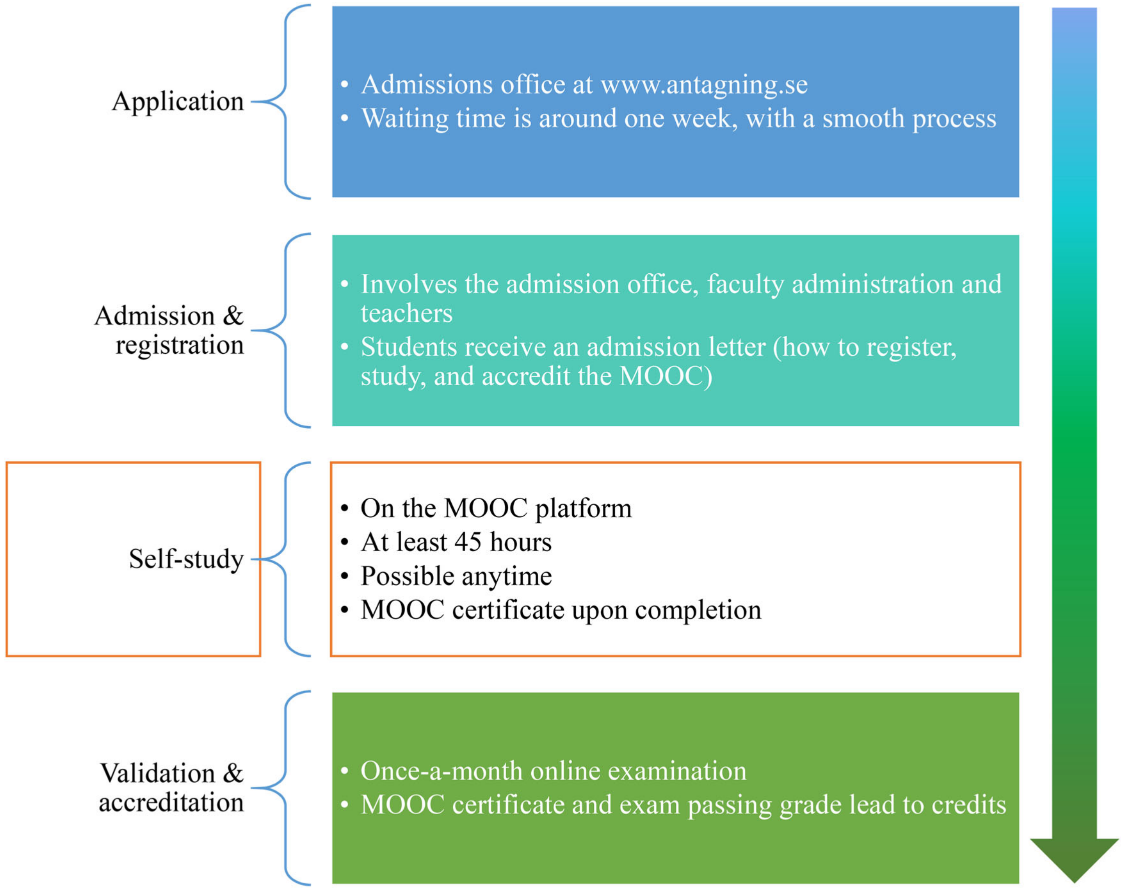

Figure 2. A summary of the mmMOOC enrolment processes from application to accreditation.

Table 1. Participants' acronyms, sub-systems and innovation leadership roles.

Acronym	Role within the system	Role within the innovation
CE1	Course examiner	Innovation leader
CE2	Course examiner	Secondary leader
FM	Faculty management	Formal leader
FA1	Faculty administrator	Secondary leader
FA2	Faculty administrator	Secondary leader
TA1	Teaching assistant	Secondary leader
TA2	Teaching assistant	Secondary leader
AO	Admission officer	Secondary leader

accounts on the innovation events from different angles strengthens this paper's credibility and helps us provide a thick description of these events, as shown in the results section. Credibility is also ensured by allowing participants to read this manuscript and demand changes in the results section, allowing further participant reflexivity and agency over how their narratives are depicted (Stahl & King, 2020). Trustworthiness, particularly dependability, was safeguarded by the involvement of several authors who are experts on lifelong learning and Swedish higher education (Stahl & King, 2020).

Interviews took place face-to-face or online, were conducted in English, and focused on the role of the interviewee in driving this innovation. Recorded interviews took roughly an hour and were transcribed via Microsoft Word's transcription tool. Transcripts were cleaned subsequently and prepared for analysis in NVivo. Prior to data collection, participants, henceforth referred to with a code for anonymity, signed a consent form that introduced the study and informed them of their right to withdraw their accounts freely at any point before publication. Most participants emphasised to the interviewer the importance of being mindful about how their accounts were reported to maintain collegial relationships with one another.

4.2. Deductive reflexive thematic analysis

To analyse our data, we opted for a reflexive deductive thematic analysis (RTA), which aligns with an interpretive epistemology of knowledge production (Braun & Clarke, 2019, 2021a). RTA differs from positivistic qualitative content analysis (Braun & Clarke, 2021b); it is instead about meaning and meaning-making, which are context-based, positioned, and situated (Braun & Clarke, 2019). Its logic does not favour replicability; rather, it enriches the educability of the analytical field. RTA is a complex analytical tool and cannot be conducted in a theoretical vacuum, especially deductively. Instead, it is theoretically flexible and allows using one or more theories suited for critical orientations in qualitative research (Braun & Clarke, 2021b), an advantage we leveraged by cross-fertilising concepts from system-divergent innovation with structuration theory (Berg & Östergren, 1979; Giddens, 1984). RTA does not stop at descriptive or summative functions. It distinguishes codes from themes in knowledge production by conceiving of codes as 'entities that capture (at least) one observation, display (usually just) one fact' and of themes as 'multi-faceted crystals – they capture multiple observations or facets' (13) – another advantage in the case where generated themes are spatiotemporally interconnected rather than independent.

A set of six analytical steps contributes to an effective application of RTA. Byrne (2022) provides a working example. The six steps include familiarising oneself with data, generating initial codes, generating themes, reviewing potential themes, defining and naming themes, and reporting findings. Step one began with data cleaning and rereading the transcripts. A third reading is where the coding started. The data was coded into sub-themes and merged later into umbrella themes (multi-faceted crystals). The codification and thematisation were first inspired by previous literature on challenges and opportunities encountered during digital innovations in HEIs. Subsequently, thematisation was built on central concepts from structuration theory (de-routinisation, knowledgeability, dialectic of control) and three system-divergent innovation phases (unfreezing, moving, and refreezing) (see Figure 3). We approached the challenges, framing each as an opportunity for innovation depending on the innovation phase in which challenges occur, the power mobilised, and involved agents. Thus, the final themes of *challenges-as-opportunities* departed from bureaucratic, financial, and technological challenges, as well as those relating to internal conflicts, external pressure, and deroutinisation.

Acknowledging that 'our social positions influence how we approach, investigate, and analyse data' (Jacobson & Mustafa, 2019, 8), the authors note: (1) the study's funding aims for informed change in Swedish HE rather than continuity; (2) that a reflexive design and data analysis may overly underscore agency and hence individualises the responsibility over driving innovations within tenacious systems; and (3), that one participant is also a co-author. This not-so-rare author-participant duality warranted additional reflexivity on the authors' part. This co-author drove the innovation in their capacity as a direct owner and leader (Berg & Östergren, 1979). They accumulated and consequently enriched the paper with high-stakes and rare first-hand experience and knowledge in accrediting MOOCs in Sweden, thus reinforcing this paper's scholarship. However, to moderate the influence of said co-author on the interpretive data analysis, their active contribution to the study was limited to the first three sections; the remaining authors solely covered the analytical sections.

5. Results: challenges-as-opportunities

This section responds to the first research question by describing the evolution of the underlying processes of the innovation and how those processes manifested over three phases (unfreezing, moving, and refreezing). Each deductively generated theme describes one multi-faceted challenge as an opportunity. Figure 4 recaps the challenges atheoretically in a way that addresses a broader audience.

5.1. Bureaucratic challenges as opportunity for process solutions

Following the original crack when Course Examiner 1 (CE1) was contacted by AI Sweden regarding the mmMOOC, in the *unfreezing* phase, bureaucratic procedures were kickstarted when CE1 reached out to the dean Faculty Management (FM), proposing to accredit a mmMOOC on AI at the technical faculty of the Swedish University (SU) in January 2019. The positive response by the Dean FM in February 2019

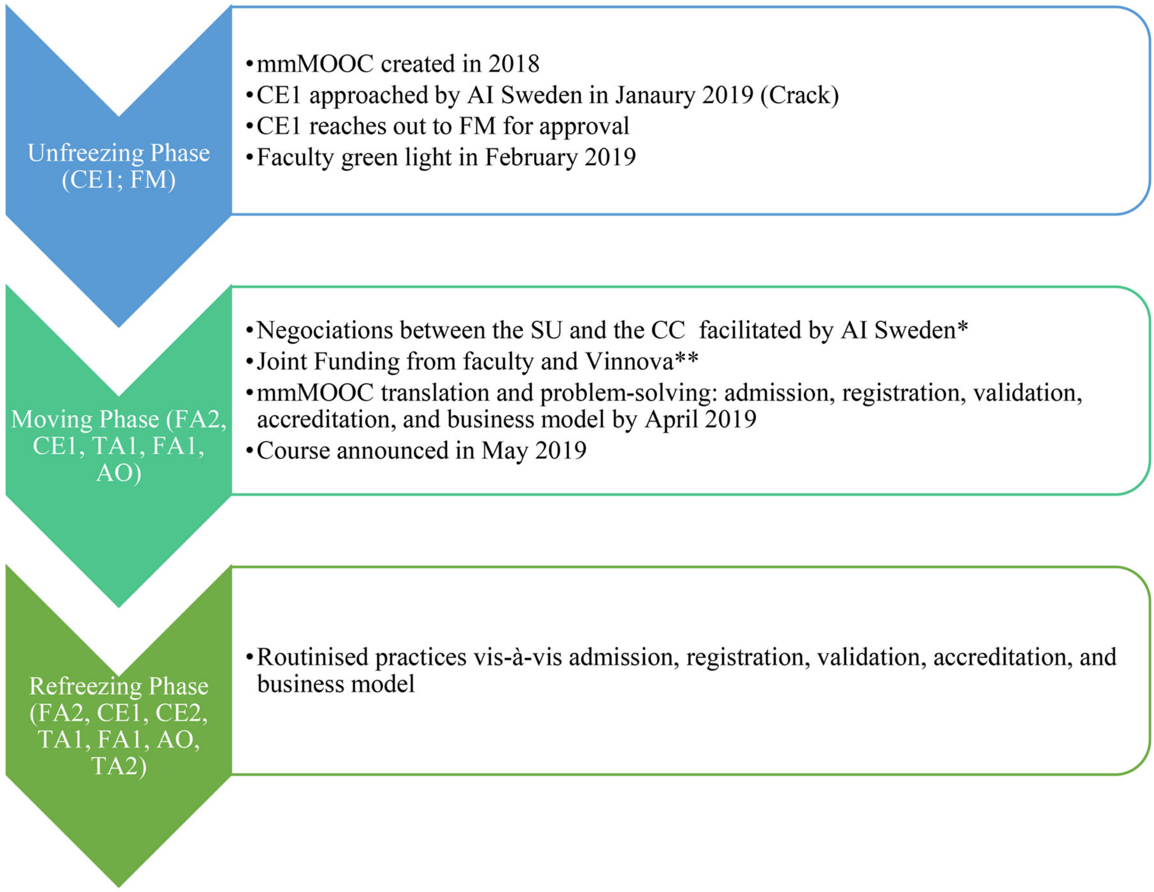

Figure 3. The unfreezing, moving and refreezing phases of systematising the mmMOOC at the Swedish University.
**SU: Swedish University; CC: Consultancy Company; AI Sweden: The Swedish national centre for applied artificial intelligence.*
**Vinnova: Sweden's innovation agency.

was, by all means, quicker than usual (CE1). If this phase was smooth and uneventful, the *moving* phase was characterised by intensive bureaucratic work to overcome challenges pertaining to *admission, registration*, as well as *validation and accreditation* of the mmMOOC, expected to attract thousands of students (see Figures 1 and 2).

First, on *admission*. The national admission system in Sweden is not open continuously. Instead, admission starts and closes at three intervals delimited by deadlines and marked by manual intervention at each interval/semester. If this challenge would have limited the openness of the MOOC, it became necessary to create an opportunity to 'set up the free-standing course with continuous admission,' which was initially impossible due to national admission system limitations (Faculty Administrator 2 - FA2). This was solved by altering the admission parameters, i.e. the opening and closing dates of admission rounds, including late admission, while keeping the new parameters as similar to other courses as possible: a quasi-continuous admission was in motion by 'fixing schedules that seemed unnecessary to adjust before' (Admission Officer - AO).

Having established a quasi-continuous admission the first time admission opened, application-related problems associated with the following issues emerged: (1) applying with incorrect documents, (2) having a foreign educational background, and (3) having older Swedish high school certificates. Having misunderstood instructions, many students uploaded the MOOC completion certificate as grounds for accreditation instead of applying with documents satisfying university basic admission requirements; their applications 'got rejected because of insufficient merits, and students did not understand why' (AO). Moreover, students holding foreign HE degrees and old Swedish high school certificates also struggled to get admitted to the course. 'The admission eligibility models cannot handle foreign academic credits,' asserted AO. Similarly, CE1 imagined an adult who finished high school in Sweden 20 years ago, having to 'find their high school degree, they might not know where it is.' If they did, it

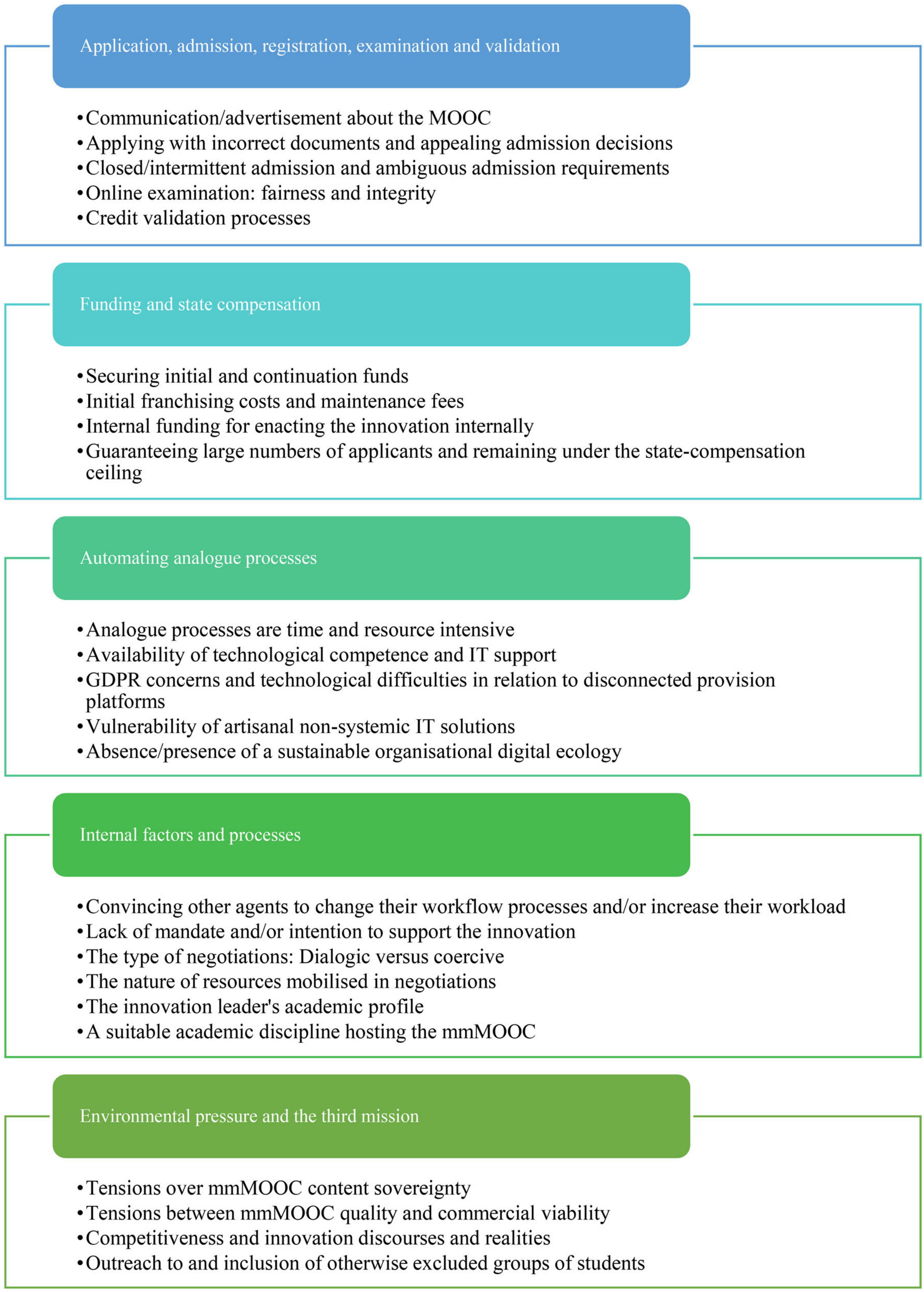

Figure 4. A summary of the major challenges associated with accrediting an mmMOOC at the Swedish University (SU).

may not readily satisfy current admission requirements, such as those for the English language. This has been partially solved by reducing the requirements for both English and Swedish languages to either one, and subsequently the MOOC became available in both languages, at students' discretion (AO).

Secondly, on *registration*. Suppose students applied successfully and got admitted, they receive a mass admission letter designed to avoid reaching their spam email folder. FA1, a faculty administrator, gets a list of admitted students (a couple of hundred) from the admission office, which they forward to Teaching Assistant 2 -TA2. TA2 then sends an admission letter and a welcome email with all the course details, including the events described in Figure 2. This email is standard but requires manual edits and 'minimal intervention' every semester (TA2).

Finally, on *examination*. The last bureaucratic challenge that needed to be addressed in the moving phase was finding time-efficient examination and validation solutions that cater to thousands of students. With these types of courses (MOOCs), CE2 notes, 'the main challenge is to have a fair examination.' An online examination format comprised of six multiple-choice questions subject to automatic grading was created, but how to guarantee that students truly deserve their credits remains a question in progress (TA1). The teaching assistants ensure that questions are shuffled, updated monthly, and accessible only with university credentials. According to TA1, students are legally bound not to cheat on their exams and to observe cheating and plagiarism guidelines, and CE2 sees this type of examination as an opportunity for 'building trust with students' (CE2).

The *refreezing* phase, which consists of routinised practices developed and tested in the moving phase, presents some remaining hiccups with admission. Given that the admission system can only afford a manual and quasi-continuous admission, adding more MOOCs in the future that require similar exceptions only adds to the manual work that admissions officers must do (AO). Currently, around six MOOCs and LOOCs spanning over three semesters are equivalent to the workload of dealing with 18 different courses, and 'in that way, it is a bigger administrative workload' and 'we cannot handle more than a handful of courses with special time schedules' (AO). Despite praising the 'new admission system,' called *NyA antagningsystem*, introduced in 2006, AO iterates that a truly seamless admission process is indispensable; otherwise, more personnel would need to be hired. Another hiccup that creates unnecessary labour for the AO derives from students appealing an unfavourable admission decision based on submitting the wrong documents. As for admitted students, they may not read their welcome letters thoroughly, leading to disturbances in how they proceed with the course, not least when they register on the MOOC platform using a nickname rather than a name connected to their university credentials, making even validation more complicated. These minor hiccups are being addressed with more precise communication with students.

5.2. Financial challenges as opportunity for sustainability

The *unfreezing* phase was marked by the financial feasibility of this innovation and its business model despite an initial lack of financial resources for developing and sustaining MOOCs. Universities in Sweden are tuition-free for citizens within the European Union, the European Economic Area and Switzerland and are state-financed, not-for-profit institutions, reimbursed by the state for each credit/person they deliver up to a particular ceiling. The SU had not reached that upper limit in the spring of 2019 (FM; CE1), meaning that accrediting an mmMOOC leads to the SU being compensated for each MOOC credit/person it delivers. According to CE1, 'as long as we are not overshooting this ceiling, we will get funding for offering the course' (FM), which was consequential to the faculty's swift approval and favourable attitude towards accrediting the mmMOOC. However, to acquire copyrights to turn the MOOC into an accreditable single-subject university course, the SU engaged in what may be called a franchise business relationship with the Consultancy Company (CC): the mmMOOC developer. At first, the relationship was mediated by AI Sweden, but later, by paying a yearly fee directly to the order of the CC (see Figure 3).

The *moving* phase, the actual course implementation, required initial funds. Apart from an external seed fund secured by Sweden's innovation agency, covering the translation of the MOOC into Swedish, internal faculty funds were allocated to cover the local expenses for the moving phase. These expenses comprised work hours for, among others, secondary innovation leaders involved in solving the several bureaucratic challenges associated with it. Otherwise, developing new MOOCs has, until then, been a risky endeavour. For FA2, even if faculty receive external project money to develop MOOCs, who is then tasked with updating the MOOC and covering its running costs? Outside any accreditation frameworks, state compensation is impossible. Accrediting this mmMOOC into a free-standing course was a worthwhile risk since it generated state compensation, extending its financial sustainability to the refreezing phase.

In the *refreezing* phase, the course's business model proved 'profitable.' Since its launch in Fall 2019, thousands of students have enrolled in the course yearly (see Figure 1). CE1 humorously noted that after promoting more than 1000 students just as the course was first offered in the late moving phase, it looked like 'the University was scamming the state.' State compensation has been reused to re-run the course, develop new LOOCs, and fund partnerships over additional mmMOOCs. The risk of an otherwise unsustainable financial challenge revealed an opportunity: 'There was a fairly large investment in setting up the course, but running the course is not that costly' (FM).

5.3. Technological challenges as opportunity for automation

The third key challenge turned opportunity had to do with the need to mobilise technological tools and skills for efficiency's sake. Already in the *unfreezing* phase, and since the MOOC caters to a massive audience, there was a realisation that manual operations alone are far from reasonable. Even if the will and commitment to innovation exist, time is scarce. Innovation and secondary leaders realised that automating several work processes would have the double pursuit of eliminating redundancy and saving time and money while catering to hitherto unusually large numbers of students.

In the *moving* phase, innovation and secondary leaders attempted automated solutions. They wished to run the mmMOOC 24/7 and believed automation could help, given the large number of students (Course Examiner - CE1). With two websites, one internal and another external, and two types of examination in two locations, managing this course is no simple task. Successfully implementing automation requires being able to interoperate the application programming interfaces (APIs) of the MOOC and the local learning environment or would require using programming scripts to transfer the data between systems. This demands a higher level of digital maturity, over and above what is typically required for course administration, which was not the case. For example, the local learning software, *LISAM,* where the course is hosted internally, suffers from an overload and slowness due to more than 10,000 registered students in the mmMOOC (Faculty Administrator – FA1), an issue the IT department has just started addressing. Another example is the need to automate the process of matching students' (nick)-names on their MOOC-issued certificates with their official names on the university system. This was solved by deploying an artisanal, somewhat controversial, and very sensitive script 'once we knew that we would not get an API if we were to ask for it' (Teaching Assistant – A1). This script acts like a human hand and clicks its way into collecting and matching user/student data. A third example is illustrated by TA1 requesting from and settling with the IT department on the possibility of reporting results based on university credentials since doing that using the national personal number was impossible for GDPR-related concerns. Despite opting for (partial) automation, TA2 stresses, 'you can do more and more programming to make it easier, but eventually, you spend more time automating than you save. That is always the trade-off that we kind of deal with,' and that is why TA1 and TA2 abide by a checklist TA1 developed to keep their automatic processes error-free and to override when needed.

The *refreezing* phase is marked by secondary leaders realising they have overstretched their capabilities. Without automation, the teaching workload, too, would be unbearable: 'We would need four-course assistants to go manually through our tasks' (TA1). FA2, responsible for all the MOOCs currently offered by the faculty, shares the same feeling as course examiners: 'We have a routine that works for now; little work is needed every day' (CE1) to keep the MOOC running.

5.4. Internal conflicts as opportunity for dialogue

Convincing agents who enact routines within and across established sub-systems of a need for de-routinisation cannot be done without a certain level of conflict, no matter how dialogic and fruitful. If the *unfreezing* phase saw little to no internal conflicts, perhaps the most significant one characterised negotiations between the admission office represented by AO and the host faculty represented by Faculty Administrator (FA2), especially in the *moving* phase. Each agent mobilised resources based on their *knowledgeability* of the system to convince the other party of the urgency of their needs and the (sub)system routines and limitations preventing their satisfaction. The most striking example of a dialogic internal conflict was reaching a solution that, on the one hand, mimicked continuous admission but was also within the technical and legal limitations of the admission system. 'It was quite challenging to try to achieve a sort of seamless application period because the national admission system does not support it' (Admission Officer - AO). However, the attempt led to 'a great dialogue' (FA2), even if marked by subtle *power moves*: 'I think it would have been difficult for, you know, a teacher, 'ordinary' teacher to do that' (Faculty Management - FM).

FA2 argued for this needed change, drawing on the support of the-then Dean FM, who, in turn, drew arguments from recommendations made by the university's top administration; 'much pressure from the government and consequently from the university to get involved and not necessarily start on a grand level, but to learn about how to do it and acquire some experience' (FM). Simultaneously, the admission office's mandate is to help the different faculties enact their mission, 'because we get our mission from the faculties, we should serve them and carry it out' (AO) as long as it is technically possible and does not break any laws.

Another significant but unresolved conflict was that experienced by TA1 and CE2 with the IT department at SU. While TA1's main concern was to find a solution to automate otherwise redundant and extensive manual work, the IT department was stringent in what was allowed and what was prohibited: 'It was a conflict of interest in a way that you want something, and they would find it a bit difficult to implement', a clear example of *gain/loss* transactions. This led to TA1 solving the problem on their own. CE2's experience with the IT department has also been less than satisfying, despite initial support from its management: 'They have helped us with some aspects, but it is not like we can just submit the ticket, and then they take care of it.' It is likely a matter of lacking needed competence and mandate, pondered CE2. Finally, the *re-freezing* phase was characterised by significantly less conflict; participants wished to maintain good relations and continuous dialogue among various sub-systems to tackle future and current challenges effectively.

5.5. External pressure as an opportunity for exercising inclusion and sovereignty

As shown previously, external political pressure was, to a certain degree, mobilised by agents in their internal negotiations to advance their agenda in the *unfreezing* and *moving* phases. However, what they are actually advancing is SU's educational mission at which it wants to excel by competing with other (inter)national universities. Accrediting this mmMOOC strengthens this mission on a strategic level, according to CE1 and FM. FA2 cited the contagion and influence of a national project called 'Open for Climate', which also entails innovating with MOOCs. There is no doubt that the mmMOOC contributes to SU's reputation and reach (CE1). *Inclusion* of non-traditional students, therefore, is one outcome of outreach since it allows whoever, wherever in Sweden, to upskill for credits. FA2, responsible for lifelong learning at the faculty level, believes MOOCs can help workers upskill more easily. 'Many of them do not have the confidence to apply for a single-subject course at the university, so a MOOC is a much lower threshold for them to sort of engage again' (FA2; CE2; FA1). Meanwhile, CE1, FM, and TA1 believe this course on AI has significant societal implications, and 'we have to reach the whole population' (FM), not least by offering this course as 'part of every program at the university' (CE1).

Overt conflict also arose from interacting with external actors in the *moving* phase over *sovereignty* issues between the Consultancy Company (CC) and the SU represented by CE1. CE1 cites an incident with a CC-appointed consultant who was tasked with translating the MOOC content into Swedish. On the one hand, CE1 proposed improvements to the text stemming from their academic expertise; on the other hand, the translator refused changes that deviated from the original Finnish text to preserve uniformity. Despite that, CE1 introduced changes to the Swedish text to avoid what could be otherwise locally defined political incorrectness embedding excluding gender stereotypes. The difference in the mode of operations between universities and commercial consultancy companies is evident here, and creates tensions over content sovereignty. While the first party's primary concern is academic quality, the second is driven by additional profit and marketing agendas, which reached a certain balance in the *re-freezing* phase. While the University's relationship with the CC is financially sustainable, a difference in their respective ethos remains unavoidable, 'we are paying to access the course material and use their service; from their [the CC] point of view, we are paying them to market us' (CE1).

5.6. Deroutinisation challenges as opportunity for ownership

Innovation based on *deroutinising* practices not only precedes and leads to conflicts but also requires a certain level of *ownership* at the institutional and agent levels despite ensuing burdens. On the institutional level, it was clear that this mmMOOC, attracting thousands of students per year, is a tremendous branding strategy for the faculty and the university (CE1; CE2; FM; TA2; FA2). Additionally, there was consensus among all study participants that providing more MOOCs is a good idea since they firmly believed hybridising HE is the way forward. On the agent level, participants developed favourable dispositions towards this innovation and strengthened their professional role with new skills beyond the *moving* phase. For CE2, MOOCs 'are a great addition to our course portfolio.' AO learned to identify further shortcomings in the admission system and how they hamper future adoptions and developments of MOOCs in HE. As for teaching assistants TA1 and TA2, who automated much of the mmMOOC processes, relied heavily in the *moving* phase on their disciplinary knowledge and exhibited passion towards their role in the course, not least for automation: 'I enjoy programming and, you know, machine learning and stuff like that. I think it is very, very interesting. And I think that really helps me' (TA2) and

> I know about what tools there are, and I know what tasks should be automatable. I think it is something that we focus a lot on in this group: figuring out what computers are good at and what humans are good at. (TA1)

This enthusiasm also leaves room for some concern and reservations. Accounts have shown that this innovation cannot be separated from its disciplinary (academic field) context. Since the course deals with a mmMOOC on AI at a computer science department at a technical faculty, *ownership* is more readily contributive. Implementation becomes more straightforward since most innovation, secondary and formal leaders possess the necessary (preliminary) skills, competencies and attitudes to *move* this innovation despite systemic hurdles, which overcoming has meant additional labour for them. Nevertheless, despite the burden, each had a reason to embrace and carry out this innovation, from the *unfreezing* to the *re-freezing* phases, harmonising their *self-fulfilment* goals with sub-system professional roles. Meanwhile, the *refreezing* phase remains daunted by unaddressed questions on how to proceed with MOOC-based innovations in the future, such as who is responsible for developing them and how they should be hosted, managed and updated: 'Should we rely on existing platforms or make our own from scratch (CE2)?' The availability of local competence and the will to assume this responsibility are crucial to answering these questions, according to CE2.

6. Discussion

This section proffers a two-fold discussion of the 'challenges-as-opportunities' generated and expanded above. These themes embedded challenges touching upon: bureaucratic processes, finances, technological infrastructure, internal conflicts, external pressure, and deroutinisation. Having addressed the first research question by describing the circumstances and processes of this MOOC-based system-divergent innovation, here, we discuss them.

First, the challenges this case study identified readily compare to international cases (see Ali, 2024; Burd et al., 2015; Fernández et al., 2023; Hollands & Tirthali, 2014; León-Urritia et al. 2018). They also easily align with those mentioned in previous literature on Swedish HE digital innovation (see Dalipi et al., 2018; Hietanen & Svedholm-Häkkinen, 2023; Olsson, 2017; Ossiannilsson et al., 2016; Tømte et al., 2017). Naturally, this is expected not only since our thematic analysis followed a deductive approach but also little has changed in MOOC-based HE in Sweden since Barman et al. (2019). For example, financial and bureaucratic challenges (admission, examination and validation of MOOCs) cited in earlier research (see Dalipi et al., 2018; Ossiannilsson et al., 2016) have remained unaddressed until now despite policy recommendations to digitalise and modernise Swedish HE (see Regeringskansliet, 2017; SOU, 2016). This leads us to conclude that the challenges this innovation faced are telltale of persisting weak links characterising the Swedish HE (sub)system(s) and its capacity to innovate with MOOCs particularly, and demonstrate a needed level of digital maturity (Barman et al., 2019; Dalipi et al., 2018; Fernández et al. 2023; Ossiannilsson et al., 2016; Tømte et al., 2017).

Second, we distinguish between challenges *and* opportunities on the one hand and challenges *as* opportunities on the other as lenses to understanding innovation. In Figure 4, we showed how challenges can be presented atheoretically in order to communicate our results with a wider audience. Compared to previous literature, our case study transcends conventional wisdom on the binary treatment of challenges and opportunities or pros and cons (see Dalipi et al., 2018; Olsson, 2017) to challenges-as-opportunities, highlighting that innovation processes are political (Berg & Östergren, 1979) and (re)produced reflexively across time and space (Giddens, 1984; Gynnild, 2002), rather than defined by distilled and easily reproducible characteristics and factors. A challenge is one so long an agent depicts it as a challenge in one or another innovation phase but could cease to be a challenge (i.e. turned into an opportunity) depending on the perception of that agent, other agents, and the innovation phase. We clarify our assertion in the following selected examples.

Time constraints and technological infrastructure, reported as challenges in the literature (León-Urritia et al. 2018; Naylor & Nyanjom, 2021; Smith, 2012), are turned into an opportunity for automating some MOOC processes in the moving phase in order to handle thousands of applicants, and the ensuing amount of labour in correcting their examinations and validating their achievements on two disconnected platforms. Financial challenges (Olsson, 2020; Ossiannilsson et al., 2016), too, have been turned into opportunities. The state-compensation ceiling had not been reached before the innovation, and the initial inability to financially sustain MOOCs was altered into a chance to deploy, via franchise, already developed mmMOOCs and sustain their offering via the accreditation-based state-compensation model, and ultimately feeding the development of new LOOCs. Other examples include overcoming the challenge of intermittent admission (Barman et al., 2019; Tømte et al., 2017) and turning it, despite system limitations, into a quasi-continuous admission, which nevertheless requires additional deroutinisation and manual work on the part of the admission office, which poses a challenge for AO but presents an opportunity for other secondary leaders.

Thirdly, concerning spatio-temporality, our case study uncovered a decisive role in the innovation context intersecting with favourable dispositions (ownership) exhibited by innovation, secondary, and formal leaders. That innovations and subsequent deroutinisation benefit from favourable dispositions and institutional ownership is well documented in the literature (Hietanen & Svedholm-Häkkinen, 2023; Naylor & Nyanjom, 2021; Olsson, 2017; Smith, 2012) and theoretical works (Berg & Östergren, 1979; Gynnild, 2002). In this case study, ownership manifested itself on the institutional and agent levels. In their professional capacity, agents went out of their way to solve anticipated and emerging problems in the unfreezing and moving phases, even when this meant inducing burdensome de-routinisation (additional manual work) to their professional role, for ex., AO having to manually open and close admission intervals to make it seem continuous. Additionally, the formal leader's (FM) favourable disposition accelerated the approval of the mmMOOC at the faculty level and signalled the importance of this innovation to other agents.

Intersecting with dispositions, a favourable innovation context included timing, location, and the 'right' academic discipline, improving the innovation's chances for success. The mmMOOC is offered at the technical faculty by the Computer Science department and covers AI literacy, a popular and hyped topic not only on the political level but also among university students (see Figure 1; Hachem & Heintz, 2024). The innovation leader enjoys a high academic profile in research and teaching of artificial intelligence, and their unit runs the course. This meant that course examiners and teachers were fluent in the technical field and could more easily tackle digitalisation and automation-related challenges. Hence, this was a case of a MOOC-based digital innovation that was endemic to digitalisation. In other words, had the course been situated in the field of social sciences, given similar circumstances, it is less likely that the innovation would have been as successful, at least due to a lack of IT expertise needed to devise automation solutions on the go. Accordingly, it is safe to conclude that digitalisation breeds more digitalisation and to remind readers that 'innovations that sit well within a specific context spread better' (Smith, 2012, 176).

Fourth, this case study uncovered meaningful internal and external relationships and influences that illustrate power dynamics within subsystems and those evident in the interaction between subsystems and external actors. Internally, our case study showed a productive level of conflict. Innovation, formal, and secondary leaders collaborated in a rather dialogic fashion, often leading to fruitful results, despite each mobilising resources intentionally to maximise one's gain and minimise one's losses in terms of the extent of de-routinisation of their own work processes (Berg & Östergren, 1979). As they partook in negotiations, power mobilisation often remained subtle and less authoritative (Giddens, 1984), avoiding coercion, which left enough room for collaboration, generativity, and creativity in how agents moved the innovation, focusing on processes, systemic limitations and challenges, and ways to overcome them (Smith, 2012). In line with Berg and Östergren (1979), a mild level of conflict is desirable. Even external tensions and influences describing (1) political pressure to digitalise HE and (2) those characterising tensions between the university and the consultancy firm over sovereignty have led to productive ends. The partnership between the university and the consultancy company shows the importance of HEIs establishing partnerships with private-sector enterprises, enhancing their reputation, and enacting their third-mission (Burd et al., 2015; Tømte et al., 2017). However, such partnerships also require continued dialogue over content sovereignty and contextualising knowledge for local audiences beyond mere language translations (Billington & Fronmueller, 2013; León-Urritia et al., 2018; Olsson, 2017).

The fifth argument concerns the SU's capacity to incubate MOOC-based innovation as a 'responsible step' (Barman et al. 2019), highlighting a crucial difference between fostering or merely 'allowing' digital system-divergent innovations. The first demands a certain level of digital maturity, which touches upon the university's 'DNA' and business model (Fernández et al., 2023). This case study showed that the university's IT systems and infrastructure were unprepared to embrace and operationalise this MOOC-based innovation—this encumbered secondary leaders with unnecessary frustration and labour. A certain level of IT-related competence was missing, coupled with outdated and overburdened systems that struggled to accommodate thousands of students in one course.

Apart from competence and physical infrastructure, the readiness of the IT department to drive this innovation into a comfortably sustainable and routinised refreezing phase fell short of so-called digital maturity (cf. Anthony et al., 2022; Hietanen & Svedholm-Häkkinen, 2023; León-Urritia et al., 2018; Olsson, 2017; Smith, 2012). The mission of the IT department at that time did not include a mandate to address the complex tasks accompanying MOOC deployment and accreditation, which on several occasions was compensated by often artisanal solutions on the part of secondary leaders to solve IT-related dilemmas even beyond their routine professional roles. This resulted in devising artisanal, even if laudable, solutions to systemic hindrances. Therefore, a responsible university in today's Sweden is not only tasked with safeguarding economic innovation and competitiveness but also with actively reaching digital maturity, a time-intensive process, by acquiring the capacity to incubate and, more importantly, future-proof innovation (Barman et al. 2019; Fernández et al., 2023).

Our last and sixth contention clarifies that avoiding mechanistic representations of digital innovation in Swedish HE is not merely tactical but strategic, promoting educability rather than replicability. Sweden epitomises a highly industrialised and late modern society where agents and institutions interact reflexively, not least in the HE sector; change and innovation are (un)intended consequences of these interactions. Sweden's *laissez-faire* model of innovating with MOOCs (Tømte et al., 2020) implies that institutions would deploy MOOCs following different pathways depending on context (political, disciplinary) (Berg & Östergren, 1979). Not only that, but even MOOC-based innovation within the same institution would not necessarily be uniform when contemplating various types of MOOCs, their scope, scale and features (Michael Spector, 2017), an issue CE2 implied concerning future mmMOOCs franchises and LOOCs.

Here, we also caution that the bottom-up and reflexive nature of innovation in Swedish HE cannot guarantee replicability nationally or even at the institutional level. However, it warrants educability by providing suitable lenses to capture and understand innovation processes in late modern HE institutions and devise policy recommendations accordingly. If we continuously cannot speak of a Scandinavian MOOC model or a prescriptive Swedish model outside its lack (Barman et al., 2019; UKÄ, 2016, 2017a), this paper maintains that the Swedish *laissez-faire* model forms a suitable launching pad for innovating with MOOCs. Even in the context of tenacious systemic challenges and suboptimal digital maturity

(Fernández et al. 2023), there was plenty of room for agents' reflexivity, institutional flexibility and adaptability. That said, digital innovations without digital maturity are a burdensome task.

6.1. On sustainability and educability

This subsection addresses the two remaining research questions: What factors led to the success of this innovation, and how sustainable or future-proof is it? Readers will be guided to tri-dimensional policy implications on the government, sector, and institutional levels. First, several enablers (Ali, 2024) have precipitated the success of this innovation; we summarise those we believe were fundamental. External pressure, the wider political drive for digitalising HE and the AI hype indirectly paved the way for this innovation. Then, initial funding was pivotal for kick-starting the efforts. The possibility that the course would help the university reach its compensation ceiling made it even more attractive and financially viable. The innovation leader's high profile, the formal leader's cooperation, and the ownership and extent of de-routinisation by competent secondary leaders guaranteed that the innovation was moved from the unfreezing to the refreezing phase despite systemic challenges at times beyond their direct control and presently remaining on unstable grounds.

Second, the sustainability of MOOC deployment and accreditation in this university and, by extension, other universities in Sweden would depend mainly on their digital maturity and the flexibility of their business model. Hence, would more MOOCs still make sense if the SU reaches its compensation ceiling? In the future, added MOOCs would stress the artisanal solutions and routines reached in the refreezing phase by burdening agents with more hitherto unautomated work and weighing down on already stale course management systems. Currently, the various challenges-as-opportunities in the re-freezing phase reflect differential levels of sustainability deduced from participants' accounts: high, medium and weak. First, medium levels of sustainability can be predicted for the mmMOOC's business model, so long as the state compensation ceiling has not been reached. High sustainability is observed for the online examination process, unless cheating problems take precedence. Additionally, dialogue as a way to move innovation and the competence heretofore acquired by agents increase the chance for future innovations, as long as *personnel changes* are kept to a minimum (Berg & Östergren, 1979). Mild sustainability could also characterise the relationship between the consultancy company and the university when tensions between commercial and academic quality and over sovereignty are kept at bay. The weakest links, however, remain the SU's digital maturity and its ability to endorse and sustain digitalisation as part of its DNA and business model.

Based on our results and their potential for educability, we propose policy implications on three levels: government, HE sector, and HEIs (see Figure 5), projecting, on the one hand, implications for HE policy, and on the other hand serving as a blueprint for contagion at the practice level. On the national level, there is a need to recognise University-accredited MOOCs as a strategic tool for upskilling and reskilling Sweden's workforce on green and (advanced) digital skills as part of Sweden's digitalisation strategy. For that, policymakers would need to create and fund alternative business models for innovating with MOOCs so that the compensation ceiling does not hinder MOOCs' creation, development, deployment, and accreditation. On the HE sector level, continuous admission is a crucial tool for opening up HE lifelong learning opportunities and reducing skills gap (Santandreu Calonge et al. 2019). To do that, admission system shortcomings should be tackled by updating the national admission system *NyA antagninssystem*. Additionally, automating admission processes for foreign talents and older citizens to the extent possible with AI while removing unnecessary (language) requirements is an additional step in facilitating upskilling and reskilling of the workforce. The Swedish HE authority (UHR) could also entice HEIs to develop strategies for digital innovations and maturity that aim, on the one hand, to innovate for digitalisation, but on the other hand, with digitalisation. Finally, on the institutional level, we call on universities to uphold digital maturity, update IT systems and infrastructure, and alter IT departments' mandate to include digitalisation efforts so they, too, can become owners of innovations rather than slowing them down. More evidently, universities could, among other solutions, create opportunities for digital competence development so staff and teachers can more readily embrace innovating with MOOCs and other related advanced digital affordances, not restricted to learning analytics and data-driven instruction, when necessary.

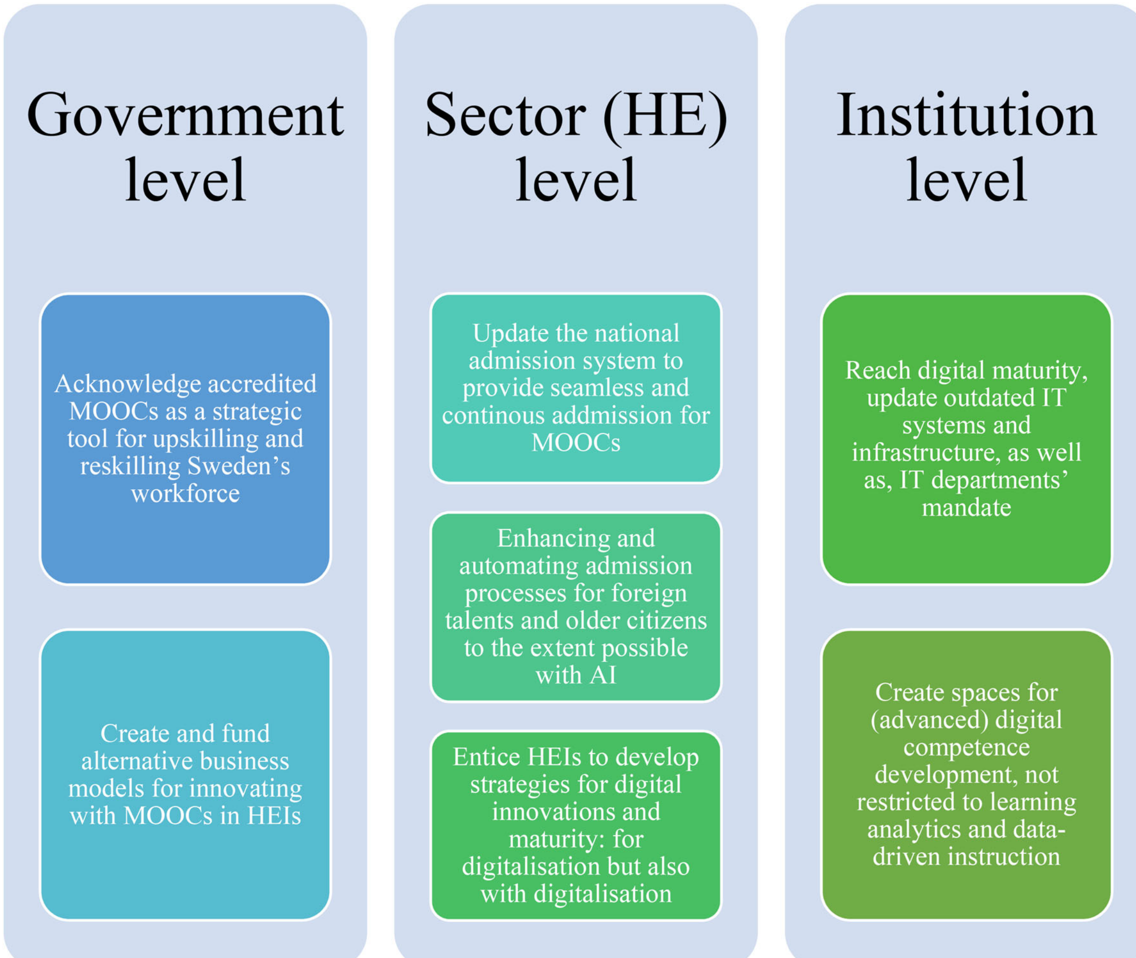

Figure 5. Policy implications structured in three tiers.

7. Concluding remarks

This case study examined a MOOC-based system divergent innovation at a Swedish university. The mmMOOC in question deals with AI literacy and is franchised from a joint venture: academic and private sector enterprise. When it was hitherto impossible in Sweden, this mmMOOC was transformed into an undergraduate credit-yielding single-subject course. Examining this innovation exposed, even more flagrantly, the already theorised weak links between the HE system in Sweden and MOOCs (see Dalipi et al., 2018), but also how the challenges in moving this innovation were turned into opportunities. That was possible via an RTA of in-depth interviews with innovation, secondary, and formal leaders, which led us to categorise several challenges-as-opportunities. Theoretically, this case study speaks to an (inter)national scholarship interested in digital system-divergent innovations in late modern contexts and demonstrates that cross-fertilising system-divergent innovation with structuration theory (Berg and Östergren 1979; Giddens, 1984; Gynnild, 2002) forms a valuable analytical lens. On a more pragmatic level, this case study offers deep and practice-based insights for Swedish HEIs faculty and staff into obstacles to innovating with MOOCs and field-tested, even if imperfect, policy-informing mechanisms to overcome them.

7.1. Limitations

This work faces some limitations. Even if looking retrospectively at innovations warrants no interference in their processes, the passing of time leads to a certain level of forgetfulness, as brought up by most participants. Another limitation is that the IT department's perspective is missing along with that of the mmMOOC users/students. One, we realise the former's lack of active participation in facilitating this innovation is due to a limited mandate, seemingly being addressed via a change in their department name from IT to the 'Digitalisation' department, signalling encouraging responses to ongoing demands for enhanced digital maturity at the SU. Two, the students' voices are missing, leading to a certain ambiguity over how their experiences have influenced and have been effected by the innovation. The N = 1 and the limited number of participants, even if justified, call for mindfulness regarding the generalisation of this case study to the Swedish national context. Throughout the paper, not only have we highlighted on several occasions that it is educability rather than replicability we aim for, but we also caution that different types of MOOCs (global or local) would interact differently with national HE policy and various organisational practices.

Despite these limitations, this case study addressed a research gap in digital innovations in Swedish HE (Tømte et al., 2020), particularly with MOOCs. This may be the first scholarly report on the organisational processes ensuing from MOOC-based system-divergent innovations in Swedish HE. We thereby consider this work an attempt to draw the contours of a nascent Swedish MOOC model, which is now in tension with the HE system and may accelerate subsequent national and regional contagion (Olsson, 2017). This is crucial in times when skill gaps are constantly evolving and one way to catch up with them is universities giving some credit to MOOCs (Santandreu Calonge et al. 2019). MOOCs could help address the Swedish industry's increasing demand for advanced digital and green competencies (EC 2021; Smidt, 2020; UKÄ, 2017a). They could also help blur further the boundaries between lifelong learning and higher education, making the relationship between the two more symbiotic (Thomas & Nedeva, 2018). While we see value in Sweden's relaxed approach governing the organisational structures of deploying MOOCs in HEIs, we raise concerns that in the absence of a national HE ecology that fosters enablers for MOOC deployment, credit-compensation, and institutional digital maturity, including a strategic commitment to teaching with MOOCs, MOOC-based innovations risk remaining a solely individual responsibility making them vulnerable and their sustainability threatened.

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About the authors

Hugo-Henrik Hachem is a Postdoc at Linköping University's Reasoning and Learning lab (ReaL). His research focuses on the philosophy of lifelong learning and adult education. In addition to his interest in educational sociology and philosophy, he is researching the intersection of lifelong learning and artificial intelligence in the context of upskilling and reskilling industry employees in Sweden.

Mattias Wiggberg is a computer scientist and business economist at KTH Royal Institute of Technology. His research focuses on digital transformation, including AI, digital excellence in organizations, educational transformation, IoT, and big data. He has held leadership positions at KTH and served as an advisor on AI and digitalization for government and industry. He co-founded the Nordic Observatory of AI and Software Development Academy and was elected to the Digital Futures faculty in 2020.

Tanya Osborne is a Postdoc in Science, Technology and Society at Chalmers University. They are a part of the Vinnova-funded "ADAPT" project. They are an interdisciplinary scholar whose research interests span digital methods, STS, and informal engineering education.

Jan Gulliksen is a professor of Human Computer Interaction at KTH Royal Institute of Technology. His research interests revolve around usability and accessibility of interactive systems, digitalization and digital work environments and lifelong learning for advanced digital skills. He is a fellow of the Royal Swedish Academy of Engineering Sciences (IVA).

Fredrik Heintz is a Professor of Computer Science at Linköping University, where he leads the Division of Artificial Intelligence and Integrated Computer Systems (AIICS) and the Reasoning and Learning lab (ReaL). His research focus is artificial intelligence, especially Trustworthy AI, and the intersection between machine reasoning and machine learning. He is a fellow of the Royal Swedish Academy of Engineering Sciences (IVA).

ORCID

Hugo-Henrik Hachem http://orcid.org/0000-0003-2752-7710
Mattias Wiggberg http://orcid.org/0000-0001-9636-1545
Tanya Osborne http://orcid.org/0000-0002-8915-0181
Jan Gulliksen http://orcid.org/0000-0002-2411-6417
Fredrik Heintz http://orcid.org/0000-0002-9595-2471

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