


Symbolic knowledge innovation through bricolage in the periphery: the Bauhaus movement

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Abstract

In this article, we examine how symbolic knowledge innovation—that is, the recombination of ideas on aesthetic value in new ways—emerges in the periphery. While symbolic knowledge innovation drives growth, its role in creating new paths in the periphery is largely under-investigated. New path creation has been largely envisaged through macro (e.g., policy) or meso (e.g., industrial R&D) aggregates, overlooking micro-level actors (e.g., individuals), and their agency in mobilizing heterogeneous resources vital for innovation. Viewed in this light, we investigate how the interaction of actors at different levels (macro, meso, and micro) shapes symbolic knowledge innovation in the periphery. We draw on the case of Bauhaus movement to investigate symbolic knowledge innovation in the peripheries of Weimar and Dessau. Our findings illustrate symbolic knowledge innovation at the Bauhaus in terms of three phases, namely, semiotic codes: Bauhaus idea generation and articulation; material basis: development of Bauhaus artefacts; and material basis: Bauhaus commercial success. We further unpack actors' agency and show how each phase of symbolic knowledge innovation emerges through bricolage. We contribute to the economic geography literature by showing the role of bricolage and actors' agency in symbolic knowledge innovation for new path creation in the periphery.

Keywords: periphery; symbolic knowledge innovation; bricolage; case study; Bauhaus

JEL classifications: O31, R11, Z11

1. Introduction

Recent studies in economic geography draw attention to innovations in the periphery (Glückler, Shearmur, and Martinus 2023; Nilsen, Grillitsch, and Hauge 2023; Sotarauta, Kurikka, and Kolehmainen 2023) and to the emergence of new industrial paths in peripheral regions (Dawley 2014; Binz, Truffer, and Coenen 2016; Isaksen and Trippel 2017). Despite the new insights, we still have a limited understanding of the processes that underpin the emergence and growth of innovations in peripheral regions and how such regions offer opportunities for creating knowledge and initiating innovation (Glückler 2014).

Received: 21 October 2022. Editorial decision: 14 March 2024. Accepted: 28 March 2024

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First, the prevailing view often portrays the periphery as a constraint, in terms of weak developed clusters, low levels of R&D capabilities, and ‘thin’ institutional structures, with research outlining the different strategies organizations employ to overcome its limitations (Tödting and Trippel 2005; Boschma 2007; Cooke 2012; Dawley 2014; Isaksen and Trippel 2014). The literature has outlined the role of external mechanisms, such as new knowledge from exogenous sources and various types of policy interventions, typically focusing on analytical¹ knowledge innovation and resulting new path creation in the periphery (Isaksen and Trippel 2017). What has not been examined is ‘if other routes (that are based on a symbolic knowledge base ...) are also feasible’ (Isaksen and Trippel 2017: 455). Arguably the symbolic knowledge innovation could follow a distinct innovation path in the periphery. The innovation process that is based on symbolic knowledge involves a recombination of ideas on aesthetic value in new ways and is driven by creativity, imagination, and the challenging of existing conventions (Asheim, Coenen, and Vang 2007; Martin and Moodysson 2011). A central difference of symbolic knowledge is that it is highly context-specific compared to other forms of knowledge innovation, making it more susceptible to being influenced by the periphery (Martin and Moodysson 2011). As a result, learning tends to be localized, as it takes place via interpersonal interactions among professional communities (Asheim, Coenen, and Vang 2007; Martin and Moodysson 2011). Symbolic knowledge innovation is worth investigating because it underpins the growth of regions with creative industries. Besides their direct contribution to growth (e.g., increase in new product innovation, new business models, turnover) and employment, creative industries are important due to their positive spillover effects across different industries within an economy (Jones, Lorenzen, and Sapsed 2015).

Second, heterogeneous actors play a pivotal role in paving the way for new paths of innovation in peripheral regions, as they can mobilize diverse resources. However, most of the debates touched on above focus on the macro or meso levels (e.g., cluster policy, regional industry specialization, multinational enterprises, and their subsidiaries, etc.), thus overlooking the role of micro actors (i.e., individuals) in new path creation in the periphery. Symbolic knowledge innovation requires face-to-face communication (Asheim, Coenen, and Vang 2007) and draws primarily on tacit knowledge (Florida 2002), highlighting the pivotal role of heterogeneous actors, particularly those on the micro-level, for symbolic knowledge innovation. Micro actors are worth investigating because they have agency and enact resources and processes vital to innovation (Garud, Kumaraswamy, and Karnøe 2010). Only recently have theoretical insights in evolutionary economic geography acknowledged the importance of individual agency at the local or non-local level for new path creation (Hassink, Isaksen, Trippel 2019; Glückler, Shearmur, and Martinus 2023; Nilsen, Grillitsch, and Hauge 2023). Micro actors, in contrast to meso- or macro-level aggregates, allow for a more nuanced understanding of new path creation steaming from unrelated (to the existing local capabilities) diversification in regions (Boschma et al. 2017). This enables them to overcome constraints associated with the lack of related local capabilities in a region and to contest the established global sectoral status quo (Boschma et al. 2017).

Here we ask: how does the interaction of actors at different levels (macro, meso, and micro) shape symbolic knowledge innovation in the periphery? To address this research question, we draw from economic geography literature and abductive reasoning, whereby understanding symbolic knowledge innovation in the periphery derives from a continuous dialogue between theoretical frameworks, data sources, and analysis (Tavory and Timmermans 2014). We employ a single-case study design (see Turnheim and Geels 2013; Hampel and Tracey 2017; Hatch and Schultz 2017) as it allows us to develop a context-specific account of the process, phases, and actors of symbolic knowledge innovation of the Bauhaus (Welch et al. 2011, 2022), the most important European avant-garde design movement established in the 1920s (Kentgens-Craig 1998). Despite the movement’s key protagonists living and working in core cities with established industrial clusters (e.g., Gropius in Berlin), the Bauhaus emerged and flourished in the peripheral cities of Weimar and Dessau.

Our findings illustrate symbolic knowledge innovation at the Bauhaus in terms of three phases: (1) Semiotic codes: Bauhaus idea generation and articulation. (2) Material basis: development of Bauhaus artefacts. (3) Material basis: Bauhaus commercial success.

¹ ‘The analytical knowledge base comprises (predominantly scientific) knowledge that is geared to understanding and explaining features of the (natural) world. The synthetic knowledge base refers to the (predominantly engineering) knowledge involved in the design and construction of solutions to human problems which is often instrumental, context specific and practice related. The symbolic knowledge base deals with the creation of cultural meaning through transmission in an affecting sensuous medium.’ (Asheim et al., 2007: 660–661)

We show that each phase emerges through a bricolage process of collaboration by heterogeneous actors, the co-shaping of resources for new purposes, experimentation, and making do to create symbolic knowledge innovation. We further unpack in each phase the agency of heterogeneous actors at micro-level (e.g., the interactions of actors within the Bauhaus), meso level (the interactions of Bauhaus actors with manufacturers, policymakers, and a knowing community), and macro level (the historical and institutional context).

Our contribution is threefold. First, in contrast to prior research that focuses on analytical and synthetic knowledge innovation (Carvalho and Vale 2018; Grabher 2018; Suitner and Ecker 2020; Sotarauta, Kurikka, and Kolehmainen 2023), we shed light on how a new path of symbolic knowledge innovation emerges in the periphery. We extend current studies on symbolic knowledge innovation (Sgourev 2021), which predominantly focus on the development of creative industries in large metropolitan areas (Rantisi 2002; Currid-Halkett and Scott 2013; Cohendet et al. 2014), by arguing that symbolic knowledge innovation can emerge in the periphery facilitated by advantages in the periphery and relating this to the limitations of the core.

Second, we contribute to the recent research in evolutionary economic geography that emphasizes the importance of agency for new regional path creation (Boschma et al. 2017; Hassink, Isaksen, Trippel 2019). We illustrate how agency at different levels shapes symbolic knowledge innovation in the periphery, something that is rarely examined in the literature. Zooming in on each phase, we suggest that symbolic knowledge innovation occurs via a bricolage process and further unpack the agency of these heterogeneous actors. In doing so, we address calls in the literature for ‘an investigation of the agentic processes’ of actors and contexts ‘which are behind shaping regional growth paths’ (Grillitsch and Sotarauta 2020: 718).

Third, this article makes a methodological contribution to economic geography by taking a long-term historical perspective to study the Bauhaus movement. Drawing on a variety of historical sources, we aim at ‘letting time tell more’ about the phenomenon of our study, an approach which is somewhat lacking but relevant in the field of economic geography (Henning 2019: 603).

The remainder of this article is set out as follows. The next section presents a review of the extant literature, outlining the theoretical approach taken in this article, and is followed by a methodology section that introduces the case study method and the background of the case. We then present our empirical findings, after which the final section offers a discussion and conclusion setting out the contributions and implications of our work.

2. Theoretical background

We initially framed our study using economic geography literature concentrating on new path creation in the periphery, as well as relevant literature that discusses what constitutes ‘a periphery’. As we delved deeper into our findings, a processual view of symbolic knowledge innovation through the interaction of heterogeneous actors crystallized. The iteration between data and theory (Tavory and Timmermans 2014) pointed us to the bricolage approach as an appropriate theoretical route for examining symbolic knowledge innovation in the periphery. This prompted a refinement of our research question and allowed us to find insights related to how the bricolage process creates symbolic knowledge innovation in the periphery. We finally drew insights from the creativity literature, as it enabled us to gain a deeper understanding of the different phases of symbolic knowledge innovation. This led to a final refinement of our conceptualization of the phases of symbolic knowledge innovation as a journey of creative ideas that begins with the generation of those ideas and ends with their commercial success.

2.1 New path creation based on symbolic knowledge

Isaksen and Trippel (2017) advocate the knowledge-based approach in understanding new path creation, as different types of knowledge lead to innovation in diverse ways. The concept of the knowledge base was originally introduced to elucidate how the geography of innovation differs across industries (Asheim and Coenen 2005; Asheim and Gertler 2005), with analytical (science-based industries) and synthetic (engineering-based industries) knowledge bases being the initial focus. The symbolic knowledge base was later introduced to explain the innovation processes of cultural and creative industries (Asheim, Coenen, and Vang 2007).

The three knowledge bases differ in the way knowledge is produced and diffused, with symbolic knowledge being focused on creating meanings, desires, aesthetics, symbols, and intangible features (Asheim, Coenen, and Vang 2007). The innovation process based on symbolic knowledge emphasizes individual learning and learning by interacting within and beyond specific professional communities of practice, with cross-fertilization playing a critical role (Manniche and Testa 2010). In contrast, analytical knowledge relies on basic research, with learning being interactive within and between research units, both between and within firms. For synthetic knowledge, learning occurs mainly by doing, by imitation, by using, and by interacting with customers and suppliers.

Symbolic knowledge innovation strongly emphasizes tacit knowledge, which is created and exchanged through direct communication, highlighting the pivotal role of actors and agency (Florida 2002). Symbolic knowledge is highly context-specific, and identifying the actors with the creative and innovative skills necessary for collaboration is crucial (Asheim, Coenen, and Vang 2007). Symbolic knowledge can be shared locally and globally, requiring both geographic proximity and relational proximity (Manniche and Testa 2010). Analytical knowledge, on the other hand, is codified, highly abstract, and universal, and can be shared globally based on relational proximity (Asheim, Coenen, and Vang 2007). Synthetic knowledge has a strong tacit component and is context-specific, requiring geographic proximity.

Crucially, symbolic knowledge is driving innovation in creative industries. Creative industries may transform the cultural landscape when individuals engage with ‘the structure and relations among symbolic elements—to infuse new ideas and meanings into creative products’ (Jones, Lorenzen, and Sapsed 2015: 4). Relevant research suggests that creative products have two key dimensions of symbolic knowledge, semiotic codes, and the material basis, which shape aesthetic experiences (Becker 1982; Friedland and Alford 1991). Semiotic codes capture ‘the primacy of a creative product’s symbolic nature and by such codes artists give meaning to their work and shape how audiences interpret it’ (Jones, Lorenzen, and Sapsed 2015: 5). The material basis comprises the material, technologies, and socio-technical systems that support the production of creative products (Bijker, Hughes, and Pinch 1984; Pinch 2008).

The phases of symbolic knowledge innovation can be conceptualized as a journey of creative ideas that starts with the generation of ideas and ends with the commercial success of innovations (Perry-Smith and Mannucci 2017). During the idea generation and articulation phase, the actors analyse the system context and constraints in order to develop a novel concept (Gruber et al. 2015). Cognitive flexibility is crucial as individuals shift schemas and find associations between distant ideas (Perry-Smith and Mannucci 2017). Subsequently, the idea is systematically evaluated, refined, framed, and prepared for sharing, which is usually met by initial resistance due to its disruptive nature; hence, support from the knowing community to pursue the idea further is crucial. During the development of artefacts phase, actors explore the ideas further through visualizations and potential applications, with the goal of articulating and conveying the impact of the idea on the field through the influence and legitimacy of the knowing community (Perry-Smith and Mannucci 2017). The commercial success phase includes testing the concepts further towards external acceptance, with the innovation becoming the new creative reference point that changes standards in the industry and beyond (Perry-Smith and Mannucci 2017). The analytical phases of symbolic knowledge innovation allow us to illustrate the role of bricolage in the innovation process in the periphery.

2.2 Bricolage and actors’ agency

The concept of bricolage was initially introduced by Lévi-Strauss (1967), and it entails making do with ‘whatever is at hand’ (Lévi-Strauss 1967: 17; Baker and Nelson 2005). Here, we define ‘bricolage’ as a process that brings together inputs from heterogeneous actors on different levels, creating a momentum or a set of circumstances enabling radical change in a resource-constrained location at a particular time (Garud and Karnøe 2003; Grillitsch and Sotarauta 2020). The actors can include entrepreneurs and firm-based agency as well as non-firm, institutional actors and system-level agency (Garud and Karnøe 2003; Grillitsch and Sotarauta 2020).

With its focus on actors utilizing limited resources, bricolage is particularly important as a theoretical lens through which to study new path creation in the periphery (Carvalho and Vale 2018) and symbolic knowledge innovation, as the latter highlights the pivotal role of actors that exchange and create tacit knowledge. Bricolage enables not only the identification of heterogeneous actors involved in the

innovation process, but also the uncovering of exactly how their inputs and activities contribute to the process.

Bricolage is envisaged in terms of (1) the collaboration of heterogeneous actors, (2) co-shaping resources for new purposes, and (3) making do via experimentation and recombination. The strategic agency of heterogeneous actors within a unique locational and historical context can be crucial for innovation through bricolage. Actors can collectively shape the conditions that enable them to mobilize resources and then interact in pursuit of new innovations, solutions, and markets (Garud, Kumaraswamy, and Karnøe 2010). Hence, bricolage entails the accumulating of inputs from heterogeneous actors who adapt, improvise, and utilize a wide range of easily accessible resources, elements, and contexts for new purposes.

Actors' agency has only recently been addressed in the literature on economic geography, despite its importance in understanding regional development (Boschma et al. 2017), a gap highlighted by Grillitsch and Sotarauta (2020). Studies such as the examination by Binz, Truffer, and Coenen (2016) of Beijing's water recycling industry, and Grillitsch and Sotarauta's (2020) 'trinity of change agency' model, addressed actors' agency by incorporating Schumpeterian innovative entrepreneurship, institutional entrepreneurship and place-based leadership as components of agency initiating developmental paths. However, these studies, including that of Isaksen et al. (2019), which differentiated between firm- and system-level agency, overlooked the explicit consideration of agency within peripheral regions.

Recent research has begun to address this gap by turning attention to agency in peripheral contexts. The empirical study on Lapland's pulp industry by Sotarauta, Kurikka, and Kolehmainen (2023) and the conceptual exploration of local agency in various peripheral regions by Nilsen, Grillitsch, and Hauge (2023) are notable examples. Yet, these studies fall short of explicitly delving into how actors' agency occurs, which is what this study sets out to address through the bricolage process. Only recently Carvalho and Vale (2018) and Suitner and Ecker (2020) have considered analytical knowledge innovation through bricolage, in contrast to the current study's focus on unpacking the role of bricolage in fostering symbolic knowledge innovation within peripheral creative and cultural regions.

2.3 The concept of periphery

Scholars specializing in the geography of innovation are increasingly recognizing the significance of innovation occurring in peripheral regions (for a review, see Eder 2019). In order to explore the phenomenon of symbolic knowledge innovation in the creative industry in the periphery, it is necessary to establish a clear definition of the term 'periphery'. The concept of periphery is characterized by conceptual fuzziness, and the field is replete with contentious debates and contradictory perspectives (Pugh and Dubois 2021). For instance, Eder's (2019) findings reveal that a considerable proportion of publications on peripheral regions lack a clear definition of the term.²

Due to this conceptual ambiguity and these perceived weaknesses, the periphery has traditionally been considered unable to break through the locked-in path of lagged regional development and pursue a new path (Tödtling and Trippel 2005; Martin and Sunley 2006; Doloreux and Dionne 2008; Boschma and Frenken 2011). Despite such limitations, recent studies show that new paths can arise in the periphery via related diversification when declining industries are recombined into new ones—that is, path branching (Boschma and Iammarino 2009; Castaldi, Frenken, and Los 2015; Boschma et al. 2017)—or via unrelated diversification by transplantation (Hassink, Isaksen, Trippel 2019) or importation from elsewhere (Martin and Sunley 2006). These may be driven both by endogenous mechanisms (start-ups, institutes, and pools of human capital) and by a much broader array of external (Glückler 2014; Isaksen 2015; Binz, Truffer, and Coenen 2016) and multilevel regionwide and nationwide factors (Dawley 2014).

Here, our intention is to highlight the imperative of adopting a comprehensive perspective that encompasses different dimensions of the periphery (Shearmur 2012), particularly within the context of innovation in creative industries. Drawing on the relational definition of periphery put forward by Glückler, Shearmur, and Martinus (2023), we acknowledge that a peripheral position is relative to the core in a field. Glückler, Shearmur, and Martinus (2023) define periphery on the basis of two key

² Eder (2019) reports that around a quarter of studies omit a definition of periphery altogether. Among those that do define periphery, various approaches are employed, with a quarter using an economic approach, while others use a geographic approach (e.g., low accessibility), both economic and geographic perspectives, or a demographic perspective (e.g., low population density).

dimensions: geography, referring to the spatial location of an actor in a specific territory (in terms of transport, communication, utilities, etc.), and network connectivity, referring to the position of an actor in a system of social transactions, exchanges, and relationships. Accordingly, these two dimensions produce four different types of positions (Glückler, Shearmur, and Martinus 2023): the C–C positions denote central actors in central places, while C–P positions refer to central actors in peripheral spaces or peripheral spaces that house central actors. P–P positions refer to peripheral actors in peripheral places, while P–C positions refer to peripheral actors in central places.

Recent studies in economic geography have shifted the focus towards exploring the opportunities that the periphery may offer, rather than keeping it solely on overcoming adversities (Hautala 2015; Hautala and Jauhianien 2019). For example, actors in C–C positions may intentionally place their activities in C–P positions to foster innovations in protected and opaque environments, as highlighted by Glückler, Shearmur, and Martinus (2023). This idea is based on the fact that '[a]ctors positioned at the fringes of the field are freer to experiment with unconventional ideas because they are less constrained by role expectations or peer pressures and, therefore, more likely to champion dissenting ideas threatening the accepted canons of the field' (Cattani, Colucci, and Ferriani 2016: 127). This strategy is exemplified in Grabher's (2018) study, where architects from the Academy of Arts in Vienna relocated to Vorarlberg to evade resistance at the core. The C–P position can be particularly significant for 'controversial' innovation, where the geographic periphery allows innovators to disconnect from a resistant majority and the pressure to conform that can arise in core locations (Glückler 2014).

The role of the periphery in the context of the creative industry has been overlooked in previous research, perhaps due to the ambiguity of the notion of periphery. Prior studies emphasize the significance of core cultural and creative centres, such as the case of design innovation in women's garments in New York City (Rantisi 2002). In the same vein, the case of individuals seeking to become celebrities, as discussed by Currid-Halkett and Scott (2013), demonstrates that actors locate themselves in core cities so as to align themselves with the status quo. To address this deficiency, we propose a relational perspective in defining 'periphery' based on the dimensions of geography and networks, drawing on the work of Glückler, Shearmur, and Martinus (2023). Given that symbolic knowledge innovation requires both geographic and relational proximity, we contend that to fully understand the role of the periphery for symbolic innovation in creative industries, it is crucial to consider both the spatial and social network position of actors.

3. Research methodology

The Bauhaus movement serves as a single case suitable for capturing the historical unfolding of symbolic knowledge innovation, its phases, and actors' agency in the periphery (Dyer and Wilkins 1991; Stake 1995; Henning 2019). The identification of the case is theoretically grounded, in that the Bauhaus has been acknowledged as the most important and significant European avant-garde movement of the 1920s, with a global impact that challenged and redefined the boundaries of various forms of art and the interface of art and technology (Kentgens-Craig 1998). Our approach can be described as contextualized explanation (Welch et al. 2011, 2022): we study symbolic knowledge innovation in the Bauhaus as being inseparable from its contextual fabric. We further draw on abductive reasoning (Tavory and Timmermans 2014) by allowing theory to inform our study from the beginning. We entered the field with a deep appreciation of economic geography literature that focused on symbolic knowledge innovation and the periphery. In the course of the study and while juxtaposing theory and data (Dubois and Gadde 2002), these theoretical lenses were complemented by the bricolage approach.

3.1 Data collection and analysis

The data collection process integrated a variety of historical sources, both primary and secondary, spanning almost a century. Primary sources included documents (e.g., the Bauhaus Manifesto and letters from Bauhaus actors), diaries, artefacts, autobiographies, and other sources of information (e.g., the *Bauhaus Journal*) that were created at the time under study by Bauhaus actors (or individuals with direct knowledge) and offer first-hand, eyewitness accounts of events (Turnheim and Geels 2012, 2013) (Appendix A). Secondary sources are those that cited, commented on or built upon primary sources and include books, PhD theses, and documentaries. They were generally produced after the phenomenon had taken place, with the benefit of hindsight (Appendix B).

We followed the process suggested by Welch (2000) to identify and access primary and secondary sources and to evaluate their quality. We identified relevant sources by consulting the Bauhaus Foundation and searching major libraries in the UK and internationally (including the British Library, the Bauhaus Archive in Berlin, and several museum and university libraries and electronic resources). The access phase raised challenges associated with the size of archives found in physical or digital form and the difficulties of conducting a focused search for relevant material. Deep immersion in the archives encouraged an appreciation of the diverse voices of the micro, meso, and macro actors of the Bauhaus, as well as a better understanding of the historical context (Decker 2014). Assessment entailed evaluating the quality of sources by employing the four criteria of authenticity, credibility, representativeness, and meaning (Welch 2000). All sources drawn from libraries and formal institutions were properly catalogued, allowing us to confirm the authorship and date of each document, as well as its target audience. Assessing the representativeness of a document was a challenge, as archival records are rarely complete (Decker 2014). The sources we encountered provided either fragmented or very focused accounts of the Bauhaus, but we were able to compensate with insights drawn from material that discussed holistically the entire history of the Bauhaus movement (e.g., Siebenbrodt and Schöbe 2009).

Data analysis and theorizing drew inspiration from abductive reasoning (Tavory and Timmermans 2014) and included multiple iterations between theory and case study evidence as well as zooming in and out of the dataset. We started by sorting primary and secondary historical accounts into a meaningful and systematic order to facilitate our analysis of the data. This phase involved the chronological and spatial sequencing of events and milestones associated with the Bauhaus periods in Weimar, Dessau, and Berlin. It produced an understanding of the multiple facets of the Bauhaus (e.g., movement, school, and philosophy) and generated the Bauhaus timeline and case history.

Once we had developed our case study timeline (Appendix C), we further zoomed in on each location to flesh out the 'ingredients' of symbolic knowledge innovation and its key actors. We followed a temporal bracketing (Langley et al. 2013) analysis that concentrated on the 'progressions of events and activities separated by identifiable discontinuities in the temporal flow' (Langley et al. 2013: 7). Drawing on Perry-Smith and Mannucci (2017), we identified three phases of symbolic knowledge innovation, namely idea generation and articulation, the development of artefacts, and commercial success. For example, the active discourse among key actors for a new era in arts and crafts triggered idea generation and articulation; the Bauhaus Manifesto fully articulated the new idea, thus triggering the development of artefacts; and the acceptance of the artefacts by the knowing community and the establishment of Bauhaus Ltd. triggered the commercialization phase. Temporal bracketing further revealed a view of symbolic knowledge innovation enabled by the interaction of various actors. At this point, we refined our research focus and centred our data analysis around the research question: how does the interaction of actors at different levels shape symbolic knowledge innovation in the periphery? We iterated with relevant literature to explain our findings and adopted the bricolage approach to capture and represent how interactions among heterogeneous actors created symbolic knowledge innovation in the context of the Bauhaus. Our specific focus lay on investigating the utilization of limited resources and examining the actors involved, along with their modes of engagement.

Being mindful of context, we zoomed out of the temporal bracketing of the innovation phases to identify and situate actors at the macro (e.g., national industry, national government, and global knowing community), meso (e.g., local industry, local policymakers, and local social structures), and micro (e.g., directors, masters, and students) levels within the temporal boundaries of each phase. In doing so, we aimed to show patterns and connections illustrating the 'bigger picture'—that is, the contextuality and complexity (Cornelissen 2017) of Bauhaus innovation.

In this article, we aimed at building a rigorous single-case study relying on the recommendations of Cuervo-Cazurra et al. (2016). In line with those authors, we addressed key milestones associated with the identification of the case and a description of the research context, research design, and empirical analysis. We employed data triangulation (Denzin 1989) by gathering primary and secondary data from more than one collection or source. In doing so, we were able to compare texts from different sources in order to check the accuracy and different voices reported in various accounts. We also pursued the strategy of investigator triangulation (Denzin 1989), which allowed the analysis of a single source by all the co-authors of this study. To further enhance the trustworthiness of our findings, we used member checks (Lincoln and Guba 1985). Specifically, we consulted two historians and the descendant of a Bauhaus master in Berlin on our overarching explanations of the Bauhaus innovation.

4. Findings: symbolic knowledge innovation in the periphery through bricolage

We discuss below the findings of our study, starting with the periphery of Weimar and Dessau. We then elaborate on symbolic knowledge innovation in the Bauhaus, which is envisaged in three phases: (1) Semiotic codes: idea generation and articulation. (2) Material basis: development of Bauhaus artefacts. (3) Material basis: commercial success.

Each phase emerges through a bricolage process of collaboration by heterogeneous actors, the co-shaping of resources, and experimentation and making do. We show the involvement of actors at the micro (interactions of actors within Bauhaus), meso (interactions of Bauhaus actors with manufacturers, policymakers, and the knowing community), and macro (historical and institutional context) levels. [Figure 1](#) presents the main phases of symbolic knowledge innovation, through the bricolage and involvement of heterogeneous actors and outputs in Weimar and Dessau. [Table 1](#) gives a detailed account of the different actors at different levels engaged in the respective phases of symbolic knowledge innovation. Each of the phases resulted in specific Bauhaus innovations ([Fig. 1](#)). In the first phase, the key innovation was the Bauhaus Manifesto, which codified the symbolic knowledge innovation and presented a radical solution ([Gruber et al. 2015](#)). Also, the actors co-shaped a novel curriculum that made Bauhaus unique in the world ([Whitford 1984](#)). The key outcome of the second phase was the material symbol of the movement: the Bauhaus building, which subsequently became the icon of modern architecture ([Kentgens-Craig 1998](#)). The final phase included the development of some of the most iconic commercial products, such as the Wassily chair, Marcel Breuer's Cesca chair, and Josef Albers's nesting tables.

4.1 The periphery: Weimar and Dessau

The historical evolution of the Bauhaus movement is illustrated in the timeline ([Appendix C](#)), which marks the pivotal moments in its development. After its establishment in Weimar in 1919, in 1925 the school moved to Dessau, and in 1932 it was moved to Berlin, where it was dissolved in 1933. We focus on the Bauhaus in Weimar and Dessau as crucial locations where new paths of symbolic knowledge innovation were created and further evolved. In line with [Glückler, Shearmur, and Martinus \(2023\)](#) and our empirical evidence, we approach Weimar and Dessau as peripheries since they are spatial locations characterized by a distant and disconnected position from the core, generally low economic development, and network connectivity, which refers to the position of actors in a system of social transactions, exchanges, and relationships ([Table 2](#)).

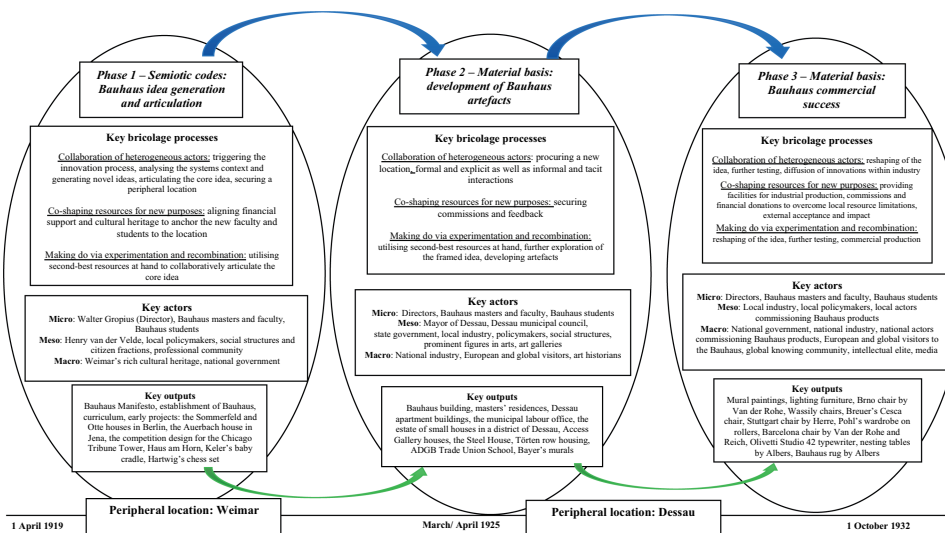


Figure 1. A bricolage process of symbolic knowledge innovation in the periphery: the case of the Bauhaus.

Table 1. The most significant Bauhaus actors, listed by type, and phase of symbolic knowledge innovation.*

Heterogeneous actors	Phase of symbolic knowledge innovation		
	Phase 1—Semiotic codes: Bauhaus idea generation and articulation	Phase 2—Material basis: development of Bauhaus artefacts	Phase 3—Material basis: Bauhaus commercial success
Micro-level actors	<p>Director: Walter Gropius</p> <p>Bauhaus masters and faculty: Lyonel Feininger, Johannes Itten, Gerhard Marcks, George Muche, Paul Klee, Oskar Schlemmer, Adolf Meyer, Wassily Kandinsky, László Moholy-Nagy, Lothar Schreyer, Joost Schmidt, Gunta Stözl</p> <p>Bauhaus students** (e.g., J. and A. Albers, Bayer, Breuer, Brandt, Hoffmann, Citroën, Schawinsky)</p>	<p>Directors: Walter Gropius (1919–28), Hannes Meyer (1928–30), Ludwig Mies van der Rohe (1930–33)</p> <p>Bauhaus masters and faculty: Lyonel Feininger, Johannes Itten, Herbert Bayer, George Muche, Paul Klee, Oskar Schlemmer, Adolf Meyer, Wassily Kandinsky, László Moholy-Nagy, Lothar Schreyer, Marcel Breuer, Piet Mondrian, Hannes Meyer, Gunta Stözl, Hinnerk Scheper, Joost Schmidt, Gertrud Grunow</p> <p>Bauhaus students** (e.g., Arndt, Berger, Seidler, Drewes, Neufert, Reichardt, Weber)</p>	<p>Directors: Walter Gropius (1919–28), Hannes Meyer (1928–30), Ludwig Mies van der Rohe (1930–33)</p> <p>Bauhaus Ltd</p> <p>Bauhaus masters and faculty: Lyonel Feininger, Johannes Itten, Herbert Bayer, George Muche, Paul Klee, Oskar Schlemmer, Adolf Meyer, Wassily Kandinsky, László Moholy-Nagy, Lothar Schreyer, Marcel Breuer, Piet Mondrian, Hannes Meyer, Gunta Stözl, Hinnerk Scheper, Joost Schmidt, Gertrud Grunow</p> <p>Bauhaus students*** (e.g., Arndt, Berger, Seidler, Drewes, Neufert, Reichardt, Weber)</p> <p>Local industry</p> <p>Local policymakers</p> <p>Local actors commissioning Bauhaus products</p>
Meso-level actors	<p>Henry van der Velde</p> <p>Grand Duke of Saxony</p> <p>Local policymakers</p> <p>Local social structures</p> <p>Local citizen fractions</p> <p>Visiting faculty (Theo van Doesburg)</p> <p>‘Friends of the Bauhaus’ (Marc Chagall, Albert Einstein and Gerhart Hauptmann)</p> <p>Professional community (European and global architectural scene)</p>	<p>Fritz Hesse, Mayor of Dessau</p> <p>Dessau municipal council</p> <p>State government of Saxony-Anhalt</p> <p>Local industry (e.g., Junkers factory)</p> <p>Local policymakers</p> <p>Local social structures</p> <p>Local citizen fractions</p> <p>Prominent figures in arts (Von Hoeglein)</p> <p>Art galleries commissioning work (e.g., Gallerie Neumann, Berlin; Gallerie Neue Kunst Fides, Dresden), museums</p> <p>National industry (e.g., manufacturers in Berlin)</p> <p>European and global visitors (over 20,000 global academics, students, architects, engineers, artists, journalists, factory directors, industry, whole organizations)</p> <p>European and global art historians and authors (e.g., Arnheim; Kaufmann; Argan; Johnson; Hitchcock)</p>	<p>National government</p> <p>National industry (e.g., manufacturers in Berlin)</p> <p>National actors commissioning Bauhaus products</p> <p>European and global visitors to the Bauhaus</p> <p>European and global knowing community</p> <p>Intellectual elite circles</p> <p>Media</p>
Macro-level actors	<p>Weimar’s rich cultural heritage</p> <p>National government</p>		

* We define micro-level actors as actors (directors, masters, students) within Bauhaus; meso-level actors as the interactions of Bauhaus actors with manufacturers, policymakers and knowing community; and macro-level actors as the historical and institutional context (national industry, national government, and global knowing community).

** Around 200 students were registered at the Bauhaus in Weimar (Phase 1).

*** Around 1,250 students were registered at the Bauhaus in Dessau (Phases 2 and 3).

Table 2. Supplementary empirical illustrations supporting the C-P definition of locations in Bauhaus.

	Geographical space: periphery	Position of key actors in a social network: Core
Weimar (Phase 1)	<p>'Neither in its churches, nor public buildings, nor streets, does [Weimar] present anything very notable'. (Forgács 1995: 23)</p> <p>'Weimar was physically dominated by the legacy of the dual past ... Weimar's attachment to traditional art forms ... was powerfully enhanced by the presence of the dual art academy ... Weimar was thus known in Germany for its handsome neoclassical architecture, important school of academic painting, and associations with a sacred literary tradition'. (Lane 1968: 70–71) 'But the people of Weimar were quite satisfied with their former Academy of Fine Arts, and did not have the slightest inclination to exchange it for an art that was alien'. (Forgács 1995: 38)</p> <p>'The little town was averse to the [Bauhaus] experiment'. (von Beyme 1998, 92)</p> <p>'... the sheer lack of means ... [Bauhaus in Weimar]' (Franciscono, quoted in Kentgens-Craig (1999: 151)</p> <p>'It's a pity that this piece of work by G. is in such a little place and thus so little known ... moving to such a little town [Dessau] again ...' (I. Gropius, quoted in Scheiffele 1998: 113)</p> <p>'The building [in Dessau] was cut off from the town center by railway lines ... the infrastructure in its immediate vicinity was underdeveloped'. (Kentgens-Craig 1998: 70)</p> <p>'Financial problems always played a part during the Dessau Bauhaus period ... Dessau's annual budget ... led to restrictions in workshop activity'. (Neumuellers 1998: 107–108)</p> <p>'[On Dessau:] industrial town and transportation center: Junkers Works (all-metal airplanes), chemical industry, manufacture of machinery, railroad cars, wooden articles, chocolate, sugar. Renaissance palace, residence of the Dukes of Anhalt; small palaces and town houses in baroque and neo-classic styles. Near the town, at Wörnitz, are large 18th century parks in the English "Romantic" style'. (Bayer et al. [1938] 1975: 99)</p> <p>'Dessau, a town similar in size to Weimar and with similar local attitudes'. (Forgács 1995: 132)</p>	<p>'For more than twenty years, he [Gropius] was at the very centre of European modern art and design'. (MacCarthy 2019: 20)</p> <p>'He saw this [Gropius's design of the Fagus factory] as one of the classic locations of the modern sensibility in architecture ... the International Style's most beguiling contribution to the vocabulary of architecture'. (MacCarthy 2019: 42)</p> <p>'Gropius was being regarded in Berlin as a progressive young architect of promise ... receiving important new commissions, most notably for the 1914 Deutscher Werkbund exhibition'. (MacCarthy 2019: 69)</p>
Dessau (Phases 2 and 3)	<p>'By the late 1920s ... van der Rohe ... had become the leading architectural representative of Germany's avant-garde'. (Schulze and Windhorst 2012: xii/2)</p> <p>'Four years of the Bauhaus constitutes a chapter in art history'. (Forgács 1995: 104)</p> <p>'Gropius succeeded in placing Weimar in the international spotlight ... he presented the Bauhaus as the new cultural sensation for the intellectuals of Germany and all of Europe'. (Forgács 1995: 117)</p> <p>'The phenomenon of tubular furniture clearly illustrates how the Bauhaus changed, from the initiator of future-oriented visions and proposals, into the leading design institute of its day'. (Forgács 1995: 200)</p> <p>'No other building produced by the German avant-garde was as widely and prominently published in the United States before 1936 as the Dessau Bauhaus building. It represented the movement's epitome and was the emblem of the Bauhaus's vision'. (Kentgens-Craig 1999: 112)</p> <p>'A group of highly talented young people emerged from behind the first generation of masters to become significant artists and masters themselves. Among them were Josef Albers, Herbert Bayer, Marcel Breuer, Hinnerk Scheper, Joost Schmidt, and Gunta Stölzl'. (Kentgens-Craig 1999: 114)</p>	<p>'By the late 1920s ... van der Rohe ... had become the leading architectural representative of Germany's avant-garde'. (Schulze and Windhorst 2012: xii/2)</p> <p>'Four years of the Bauhaus constitutes a chapter in art history'. (Forgács 1995: 104)</p> <p>'Gropius succeeded in placing Weimar in the international spotlight ... he presented the Bauhaus as the new cultural sensation for the intellectuals of Germany and all of Europe'. (Forgács 1995: 117)</p> <p>'The phenomenon of tubular furniture clearly illustrates how the Bauhaus changed, from the initiator of future-oriented visions and proposals, into the leading design institute of its day'. (Forgács 1995: 200)</p> <p>'No other building produced by the German avant-garde was as widely and prominently published in the United States before 1936 as the Dessau Bauhaus building. It represented the movement's epitome and was the emblem of the Bauhaus's vision'. (Kentgens-Craig 1999: 112)</p> <p>'A group of highly talented young people emerged from behind the first generation of masters to become significant artists and masters themselves. Among them were Josef Albers, Herbert Bayer, Marcel Breuer, Hinnerk Scheper, Joost Schmidt, and Gunta Stölzl'. (Kentgens-Craig 1999: 114)</p>

In the early 20th century, Weimar in the Thuringia region of Germany was a small town (35,000 inhabitants) whose level of economic development was overshadowed by the dynamic chemical- and energy-generating regions of central Germany (Jürgen 2008). Erfurt was the largest city (140,000 inhabitants) in the region and the most significant transport hub (Jürgen 2008). Also, the region contained a bigger industrial and university town, Jena, where companies such as Zeiss and Schott operated on an international scale (Jürgen 2008). Weimar had an agriculture-led economy with few craftsmen and no established industry. For Bauhaus, the dire economic conditions meant that there were no industry actors to support the innovations, no existing equipment and even no coal to see the winters through (Naylor 1985; Cimino 2003). Also, Weimar was relatively disconnected externally. It was a conservative town, focused on its traditions and culturally rich past associated with the German Enlightenment (e.g., Herder, Goethe, and Schiller) instead of implementing the social and political changes happening in the country at that time (e.g., the November Revolution of 1918) (Cimino 2003). While Weimar was famous for its cultural heritage, it was also renowned for opposing new trends and innovation. The Bauhaus was isolated within Weimar and received very little public support as its 'spirit was alien to the town: artists with a European outlook and reputation, who were not on intimate terms with local Weimar traditions' (Forgács 1995: 38). Our sources portray Weimar as a hostile setting for the Bauhaus movement: 'Weimar was a place of jealously guarded traditions and reactionary opinions, all of them hostile to anything which, like the Bauhaus, proposed innovation and radical change' (Whitford 1993: 30). The international staff and students of the Bauhaus were treated with scepticism as they fostered 'cosmopolitan' rather than 'German' values' (Whitford 1993: 30).

The unwelcoming community and change in the city's political climate forced the relocation of the movement to Dessau, another peripheral location (albeit larger than Weimar, with around 70,000 inhabitants), despite core cities such as Frankfurt, Munich, and Hamburg competing to house the movement's further development (Bayer, Gropius, and Gropius [1938] 1975). Dessau, the capital of the Anhalt region, was a provincial town between the core cities of Berlin and Leipzig. Although twice the size of Weimar, Dessau was inferior to its neighbouring cities in terms of economic development and internal and external connections. Also, it had no notable cultural history, was anonymous domestically and internationally, and was undergoing a housing crisis (Forgács 1995). Gropius had explicitly deliberated on why, on two occasions, he chose a provincial German small town as a site of the Bauhaus. He emphasized two key advantages of small towns in the periphery.

Only those familiar with the cultural quality and importance of the provincial German town can understand why on two occasions a small town was chosen as the site of the Bauhaus ... Thanks to their civic structure and their spiritual vitality, they provide an ideal environment for cultural movements which require strong personal direction and a favorable atmosphere. Comparatively simple administrative machinery; comparatively few authorities (whose decisions can be quickly carried out); a community whose various elements are clearly differentiated and defined—these are the advantages of the provincial city. Both in Weimar and in Dessau a fruitful working atmosphere, free from distraction, and the proximity of beautiful natural surroundings were indispensable factors in the lives of those who worked at the Bauhaus. (Bayer et al. [1938] 1975: 99)

It follows that despite their limitations as peripheral locations, the two towns had advantages that were crucial for symbolic knowledge innovation. The peaceful and remote environment of Weimar, which was disconnected from the political conflicts of core cities, played a crucial role in protecting the Bauhaus from a growing political conservatism and conflicts that were prevalent in the core cities. Dessau was an emerging industrial town with prominent industry leaders (e.g., the Junkers aircraft factory), which constituted a key resource because of the school's significant potential for industrial product development based on its research into materials and techniques and its design experiments (Kentgens-Craig 1998). Because it was an up-and-coming industrial location, Dessau also provided opportunities for the school to contribute to new construction projects. Indeed, it was during the Dessau period that the Bauhaus produced its most notable symbols, including the Bauhaus building. Compared to the core locations, Dessau was also more politically inclined to left-wing ideas, was more hospitable—in that the mayor offered land for Bauhaus use—and had a growing chemical and electronics industry (Bayer Gropius, and Gropius [1938] 1975; Siebenbrodt and Schöbe 2009).

The key Bauhaus actors were positioned at the core of network relationships. Gropius, Meyer, and Van der Rohe were actively involved in the European and global architectural scene (James-

Chakraborty 2006). Before founding the Bauhaus, Gropius was apprenticed to Antoni Gaudí, who was in the midst of constructing the Sagrada Família (MacCarthy 2019). Gropius, Meyer, and Van der Rohe were all apprenticed to the founding father of industrial design and the most famous architect in Germany at the time, Peter Behrens (Schulze and Windhorst 2012; MacCarthy 2019). Also, Gropius and Van der Rohe were active members of the Werkbund group, a progressivism force for German arts, crafts, and architecture (Schulze and Windhorst 2012). In 1911, Gropius and Meyer designed the Fagus factory, considered one of the greatest buildings of early modernism, putting both at the forefront of a new era in art and design (MacCarthy 2019).

4.2 Phase 1—Semiotic codes: Bauhaus idea generation and articulation

Collaboration by heterogeneous actors triggered the generation of the new idea that emerged as the first phase of symbolic knowledge innovation. Before founding the Bauhaus, the key micro-level Bauhaus actors, namely founder and director Gropius and masters Meyer and Van der Rohe, worked together for the German General Electric Company in Berlin and were active on the European and global architectural scene. Through these collaborations, they engaged in projects that were alternatives to the monumental constructions typical of German architecture at that time (James-Chakraborty 2006). This discourse and exchange of tacit knowledge, reflecting the actors' understanding of the limitations of current sociocultural models (Gruber et al. 2015; Perry-Smith and Mannucci 2017), inspired Gropius to articulate the idea in the form of the Bauhaus Manifesto, in which he proposed the creation of a unique institute that would unite art and craft. In framing the problem and presenting a radical solution, the manifesto constituted a crucial semiotic code of symbolic knowledge innovation (Gruber et al. 2015) and represented a key output of this phase. But the actors' working environment in Berlin was repressive, making it an unviable location to develop the radical idea further (James-Chakraborty 2006). The choice of a peripheral location and the establishment of the movement in Weimar were also accomplished through the collaboration of heterogeneous actors. Gropius engaged Van de Velde, the director of the School of Arts and Crafts in Weimar and one of the leading figures in the European arts and crafts movement, to provide meso-level support for the movement to be located in Weimar (James-Chakraborty 2006). Van de Velde shared Gropius's disinterest in standardized German architecture and recommended Gropius as his successor. Gropius submitted a proposal for the directorship of the School of Arts and Crafts in Weimar and gained support from other meso-level actors, including the local governance structures and influential local actors, and succeeded Van de Velde (Whitford 1984):

I travelled here without too much enthusiasm: however, my radical plans met with such support that I have hopes now of their realization. (Gropius after his first negotiations in Weimar, quoted in Isaacs 1991: 205)

But Weimar's art school was of negligible relevance and limited in resources compared with art schools in core locations such as Berlin and Munich. To compensate for this, and in order to pursue innovation, actors at different levels engaged in co-shaping resources for new purposes. Gropius mobilized meso-level actors such as local policymakers and wealthy residents to support and fund the hiring of distinguished new faculty whom he considered world-leading representatives of a new vision in arts and crafts.

Naturally the most important task is to invite strong, vital personalities to join us. We must not meddle with mediocrities, but must do everything within our means to attract significant, well-known personages, even if deep down we do not as yet fully comprehend them. (Gropius, Letter to Ernst Hardt, 14 April 1919, quoted in Isaacs 1991: 209)

He also utilized the town's rich cultural heritage (a macro-level factor) to promote his ambitious idea for the location, attract faculty, and achieve competitive distinction (Swann 2006):

My idea of Weimar is not a small one ... I firmly believe that Weimar, precisely because it is world-famous, is the best place to lay the foundation stone of a republic of intellectuals. (Gropius, Letter to Ernst Hardt, 14 April, 1919; quoted by Forgács 1995: 25)

Gropius successfully set about anchoring (Binz, Truffer, and Coenen 2016) distinguished members of the global avant-garde knowing community into the periphery (Bauhaus masters and faculty) and mitigated the human resource constraint in the location (James-Chakraborty 2006).

The heterogeneous micro-level actors, with their very wide range of knowledge and expertise (architects, sculptors, painters, musicians, etc. as well as students), a crucial resource in symbolic knowledge innovation (Norman and Verganti 2014), engaged in making do via experimentation and recombination in the new location. Guided by Gropius's Bauhaus Manifesto, which promoted collaboration between artists and craftsmen, the actors experimented using cognitive flexibility to articulate the core idea further:

As Gropius envisaged it the Bauhaus, first in Weimar then in Dessau, was a place of light and freedom, concentration and experiment. (MacCarthy 2019: 6)

Now the moment for integration has come No other academy in Germany has a structure that lends itself to integration as this one does. (Gropius, quoted by Forgács 1995: 23)

No large spiritual organizations, but small, secret, self-contained societies, lodges. (Gropius, quoted by Forgács, op. cit., 36)

Furthermore, Gropius and the micro-level actors were unceasingly resourceful, making do with what was at hand: the former school's second-best resources, such as the existing facilities, institutions, forms, routines, models, conventions, and organizational mechanisms:

Ladies and gentlemen, we are poor, not rich. We can't afford to waste materials or time. We have to make the most out of the least. (Josef Albers, quoted by Neumann 1993: 206)

The outcome of these bricolage processes was the second key output of this phase, a co-shaped novel curriculum. The curriculum, by students training to become both artists and craftsmen, made the Bauhaus unique in the world (Whitford 1984). It also changed product meanings by, for instance, integrating Kandinsky's work in architecture and redefining space as a means of implementing individual happiness (Kentgens-Craig 1998).

Due to its disruptive nature, the Bauhaus at first met with resistance from other meso-level actors from the peripheral location of Weimar. Teaching staff from the old institution criticized the new curriculum, local small craftsmen perceived it as a threat to traditional methods, and political opposition suspected it of promoting non-German culture (Whitford 1984). This uncertainty and risk associated with the Bauhaus further evidences its uniqueness and disruptiveness compared with established models (Perry-Smith and Mannucci 2017). Also, the growing influence of the national socialist government in the country caused the Weimar parliament to fall into the hands of the far-right opposition, at which point the Bauhaus lost political support and funding and was closed in 1925.

4.3 Phase 2—Material basis: development of Bauhaus artefacts

Articulation acted as a trigger to materialize symbolic knowledge through the development of artefacts (Perry-Smith and Mannucci 2017). Heterogeneous actors collaborated, firstly to procure a new location for the development of Bauhaus artefacts as epitomized in the Bauhaus Building. In particular, Mayor Hesse of the peripheral city of Dessau used his influence and official standing to secure land and funding and persuaded meso-level actors, such as local industry leaders, of the Bauhaus school's significant potential for industrial product development based on its research into materials and techniques and its design experiments (Whitford 1984; Kentgens-Craig 1998). Notwithstanding the location's constraints, Gropius saw the political support and freedom afforded by a peripheral location as particularly advantageous and chose to move the Bauhaus to Dessau, despite more developed cities such as Darmstadt, Breslau, and Frankfurt am Main competing to attract it (Kentgens-Craig 1998).

Most of the Weimar micro-level actors relocated to Dessau, but, more importantly, due to the growing reputation of the Bauhaus idea, more international experts joined (e.g., Swiss architect Hannes Meyer) (Table 1) (Whitford 1984). Located in the outskirts of Dessau, the Bauhaus was essentially a networked laboratory where the actors communicated through both formal and explicit interactions (e.g., roles and responsibilities in the school) and informal and tacit interactions, for which opportunities were abundant since the micro-level actors lived and worked in the location:

Cultivation of a friendly relationship between masters and students outside work; to include theatre, lectures, poetry, music, costume parties. (Gropius, quoted in [Volkman and De Cock 2007](#): 6)

Next, to develop the artefacts, micro-level actors needed to raise funding, thus co-shaping resources for new purposes. They engaged meso-level local political and social structures and groups of citizens who commissioned the school to undertake various architectural projects, for instance the municipal labour office, an estate of small houses in a district of Dessau, Access Gallery houses, and the Steel House ([Kentgens-Craig 1998](#)). These projects brought income, but also supported the development of artefacts, as the innovations were at the same time tested by the different users and stakeholders, providing feedback ([Gruber et al. 2015](#)):

So, it is all about the linking of creative activity of individuals with the broad craft work of the world! ... Constant contact between the School and leaders of craft and industry in the country ... (Gropius, quoted in [Volkman and De Cock 2007](#): 11, 6)

However, much as in Weimar, the Dessau facilities were inadequate or even non-existent (at an isolated location on the city outskirts) ([Table 2](#)), and the school was forced to make do, via experimentation and recombination, to develop its artefacts. It operated as a vibrant microcosm ([Kentgens-Craig 1998](#)), a networked laboratory based on collective research, a design discourse with experimentation on meanings and design languages ([Verganti 2008](#)), capitalizing on the ability to experiment and recombine ideas independently of interventions ([Glückler 2014](#)).

We could again establish a prosperous working community similar to those medieval builders' workshops we so fondly long for, where architects, sculptors—all sorts of artisans belonging to many guilds—would coexist, autonomously accomplishing their portion of the common task, imbued by the same spirit, full of understanding and respect for the unity of that single, common ideal whose meaning pervades them and fills their being. (Gropius, quoted in [Forgács 1995](#): 16)

I welcome the fact that at our Bauhaus so many differently orientated forces work together. (Klee, quoted in [Volkman and De Cock 2007](#): 11)

Through the development of a common language facilitated by shared vision and understanding ([Hülshager, Anderson, Salgado 2009](#)), the collective production process was highly effective ([Perry-Smith and Mannucci 2017](#)). For example, Hinnerk Scheper's use of colour as a recognition sign builds on ideas from architects and painters, specifically Herbert Bayer's earlier work on murals. The latter, in turn, is based on Wassily Kandinsky's innovative design theories on the match between the basic geometrical forms and the basic colours ([Kentgens-Craig 1998](#)). The making do via experimentation and recombination transcended the Dessau location and included the wider local and global knowing community. Exhibitions, open lectures, visits, and cultural events were organized, which promoted and pushed the radical ideas forward ([Kentgens-Craig 1998](#); [Perry-Smith and Mannucci 2017](#)), but also provided valuable feedback which fed into the experiments. These communities therefore served as key macro-level actors ([Table 1](#)). In total, around 20,000 people visited the Bauhaus between 1927 and 1930 ([Kentgens-Craig 1998](#)).

The key outcome of the second phase was the material symbol of the movement: the Bauhaus building, which subsequently became the icon of modern architecture ([Kentgens-Craig 1998](#)). It had its practical value (i.e., housing the school), but, more importantly, it showcased innovations such as using glass as the purest material (weightless, transparent, its interior and exterior flowing simultaneously), modern steel tubular furniture (light but solid) and new ways of using colour in space (coloured ceilings with light walls) ([Kentgens-Craig 1998](#); [Wilhelm 1998](#)). The opening of the Bauhaus building was a global event, supported by numerous publications in newspapers and magazines ([Kentgens-Craig 1998](#)). The European knowing community recognized the building (and Bauhaus) as the symbol of a new era, 'headquarters of modern design', 'proof of the epoch-making value of the achievements of the new art ... Iron, reinforced concrete and glass' (respectively the observations of Karel Teige and Tadeusz Peiper, quoted in [Kentgens-Craig 1998](#): 117). There was also significant interest and visits to the site from the global knowing community—for instance, visitors from America, where the building was regarded as having 'beauty of PLAN, and great strength of design ... this Mecca of Modernism' (Philip Johnson, quoted in [Kentgens-Craig 1998](#)).

4.4 Phase 3—Material basis: Bauhaus commercial success

The development of artefacts and acceptance from the global knowing community triggered the final phase, commercialization. To create and diffuse commercially viable products, the micro-level actors (Bauhaus directors, masters, and students) collaborated intensively with heterogeneous actors, namely the broader local and national industry (key meso- and macro-level actors) (Kentgens-Craig 1998). Gropius envisioned early on in that the Bauhaus would produce consumer goods in Weimar and appointed a business manager (James-Chakraborty 2006). However, these attempts were unsuccessful: manufacturers were unimpressed because the prototypes were largely unsuitable for mass production (James-Chakraborty 2006). For example, the teapot by Marianne Brandt in 1924 was hand-wrought, with parts made from ebony (Saletnik and Schuldenfrei 2013). The stronger industrial base in Dessau, compared with Weimar, facilitated much stronger collaborations between Bauhaus actors from the workshops and manufacturers, with the school being more appropriately positioned to take advantage of the new products (Kentgens-Craig 1998; Siebenbrodt and Schöbe 2009). Bauhaus Ltd was founded (as a micro-level actor) with the sole purpose of acting as an agency to secure collaborations and sell licences for Bauhaus innovations for production and distribution (Kentgens-Craig 1998):

The practical objective of the Bauhaus workshops—to evolve designs satisfactory from formal and technical points of view which should then be submitted to industry for production—was pursued on a large scale only after the Bauhaus had moved to Dessau. Designs for furniture, lamps, textile, fabrics, metal- and glassware were accepted by manufacturers. The factories were then often visited by Bauhaus designers who studied the processes used and cooperated with technicians to simplify and improve the designs. Conversely, the factories often sent their technicians to the Bauhaus workshops to keep them informed about the development of designs. This was a great improvement over the ineffective dependence on paper projects against which the Bauhaus had rebelled as an inadequate means of communication between designers and industry. (Bayer Gropius, and Gropius [1938] 1975: 135)

In Weimar, the school did not have the facilities for industrial production and was unable to satisfy orders, so commissions were lost (James-Chakraborty 2006). In Dessau, the building served as a hub for micro- and meso-level actors to engage in co-shaping resources to facilitate the manufacturing process. As suggested by Forgács (1995: 135) during the Dessau period, the Bauhaus had ‘the right to experiment, and the duty to produce’. Macro-level actors (Table 2) such as the European and global knowing community also engaged in co-shaping resources by facilitating commissions and providing financial donations for the ongoing work. Also, they disseminated the meaning of the innovations and amplified the message (Verganti 2006) to a wider audience (e.g., the *Bauhaus: 1919–28* exhibition at the Museum of Modern Art, New York, in 1938).³ Acting as gatekeepers (Allen 1977), they were championing the innovations and giving the radical ideas influence and legitimacy as a new creative reference point within the field, a prerequisite for successful commercialization (Perry-Smith and Mannucci 2017).

The Bauhaus micro and meso actors also engaged in making do via experimentation and recombination. The case of Breuer’s tubular chair exemplifies this process (mapped in Appendix D). Breuer collaborated with at least nine different companies and individuals (established metalworkers) to develop the innovation. These actors supplied him with much-needed materials, such as steel tubes, screws, and fabric. But, even more importantly, the actors assisted him in experimenting with design, cutting and bending the tubes, and assembly. The European and global knowing community also provided valuable feedback, regarding novelty and how to incorporate the products into the wider culture. The new prototypes were more functional, with more aesthetic appeal, and developed for mass rather than custom-made production (Forgács 1995). Further evidence of the bricolage processes in each phase is given in Table 3.

This phase was also shaped by macro-level conditions. Due to the economic crisis, Bauhaus innovations remained prohibitively expensive compared to generic products. For example, while a Bauhaus tea service design cost 180 marks, a generic nickelled coffee set cost ten marks (Saletnik and Schuldenfrei 2013). Also, patronage from the wider industry was diminishing. It largely originated from avant-garde art galleries and left-wing artistic and intellectual elite circles (Saletnik and Schuldenfrei 2013). Ultimately, these macro-level actors ensured that Bauhaus innovations became global objects of fascination, although, at the same time, the difficulties surrounding

³ <https://www.moma.org/calendar/exhibitions/2735>

Table 3. Supplementary empirical illustrations of the bricolage process in Bauhaus, by phase of symbolic knowledge innovation.

Key bricolage processes	Phase of symbolic knowledge innovation		
	Phase 1—Semiotic codes: Bauhaus idea generation and articulation	Phase 2—Material basis: development of Bauhaus artefacts	Phase 3—Material basis: Bauhaus commercial success
Collaboration of heterogeneous actors	<p>There is no substantial difference between the artist and the craftsman ... Participation of the students in the works of the masters. (Gropius, Bauhaus Manifesto, quoted in Volkmann and De Cock 2007: 5)</p> <p>For the whole there is no right and wrong, rather it lives and develops through the interplay of forces, just as in the world as a whole good and evil ultimately work together productively' (P. Klee, quoted in Volkmann and De Cock 2007: 11)</p> <p>'... as a common experience, as a common act of devotion, as a common creation'. (Schreyer, quoted in Forgács 1995: 60)</p>	<p>'The 'architect' is dead ... The building materials expert, the small-town master builder, the colourist—each an instrument of co-operation'. (H. Meyer, quoted in Wingler 1980: 60)</p> <p>'I also support the fight of these forces against one another, if the effect should be visible in the resulting achievement. It is a good test for every force to meet with opposition, so long as this opposition remains factual in nature ... For the whole there is no right and wrong, rather it lives and develops through the interplay of forces, just as in the world as a whole good and evil ultimately work together productively'. (P. Klee, quoted in Volkmann and De Cock 2007: 11)</p> <p>'We should be most grateful to accept any and all positive contributions you might make. You, along with me, stand in the centre of the Whole, and the success of our experiment will essentially hinge on our ability to cooperate'. (Gropius, Letter to Emil Lange, 1922, Bauhaus Archiv, Berlin)</p> <p>'In everything I intend to do I am especially counting on you ... Let us help each other, let us will the seemingly impossible, and I am certain that we shall succeed'. (Gropius, quoted in Forgács 1995: 26)</p>	<p>'The fact is that we have to show to outsiders how we perform (and what we are able to produce) in order to win over the industrialists. It is a question of do or die for the Bauhaus. We have to steer towards profitable tasks and mass production'. (Feininger, quoted in Forgács 1995: 98)</p> <p>'Craftsmanship and industry are today steadily approaching one another and are destined eventually to merge into one'. (Gropius quoted in Bayer et al., [1938] 1975: 25)</p> <p>'The artist's studio turns into a scientific laboratory ... The new creation is collective work'. (Meyer, quoted in Forgács 1995: 154)</p> <p>'[Artists] will compel industry to serve their idea and industry will seek out and utilize their comprehensive training'. (Gropius, quoted in Whitford 1984: 31)</p>

(continued)

Table 3. (continued)

Key bricolage processes	Phase of symbolic knowledge innovation		
	Phase 1—Semiotic codes: Bauhaus idea generation and articulation	Phase 2—Material basis: development of Bauhaus artefacts	Phase 3—Material basis: Bauhaus commercial success
Co-shaping resources for new purposes	<p>'Together let us desire, conceive, and create the new structure of the future, which will embrace architecture and sculpture and painting in one unity ...' (Gropius, 1919, speech, quoted in Whitford 1984: 31)</p> <p>'We could again establish a prosperous working community similar to those of medieval builders ... where architects, sculptors—all sorts of artisans ... would coexist ... accomplishing their portion of the common task'. (Gropius, quoted in Forgács 1995: 16)</p> <p>'The wall of conceit that separates the artist from the workman must disappear ... Away with the snobbery of art— let us all learn to be laborers for the common good in the great democracy of tomorrow'. (Gropius, quoted in Kentgens-Craig 1998: 129)</p>	<p>'... the connections between the various Bauhaus workshops, which made it possible to work jointly on large commissions, opened for the student a view of the whole and of his particular task—and much more' (G. Stadler-Stözl quoted in Neumann 1993: 138)</p> <p>'The personality of each student is allowed to develop freely in his work in order to enable him to contribute to the practical realization of the common idea'. (Itten, quoted in Forgács 1995: 79)</p> <p>'If we wish to survive, then it is not only a desideratum but a must that we focus all upcoming efforts on this task. From today on a state of emergency will take effect, linking the work of each individual and each workshop to the idea and realization of the exhibition'. (proclamation by Gropius and other masters, quoted in Forgács 1995: 100)</p> <p>'The task of the exhibition, made nearly superhuman by the additional stake of the school's survival or extinction ... served as a challenge to the entire "membership" ... leaving no alternative but total dedication of maximal work capacity on the part of every individual: giving all to the collective, or else leaving the school'. (Forgács 1995: 100)</p>	<p>'By injecting functionalism into the representative, highly expressive architectural ideas of the former Glass Chain, Gropius offered proof positive that here, indeed, was a new unity'. (Forgács 1995: 134)</p> <p>'What the Bauhaus preached in practice was the common citizenship of all forms of creative work, and their logical interdependence on one another in the modern world'. (Gropius quoted in Bayer et al., [1938] 1975: 127)</p> <p>'Herr van der Rohe and his colleagues brought about a solution of the school's problems ... an empty factory building being quickly adapted into classrooms and workshops ... No attention was paid to the exterior graces of the house but an atmosphere of energy, co-operation and good-will still marks the whole school'. (Turkel-Deri, quoted in Kentgens-Craig, 1998: 115)</p>

(continued)

Table 3. (continued)

Key bricolage processes	Phase of symbolic knowledge innovation		
	Phase 1—Semiotic codes: Bauhaus idea generation and articulation	Phase 2—Material basis: development of Bauhaus artefacts	Phase 3—Material basis: Bauhaus commercial success
Making do via experimentation and recombination	<p>'I come to Weimar full of excitement and with the firm intention of creating one great Whole ... For us, kindred spirits, remains the task of truly desiring to bring about something grand; our intellectual cooperation must succeed, in spite of material obstacles' (Gropius, quoted in Isaacs 1991: 209).</p> <p>'These days our state has hardly any money for cultural purposes ... only those among you will remain as professional artists who are ready to starve for it'. (Gropius, quoted in Forgács 1995: 35)</p> <p>'Bauhaus had been compelled to start its own vegetable garden on its plot of land, to provide food for its kitchen during these difficult inflationary times'. (Forgács 1995: 101)</p> <p>'I was particularly attracted by the studios and workshops and the fact that the Bauhaus was still empty so that the new could be built without much tearing down of the old'. (Itten on accepting Gropius's invitation to Weimar, quoted in Forgács 1995: 51).</p> <p>'... limitation obviously makes the creative mind inventive' (Gropius, quoted in Pearlman 2007: 206)</p> <p>'Remember that often the fewest gestures take us the longest way ... If you can do without any accessories, such as cutters, scissors or glue, all the better ...' (Albers in communication to his students, quoted in Wick 1982: 166)</p> <p>'The community creates itself, it is born of need'. (Gropius, quoted in Forgács 1995: 57)</p>	<p>The most important thing for the Bauhaus is to amass a series of finished, high-quality works that will make it possible to, one day, appear before the public with these works as the results of its labours'. (Gropius, 1920, quoted in Forgács 1995: 107)</p> <p>'After the first two and a half years of our existence, we have reached a point at which we can set out in the direction of practical work ... Towards this end we intend to establish a large-scale experimental studio where practical workshop problems may be addressed'. (Gropius, quoted in Forgács 1995: 82)</p> <p>'Remember that often the fewest gestures take us the longest way'. (Beckmann, quoted in Forgács 1995: 140)</p> <p>'In the midst of a rapidly worsening inflation and the hard reality of a country at an economic nadir, this was the only chance for generating some income'. (Forgács 1995: 70)</p> <p>'The economic situation in the past few months forces us to realize the planned exhibition in a form that, in view of current fiscal realities, will be limited, but in quality all the more outstanding'. (Humbelt, cited in Forgács 1995: 99)</p> <p>'The tension was further increased by the arduous struggle to squeeze a modicum of financial assistance out of parliament'. (Forgács 1995: 100)</p> <p>'I would like you to take these newspapers in hand, and make something more out of them than what they are at present ... If you can do without any accessories, such as cutters, scissors or glue, all the better'. (Beckmann, quoted in Forgács 1995: 140)</p>	<p>'The Bauhaus workshops are essentially laboratories in which prototypes of products suitable for mass production ... are carefully developed and constantly improved'. (Gropius, quoted in Forgács 1995: 147)</p> <p>'... the financial position of the school in 1926 was, if anything, worse than it had been in Weimar. ... The Bauhaus did not always receive the payments due for industrial orders ... The town itself was not in a financial position to support the school'. (Forgács 1995: 149)</p> <p>'All Bauhaus workshops were busy filling orders ... more than fifty firms were buying Bauhaus products to such an extent that the scarcity of machinery and capital made it impossible to fill all orders'. (Bayer et al., [1938] 1975: 85)</p>

commercialization prohibited their assimilation into the general culture and everyday life of Germans and citizens globally. Also, the Bauhaus was in opposition to the national political environment (Forgács 1995). Cosmopolitanism, the novelty of its radical ideas and the Jewish origins of half its staff and students made the Bauhaus vulnerable in light of the growing political unrest which, when the local government fell under the power of the nationalists in 1932, ultimately led to the closure of the Bauhaus in Dessau (Whitford 1984).

5. Discussion and conclusions

In this study, we have explored how symbolic knowledge innovation emerges in the periphery. Symbolic knowledge drives innovation and growth in creative industries, contributing to income generation in many countries. Creative industries are projected to grow further due to trends towards the so-called 'experience economy' (Dharmani, Das, and Prashar 2021). We used as our empirical context the case of the Bauhaus, the most important European avant-garde design movement of the 1920s, which redefined the boundaries of art and technology.

First, our findings illustrate how symbolic knowledge innovation can develop in the periphery through three bricolage processes: collaboration by heterogeneous actors, co-shaping resources for new purposes, and making do via experimentation and recombination. All three involve interactions among heterogeneous micro, meso, and macro actors. Following prior studies emphasizing the role of agency in new path creation (Garud and Karnøe 2003; Grillitsch and Sotarauta 2020), we find that bricolage enabled Bauhaus actors to overcome the resource constraints in both Weimar and Dessau.

This contributes to recent studies which have explored new path creation in the periphery based on analytical or synthetic knowledge. While the latter two paths find a key role for policy action and exogenous sources as solutions to resource constraints and enablers of path creation (Isaksen and Trippel 2017), our data show how symbolic knowledge innovation is different; it points to a pivotal role for bricolage and heterogeneous actors at different levels. Other studies also point out the importance of firm- and system-level agency for path creation (Isaksen et al. 2019), but our study highlights the much broader and more comprehensive role of agents at different levels, including the micro-level. This contributes to studies of economic geography that unpack the processes shaping new path development in greater detail, where, as Grillitsch and Sotarauta (2020: 705) put it, 'There is a dearth of knowledge about what actors do to create and exploit opportunities in given contexts', particularly at micro-level. Also, while prior research underlines the importance of co-evolutionary processes (Binz, Truffer, and Coenen 2016), it overlooks the salience of the actors involved in these processes.

Second, our findings suggest that the agency of the heterogeneous micro, meso, and macro actors varies according to the phase of symbolic knowledge innovation. For example, our data point to a significant degree of involvement of micro actors in the first phase: Gropius proposed new visions and meanings and the masters contributed to the articulation of the core idea. In the second phase, the research process on meanings and design languages took place outside the boundaries of the school and relied on inputs and feedback from a variety of meso-level actors, making prototyping highly iterative and interdisciplinary (Gruber et al. 2015). In the third phase, industrial production also reached beyond the school boundaries and involved industry actors, building on Dessau's stronger industrial base and proximity to core cities.

Beyond this, we have introduced and explored the agency of a plethora of other types of actors, such as the cultural heritage of the organization and the local social structures influencing innovation. We have contributed to economic geography literature by extending the work of Isaksen and Trippel (2017), which focused on new path creation in the periphery based on analytical or synthetic knowledge. Here, we demonstrate that it is possible for another route—based on a symbolic knowledge innovation—to emerge in the periphery.

Third, the Bauhaus case shows how the periphery was a deliberate choice on the part of the movement's key protagonists. This is in line with most recent economic geography literature emphasizing the advantages of the periphery, such as unconstructed pressures for conformity and the opportunity for exploration (Cattani and Ferriani 2008; Glückler 2014; Grabher 2018; Eder and Trippel 2019), which are particularly beneficial when the ideas are controversial (Sgourev 2021). Both peripheral locations enabled the Bauhaus to pursue ideas in isolation from national political opposition, to capitalize on a stronger connection between the policymakers providing financial and cost incentives and to deploy

soft factors in terms of the location's natural resources and rich history as key attractors for anchoring. We have also been able to 'identify conditions under which one element is more or less beneficial than another' (Perry-Smith and Mannucci 2017: 72). For example, because of the resource constraints in Dessau, the role of meso-level actors such as the local government and local industry was very prominent, which presumably would not be the case if the innovation had emerged in a core location.

Our article contributes methodologically to economic geography literature by also unravelling the macro historical context of the Bauhaus movement, that is, the political and economic climate in big cities. Due to political opposition in large cities, a small town in the periphery was the appropriate place for the Bauhaus to emerge. But, as the hostility of the macro environment also spread to peripheral locations, the Bauhaus was forced to relocate and ultimately dissolve in Germany. This points to the need for more research on how dynamic hostility in the environment may impact path creation, which to date has been limited (a notable exception is, e.g., Wyrwich 2012), but may warrant more attention considering the current trends towards populism and antiglobalization (Broz, Frieden, and Weymouth 2021).

The Bauhaus case offers lessons for today's creative industries and has policy implications. Previous research shows that innovation based on synthetic knowledge requires policy to engage in multiple ways, such as attracting non-local firms and developing favourable policies (Isaksen and Trippl 2017). However, symbolic knowledge innovation, as exemplified by the Bauhaus case, demands an even stronger role for policy. Here, policy actors engaged with actors on both micro and meso level, on a continuous (even daily) basis, supporting the innovation in multiple ways. This included attracting key micro actors (local policymakers supporting Gropius in taking over the former school and hiring distinguished faculty), aligning resources (Mayor Hesse providing the location and financial support), acting as customer (by commissioning the school to undertake architectural projects) and engaging in the innovative process by providing feedback on prototypes. As mentioned above, the Bauhaus case also revealed that policy can play a hostile role, as political oppression and a lack of policy support were the main reasons for the school's closure in both Weimar and Dessau. This shows that path creation based on symbolic knowledge is possible in the periphery if there is significant policy support and engagement from individual policymakers, even in the face of opposition from other policymakers.

The Bauhaus is a case of symbolic knowledge innovation developed in the peripheral locations of Weimar and Dessau, while the key micro actors were at the core of network relationships. Future research on symbolic knowledge innovation considering a different combination of geography and network may therefore yield different insights. Interesting questions could be, for example, whether and how synthetic knowledge innovation can develop if geographical and network relationships are both peripheral. Other methodologies testing these issues, such as a comparative case study, could also be beneficial.

Acknowledgements

We would like to thank the Editor of the *Journal of Economic Geography*, Neil Coe, for his guidance and advice during the review process. We are also grateful for the detailed and constructive comments by the three reviewers, which have immensely benefited our article. We acknowledge the valuable feedback we received from the participants of the DRUID Copenhagen Business School, the European International Business Academy, British Academy of Management, Royal Geographic Society, and Geography of Innovation conferences. Finally, we are grateful for useful feedback on earlier versions of this work by Manuel Barcia, Patrick Cohendet, Stephanie Decker, Frank Finlay, Ram Mudambi, and Max Nathan.

Conflict of interest statement. None declared.

Funding

There are no financial conflicts of interest to disclose.

Data availability

The data underlying this article are available in the article.

Appendix A

Selection of primary data sources used in this study (in English and German)

No	Citation
1	Bayer, H., Gropius, W. & Gropius, I. (eds.) (1938) <i>Bauhaus 1918–28</i> . New York: Museum of Modern Art.
2	Bayer, H., Gropius, W. & Gropius, I. (eds.) (1952) <i>Bauhaus 1918–28</i> . Boston: Charles T. Branford Co.
3	Bayer, H., Gropius, W. & Gropius, I. (eds.) (1955) <i>Bauhaus 1918–28</i> . Teufen.
4	Bayer, H., Gropius, W. & Gropius, I. (eds.) (1972) <i>Bauhaus 1918–28</i> . New York: Museum of Modern Art.
5	Bayer, H., Gropius, W. & Gropius, I. (eds.) (1975) <i>Bauhaus 1918–28</i> . London: Secker and Warburg.
6	Gropius, W. (1935). <i>The Bauhaus</i> . London: Faber and Faber.
7	Gropius, W. (undated-a) Unsigned document, n. d., Bauhaus Archive, Berlin, File 73 Bauhaus AG.
8	Gropius, W. (undated-b) Zu Nr. 2 des HAB, n. d., Bauhaus Archive, Berlin, File 75 Bauhaus GmbH.
9	Gropius, W. (undated-c) Bauhaus Dessau company contract, n. d., Bauhaus Archive, Berlin, File 75 Bauhaus GmbH.
10	Gropius, W. (undated-d) Management procedures, n. d., Bauhaus Archive, Berlin, File 75 Bauhaus GmbH.
11	Gropius, W. (1919a) 'Die Sich zur Wundertat der Gotischen Kathedrale Aufschwung' Austeilung, für Unbekannte Architekten, Bauhaus Archive, Berlin, File 73.
12	Gropius, W. (1919b) Ja! Stimmen des Arbeitsrates für Kunst, Bauhaus Archive, Berlin, File 69.
13	Gropius, W. (1919c) Gropius text, dated 1919, Bauhaus Archive, Berlin, File 12.
14	Gropius, W. (1919d) Gropius first lecture to the Bauhaus, Bauhaus Archive, Berlin, File 18.
15	Gropius, W. (1919e) Bauhaus Manifesto, Bauhaus Archive, Berlin, File 21.
16	Gropius, W. (1919f) Bauhaus curriculum, Bauhaus Archive, Berlin, File 6.
17	Gropius, W. (1920) Minutes of the meeting of the Council of Masters, Gropius, W. September 1920, Bauhaus Archive, Berlin, file Meisterrat.
18	Gropius, W. (1923a) Idee und Aufbau des Staatlichen Bauhauses, München.
19	Gropius, W. (1923b) Letter from Gerhard Marcks, Bauhaus Archive, Berlin, File 78.
20	Gropius, W. (1923c) Letter to Gropius, possibly from Franz May, 10 October 1923, Bauhaus Archive, Berlin, File 73 Bauhaus AG.
21	Gropius, W. (1924a) Besprechung Über Gründung der Bauhaus-Produktive-GmbH., 19 January 1924, Bauhaus Archive, Berlin, file Berlin GmbH.
22	Gropius, W. (1920) Minutes of the meeting of the Council of Masters, Gropius, W. September 1920, Bauhaus Archive, Berlin, file Meisterrat.
23	Gropius, W. (1923a) Idee und Aufbau des Staatlichen Bauhauses, München..
24	Gropius, W. (1923b) Letter from Gerhard Marcks, Bauhaus Archive, Berlin, File 78
25	Gropius, W. (1923c) Letter to Gropius, possibly from Franz May, 10 October 1923, Bauhaus Archive, Berlin, File 73 Bauhaus AG.
26	Gropius, W. (1924a) Besprechung Über Gründung der Bauhaus-Produktive-GmbH., 19 January 1924, Bauhaus Archive, Berlin, file Berlin GmbH.
27	Gropius, W. (1924b) Letter to the Ministers, 21 March 1924, Bauhaus Archive, Berlin, File 75, An die Staatsminister.
28	Gropius, W. (1924c) Zu Nr. 1 des Haushaltsausschussbeschlusses (HAB), n. d., Bauhaus Archive Berlin, File 75 Bauhaus GmbH.
29	Gropius, W. (1924d) Letter written by the founding members of Bauhaus-Weimar to the Thuringian government, dated November 1924, Bauhaus Archive, Berlin, File 75 Bauhaus GmbH.
30	Gropius, W. (1924e) Aufstellung der bisher gezeichneten GmbH-Anteile, dated 8 December 1924, Bauhaus Archive, Berlin, File 75 Bauhaus GmbH.
31	Gropius, W. (1924f) Bauhaus Weimar company contract 1924, Bauhaus Archive, Berlin, File 75 Bauhaus GmbH.
32	Gropius, W. (1924g) Letter from Gropius to the Thuringian government, 19 October 1924, Bauhaus Archive, Berlin, File 72, Dokumente der wirtschaftlichen Situation.
33	Gropius, W. (1924h) Draft letter, 18 June 1924, Bauhaus archive, Berlin, File 77 Kreis der Bauhausfreunde (1924i) Report on the Economic Prospects of the Bauhaus, 19.10.1924.
34	Gropius, W. (1925) <i>Internationale Architektur</i> . München: Albert Langen Verlag.
35	Gropius, W. (1931) Bauhaus brochure, Bauhaus Archive, Berlin, File 78.
36	Gropius, W. (1935) <i>The New Architecture and the Bauhaus</i> . Morton Shand, P. (tr.). London: Faber & Faber.
37	Gropius, W. (1937) <i>The New Architecture and the Bauhaus</i> . Morton Shand, P. (tr.). New York: Museum of Modern Art.
38	Gropius, W. (1952) <i>Architecture and Design in the Age of Science</i> . New York: Spiral Press
39	Gropius, W. (1955) <i>Scope of Total Architecture</i> . New York: Harper & Bros.
40	Itten, J. (1975). <i>Design and Form: The Basic Course at the Bauhaus</i> . London: Thames and Hudson.

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No	Citation
41	Itten, J. (1921) 'Analysen der Alter Meister' in <i>Utopia: Documents of Reality</i> . Leipzig: Pausch.
42	Itten, J. (1961) <i>The Art of Color</i> . Van Haagen, E. (tr.). New York: Reinhold.
43	Itten, J. (1963) <i>Mein Vorkurs am Bauhaus, Gestaltung und Formenlehre</i> . Ravensburg.
44	Itten, J. (1972) <i>Werke und Schriften</i> . Zürich: Orell Füssli Verlag.
45	Kandinsky, W. (1925) Correspondence between Wassily Kandinsky, Ise Gropius and Walter Gropius, Archive, Berlin, File 650496.
46	Kandinsky, W., & Rebay, H. (1947). <i>Point and Line to Plane</i> . Courier Corporation.
47	Meyer J. & Goetz-Hardt, T. (eds.) (1975) <i>Briefe an Ernst Hardt, Eine Auswahl aus den Jahren 1898–1947</i> . Marbach: Deutsches Literaturarchiv.
48	Moholy-Nagy, L. (1923). The new typography. Reprinted in V. Kolocotroni, J. Goldman and O. Taxis (eds) (1998) <i>Modernism: An Anthology of Sources and Documents</i> , pp. 302. Edinburgh: Edinburgh University Press.
49	Moholy-Nagy, L. (1932) <i>The New Vision</i> . Hoffman, D. M. (tr.). New York, Berlin: Brewer, Warren & Putnam.
50	Schlemmer, O. (1961) <i>The Theater of the Bauhaus</i> . Wensinger, A. S. (tr.), Middletown, CT: Wesleyan University Press.

Source: Authors' field trip to Bauhaus premises in Dessau and Berlin.

Appendix B

Selection of secondary data sources used in this study (in English and German)

No	Citation
1	Anker, P. (2010). <i>From Bauhaus to Ecohouse: A History of Ecological Design</i> . LSU Press.
2	Baudrillard, J. (1981) <i>For a Critique of the Political Economy of the Sign</i> . Levin, C. (tr.). St. Louis: Telos Press.
3	Binder, T., Löwgren, J., Malmberg, L. (eds) (2008) <i>(Re)Searching The Digital Bauhaus</i> . Springer Science & Business Media.
4	Bitterberg, K-G. (ed.) (1975) <i>Catalogue to Bauhaus Exhibition</i> . Visual Arts Board, Australian Council for the Arts.
5	Chen, W., He, Z. (2013) The analysis of the influence and inspiration of the Bauhaus on contemporary design and education. <i>Engineering</i> 5.
6	Dearstyne, H. (1986) <i>Inside the Bauhaus</i> . Spaeth, D. (ed.). New York: Rizzoli.
7	Droste, M. (1993) <i>Bauhaus 1919–1933</i> . Cologne: Benedikt Taschen.
8	Droste, M. (1998) <i>Bauhaus 1919–1933</i> . London: Taschen..
9	Ehn, P. (1998) Manifesto for a digital Bauhaus. <i>Digital Creativity</i> , 9: 207–216.
10	Franciscono, M. (1971) <i>Walter Gropius and the Creation of the Bauhaus</i> . Urbana, Chicago, London: University of Illinois Press.
11	Fiedler, J., Feierabend, P. (eds.) (2000) <i>Bauhaus</i> . Cologne: Koenemann Verlagsgesellschaft.
12	Giedion, S. (1954) <i>Walter Gropius, Work and Teamwork</i> . Tyrwhitt, J. (tr.). London: Architectural Press.
13	Hahn, P. (ed.) (1985) <i>Bauhaus Berlin, Auflösung Dessau, Schliessung Berlin 1933, Bauhäusler und Drittes Reich</i> , Weingarten.
14	Henderson, R. M., & Clark, K. B. (1990) Architectural innovation: the reconfiguration of existing product technologies and the failure of established firms. <i>Administrative Science Quarterly</i> , 35: 9–30.
15	Isaacs, R. (1985) <i>Walter Gropius: Der Mensch und sein Werk</i> . Bd. 1. Berlin, Wien: Ullstein.
16	Isaacs, R. (1991). <i>Gropius: An Illustrated Biography of the Creator of the Bauhaus</i> . London: Bullfinch Press.
17	Kentgens-Craig, M. (1996). <i>Das Bauhaus zerstört 1945–1947 das Bauhaus stoert ... Der Versuch einer Neueröffnung des Bauhauses in Dessau nach dem Ende des zweiten Weltkrieges</i> . Dessau: Anhaltische Verlagsgesellschaft.
18	Kentgens-Craig, M. (1998). <i>The Dessau Bauhaus Building, 1926–1999</i> . Princeton Architectural Press.
19	Kentgens-Craig, M. (1999) <i>The Bauhaus and America. First Contacts 1919–1936</i> . Cambridge, MA: The MIT Press.
20	Lewer, D. (2005). <i>Post-Impressionism to World War II</i> (Vol. 1). Wiley-Blackwell.
21	Lewer, D. (2013). Introduction: art and cultural politics in the German Democratic Republic. <i>Art in Translation</i> , 5: 5–13.
22	Miller Lane, B. (1968) <i>Architecture and Politics in Germany, 1918–1945</i> . Cambridge, MA: Harvard University Press.
23	Neumann, E. (1993) <i>Bauhaus and Bauhaus People</i> . Richter, E., Lorman, A. (trs.). New York: Van Nostrand & Reinhold, London: Chapman Hall.

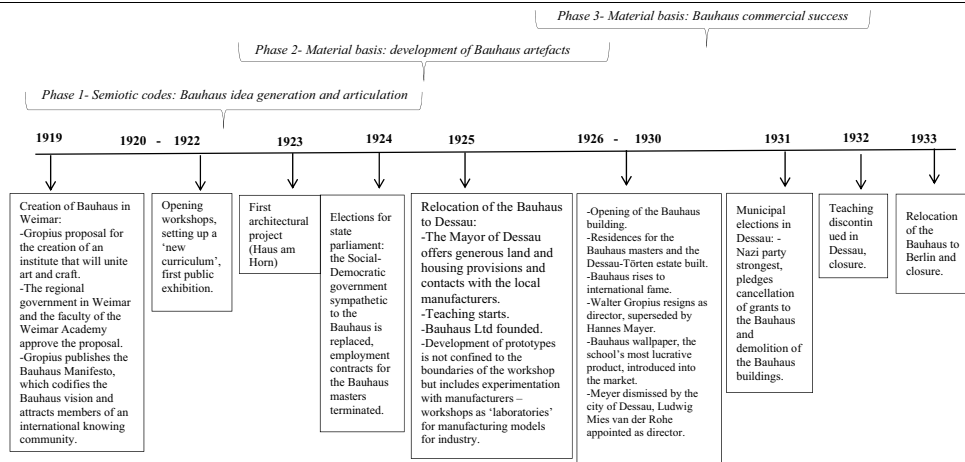
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No	Citation
24	Müller, U., Radewaldt, I., Kemker, S. (2009) <i>Bauhaus Women: Art, Handicraft, Design</i> . Paris: Flammarion.
25	Roters, E. (1969) <i>Painters of the Bauhaus</i> . New York: Praeger Publishers.
26	Rüedi, K. (2010) <i>Bauhaus Dream-House: Modernity and Globalization</i> . Abingdon, UK: Routledge.
27	Schmitz, N. (2000) The preliminary course under Josef Albers: creativity school. In J. Fiedler and P. Feierabend (eds) <i>Bauhaus</i> , pp. 374–381. Cologne: Koennemann Verlagsgesellschaft.
28	Schnaidt, C. (1965) <i>Hannes Meyer: Bauten, Projekte und Schriften</i> . Teufen AR: Arthur Niggli.
29	Schwartz, F. C. (1996) <i>The Werkbund: Design Theory & Mass Culture Before the First World War</i> . London/New Haven: Yale University Press.
30	Ulbricht, J. H. (2000) The Bauhaus and the Weimar Republic: struggles for political and cultural hegemony. In J. Fiedler and P. Feierabend (eds) <i>Bauhaus</i> , pp. 26–33. Cologne: Koennemann Verlagsgesellschaft.
31	Weber, N. F. (2009) <i>The Bauhaus Group</i> . New York: Knopf.
32	Whitford, F. (1984) <i>Bauhaus</i> . London: Thames & Hudson.
33	Whitford, F. (1993) <i>The Bauhaus. Masters and Students by Themselves</i> . Woodstock, NY: The Overlook Press.
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Appendix C

Bauhaus timeline



Source: Adapted from the Bauhaus Archive, 1919–33, available at: https://www.bauhaus.de/en/das_bauhaus/48_1919_1933/

Appendix D

The heterogeneous actors in the process of development of Breuer's tubular steel furniture

Collaborators/firms	Role
Manesman	Supplied precision steel tubes
Kolb & Co. (Dessau)	Supplied screws, experimented with assembly
Metal screw factory (unidentified)	Supplied screws
Georg Flechtner (and his firm)	Experimented on cutting and bending the tubes
Gürtlerei und Vernickelungsanstalt Krell (metal firm) (Dessau)	Nickel-plating of tubes
Rätz (building firm) (Dessau)	Assembly
Teppich Bursch (textile firm from Berlin)	Supplied fabric
metalworker K. Körner from Junkers factory (Dessau)	Design experiments*
local master of metalwork (Dessau)	Design experiments*

Note: * The role of the individuals has not been fully established, but it is presumed that they were involved during particular design phases (Based on [Kentgens-Craig 1998](#): 38).

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