COMPANIES AS LOCAL SKILL-PROVIDERS? THE 'SKILLS ECOSYSTEM' IN MEXICO

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With 1 table and 1 appendix
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Summary: A focus of economic geography is on how actors promote the local knowledge base. Studies usually show that companies act as recipients of locally generated knowledge, and not as producers of knowlege. Recruiting graduates of local vocational schools and universities enables the companies to play this role. However, companies sometimes also act as providers of knowledge, in the sense that they offer apprenticeships or comprehensive internships for pupils and students. This article focuses on this interface of 'dual' actvities, which connect the companies with vocational schools and universities. Recently, the concept of the skills ecosystem, which addresses this interface within the local actor network, has become popular. Starting with this concept and embedding it into the debate of economic geography, this contribution focusses on Mexico and investigates how the local actors integrate companies in dual activities. Based on qualitative methods, the study illustrates that there is a two-part skills ecosystem in Mexico's Central Highland. The smaller part consists of dual vocational education and training and is found in the technological 'high-road' part of the economy. The other part mainly comprises low-tech and mostly smaller companies that do not engage in dual practices. The conclusion discusses the contribution of a skills ecosystems-approach to future research.

Zusammenfassung: Wirtschaftsgeographische Forschungen zu der Frage, wer an der Produktion lokalen Wissens beteiligt ist, gehen meistens davon aus, dass Unternehmen als Empfänger von lokal generiertem Wissen agieren. Entsprechend richtet sich der Blick darauf, dass Unternehmen Absolventen lokaler Berufsschulen und Hochschulen rekrutieren. Manchmal fungieren Unternehmen aber auch ihrerseits als Wissensanbieter, indem sie Ausbildungsplätze oder umfassende Praktika für Berufschüler_innen und Studierende anbieten. Dieser Artikel fokussiert auf die Schnittstelle von „dualen" Aktivitäten, die die Betriebe mit Berufsschulen und Hochschulen verbinden. Dabei greift der Beitrag das Konzept des Skills Ecosystems auf, das in Wissenschaft und Praxis in letzter Zeit überaus populär geworden ist. Das Konzept adressiert eben diese Schnittstelle zwischen (Aus-)Bildungsinstitutionen und Betrieben. Dieser Beitrag untersucht am Beispiel von Mexiko, wie es den lokalen Akteuren in Mexikos Zentralem Hochland gelingt, die Unternehmen in duale Aktivitäten einzubinden. Basierend auf qualitativen Methoden veranschaulicht die Studie, dass es in Mexiko ein zweiteiliges Skills Ecosystem gibt. Der kleinere Teil besteht aus einer dualen Berufsausbildung und ist im technologischen „High-Road"-Teil der Wirtschaft zu finden. Der andere Teil besteht hauptsächlich aus Low-Tech- und meist kleineren Unternehmen, die keine dualen Praktiken betreiben. Das Fazit diskutiert den Beitrag des Skills Ecosystem-Konzepts für zukünftige Forschung.

Keywords: economic geography, developing countries, Mexico, education, skills ecosystem

1 Introduction

Actors who promote local knowledge production improve the economic performance of the region (Boschma et al. 2013; Fromhold-Eisebith et al. 2014; Rutten and Boekema 2012). The main actors are educational organisations that perform training activities, such as universities and vocational schools, and governments that set the rules of the educational system (Asheim and Coenen 2005; Asheim et al. 2017). Moreover, companies *can* play an important role as skill providers. For example, in Germany, Switzerland and Austria, companies comprehensively contribute to the vocational education and training of the employees and 'dually' coordinate the training of vocational schools and universities of applied sciences with the training in the companies. As there is evidence for the supportive effects of such dual vocational training activities for the local socio-economic development, practitioners also try to implement dual training activities in other skill formation systems. Here, the school/university education and the in-company training traditionally take place separately in succession and in terms of content (Li and Pilz 2021).

In this theoretical-conceptual and policy-relevant field of teaching-learning processes for local knowledge production, the concept of the 'skills

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ecosystem' has recently attracted much attention. Generally, the skills ecosystem can be defined as: a network of local stakeholders from politics, business, educational organisations and further actors (such as chambers, employers' associations, trade unions and so on) who coordinate their activities for the purpose of improving the local skill base, with a focus on hands-on technical skills, organisational capacities and social competencies. The stakeholders promote institutional change through educational reforms to foster the dual training activities for generating practically-applied competencies (Anderson and Warhurst 2012; Buchanan et al. 2017). Besides the hope of innovation-driven growth through vocational education and training, the concept of the skills ecosystem also opens up the expectation of social development, in terms of enabling and empowering pupils and students (ILO 2021; OECD and ILO 2017).

Economic geography has largely ignored the debate on skills ecosystems. However, there are good reasons to pay critical attention to the concept. First, the concept is relevant for political actors and thus has potential to change landscapes of vocational education and training or, at least, to use political capacities and public financial resources. Second, the concept, which originates primarily from educational economics and interdisciplinary educational research, resembles notional constructs about regional networks, clusters, ecosystems, and so forth in economic geography; an interdisciplinary exchange here appears inspiring. Thirdly, the interdisciplinary academic and public attention is likely to be increased by the word 'ecoystem', which has recently become a catchphrase in economic geography and requires further analysis to assess its theoretical and empirical performance (see Malecki 2018; Sternberg et al. 2019).

Since the concept of the skills ecosystem assigns companies a central role as training providers, this contribution presents the example of Mexico, where massive efforts have been made in the last decade to reform the institutional setting in the direction of dual vocational education and training (Pilz and Wiemann 2021). The question is how the actor network responsible for the skills ecosystem can integrate companies in dual teaching-learning activities in Mexico, and what lessons are learnt for the academic and public debate.

The following first explains the theoretical concept of the skills ecosystem and integrates it into the economic-geographic debate. After deliberations of the research design and method, the results show that there is a two-part (but interlinked) skills ecosystem in Mexico. The smaller part of this skills ecosystem consists of dual vocational education and training and is spread in the technological 'high-road' part of the economy. The other part mainly comprises low-tech and smaller companies that perform only brief instructions. Moreover, there are various further international and domestic companies that are reluctant to integrate dual activities. The conclusion discusses the contribution of these empirical findings to the debate on skills ecosystems in academia and politics.

2 The 'skills ecosystem' and related economic geographical research

The connection between skills and the innovative strength of a national or regional economy has long been a topic in economics, social and regional sciences. Since the 1980s, academic interest has focused particularly on the political-institutional conditions for improving the skills of the labour force (Ewers and Wettmann 1980). Such notions also inspired research in the 2000s, in economic geography (Coenen et al. 2015; Marques 2011) and in research on skills ecosystems (Buchanan et al. 2017; Wedekind et al. 2021). In both strands of literature, the recent debates emphasise that it is not only necessary to analyse local actors in their particular constellation but also to include regional dynamics. Similar to the economic-geographical debate, which turned away from economic equilibrium ideas and from neoliberal approaches with their particular view on market failure (see Gong and Hassink 2019; Harris 2021; Henning 2019), the research on skills ecosystems also emphasised the non-linear character of change within the particular local socio-economic 'formations' (Buchanan et al. 2017).

Research on skills ecosystems recognises that companies often act as demanders (or users) of locally generated knowledge (Finegold and Soskice 1988; Finegold 1999). In this respect, it resembles research in economic geography on skills and training (Asheim and Coenen 2005; Asheim et al. 2017; Brenner et al. 2011; James 2012). The focus is on companies that need 'supportive' knowledge, generated by schools and universities. Various studies share this idea, such as studies on clusters (Maskell 2001), industrial districts (Boschma and ter Wal 2007), innovative milieus (Maillat 1998) and regional/territorial innovation systems (Asheim and Coenen 2005; James 2012). This view on 'supportive' knowl-

edge generation also dominates in research on entrepreneurial ecosystems in economic geography. This approach generally relates on an Anglo-American understanding of business culture and society (see Sternberg et al. 2019; Malecki 2018), based on school/university-based learning (Gessler 2017).

Critically viewing the notion of companies as demanders of skills, with the educational institutions in 'supportive' roles, the skills ecosystem-approach suggests an active role of companies in vocational education and training (Anderson and Warhurst 2012; Buchanan et al. 2017). Thus, the idea is that educational institutions have to integrate companies in their study programmes, and vice versa, companies collaborate with the educational organisations. This shifts non-academic vocational education and training into the focus (James 2019; Phelps et al. 2005) as well as higher-education organisations (Fromhold-Eisebith and Werker 2013; Comunian et al. 2015; Faulconbridge and Hall 2009; Kleibert 2016). In apprenticships and comprehensive internships, companies provide practically applied knowledge. Teaching and learning takes place in training workshops in the company, and, supervised by a trainer, in the 'real' production process or in 'real' administration (work-based learning). This active role of companies implies that the companies have to invest money and time in human resources and organisational resources.

Considering the wide adaptation in political reform efforts, the term 'skills ecosystem' has become a partially blurred, 'messy concept' with unclear analytical and normative dimensions (Anderson and Warhurst 2012, 116). To avoid this opacity, it must be clarified in advance whether every constellation in a local actor network is to be regarded as a skills ecosystem, or if it only becomes a skills ecosystem if it has fulfilled certain criteria. Then, a skills ecosystem would be a normative model, and constellations deviating from this would be, for example, nascent or advancing stages (see Malecki 2018). In this article, the 'skills ecosystem' is understood as a normative model that the actors pursue with their reform policies. This is measured against the actors' jointly formulated objective of implementing dual training activities. In such reform policies, the skill formation systems in Germany, Austria and Switzerland offer models for dual training activities. To evaluate such reform policies that aim for dual training practices in different countries, Buchanan et al. (2001) suggest focusing on companies, their business models and recruitment strategies, on institutional and policy frameworks as well as on the employment structure and training infrastructure. This specifies the role of the stakeholders from politics, business and educational organisations—which are generally in focus in this debate—and shows that these roles often are complex and opaque (Buchanan et al. 2017). For clarification, Wedekind et al. (2021) suggest to differentiate between mission-driven change-agents and top-down/bottom-up decision-makers in the reform processes. Both are convinced by the supportive effects of dual vocational training activities for regional development, at least in countries of the Global North, and justify their reform activities in other countries on this basis. In fact, Nilsson (2010) gives evidence that the productivity-enhancing effects of dual activities at company level are persuasive (however the author has doubts about the impacts on social development). Backes-Gellner and Lehnert (2021) show that the graduates of dually coordinated education programmes have broad skill sets that enable the graduates to participate in modernisation processes and promote the innovativeness of the companies. Moreover, they argue that the broad employability of the graduates has positive social impacts for these young persons because they can use their acquired skills also when they shift to another employer.

Germany, Austria and Switzerland are, however, very particular reference points in this reform process (Graf 2021). In their 'collective' skill formation system (Busemeyer and Trampusch 2012), companies act as providers of knowledge, in the sense that they offer multiannual apprenticeships and systematic, comprehensive internships, in coordination with vocational schools and universities. Dual vocational education and training connects the 'learning locations' in companies and in vocational schools and universities in systematic, curricularly coordinated ways. In Germany, for example, on the level of vocational schools, employers' federations, chambers, trade unions, and the national and federal state authorities specify the contents of teaching and learning. The regional chamber in charge performs the examinations, with an examination board comprising representatives of the trade union, the employers' association and vocational school teachers. On the level of dual study programmes at universities, the cooperation between learning venues is less regulated; however, the skills are specified in module manuals and examination regulations (Pilz and Fürstenau 2019). Foreign companies that invest in Germany generally adapt to this well-established German skill formation system over time (Fuchs et al. 2021).

In many other countries, with their school-based vocational systems, the settings are different. Often, subsidiaries of multinational companies (MNCs) play a key role as misson-driven actors (Fuchs 2020). However, reform policy for enhancing the skills ecosystems is difficult, as shown for Sub-Saharan Africa (McGrath et al. 2020; Lotz-Sisitka 2020; Wedekind and Mutereko 2016; Wedekind et al. 2021) and Latin America (Wiemann and Fuchs 2018; Valiente et al. 2020). Local company managers often see little training requirements due to the simple job profiles in the neo-Taylorist work organisation (Buchanan et al. 2017). Often, labour turnover is high, and companies face the risk that employees will leave the company after the investments in vocational education and training (Pilz and Wiemann 2021). Moreover, in small and partly informal companies, technical induction often takes place as 'non-formal' training (without certification), such as by explaining and imitating particular technical processes (Regel and Pilz 2019; Wiemann and Pilz 2017). In such contexts, skills mean the abilities that are necessary for a particular 'job' and not comprehensive technical, organisational and social competencies, experiences and professional expertise. Finally, if managers are ready to engage in dual activities, coordination is often difficult (Wedekind et al. 2021). Beyond market logics (training costs) and the state bureaucracies, the complexity of involved actors generates a 'third logic' (Freidson 2001) with challenging patterns of different responsibilities, competencies and ambitions (Buchanan et al. 2017). Despite the ambitious reform policies, often a 'dual spirit' is lacking in economy and society (Gonon 2021; Hall and Lansbury 2006).

3 Research design and method

This article focuses on Mexico's skills ecosystem, and the manufacturing sector within, because the recent reform of Mexican policies to establish dual vocational education and training is comprehensive, also compared to other emerging economies (Pilz and Wiemann 2021). The focus is on the Central Highland, particularly the industrialised region in and around Mexico City. This is the economic and political centre of the country (Parnreiter 2007). The contribution is based on a qualitative study with semi-structured interviews with the relevant Mexican actors and actors from Germany, Austria and Switzerland. This allows the view on the 'relational' coordination of the multi-scalar actors whose reform policies have potential impact on the region (instead of only focussing on local actors within a firmly delimited and mapped territory). In 2019, data collection started with a pilot study (10 interviews) in Mexico. In 2020 and 2021, additional 60 interviews were conducted online. Due to the Covid-19 pandemic, these interviews were conducted via video conferencing, with experts from MNCs, associations, chambers, vocational schools, universities, governmental and non-governmental organisations. As is usual in skills ecosystem and economic geography research, in this study 'actors' are mostly understood to be the individuals who represent the organisations. The interviewees represent these actors, and the interviewees report on other actors within the network, so that the insights were triangulated. The interview partners were selected through literature research and recommendations from other actors. Interviews usually lasted an hour. The interviews dealt thematically with the interviewees' cooperation partners, their relationships and coordination activities, training activities, frictions, and prospects for the future. Given the range of interview partners within subsidiaries and additional organisations, the questionnaires were adapted to specific areas of responsibility. The interviews were completely transcribed and condensed into preliminary results using content analysis methods. Then, a systematic and in-depth analysis was conducted and critically adapted to the empirical findings (Flick 2009; Soeffner 2004). The insights were discussed in the research team during the interpretation stage. The direct quotes below of the interviews conducted in Spanish and German were translated into English. The list of quoted interviewees is included in the appendix.

4 Results

In Mexico, the Secretaría de Educación Pública (SEP) is the responsible governmental body for education. Despite some decentralisation during the 1990s, the central government develops the general plans and programmes, and supervises the curricula. Vocational education and training is usually organised in a school-based way. The Colegio Nacional de Educación Profesional Técnica (CONALEP) is the most important organisation in this endeavour. In addition, there are the Technical Universities (Universidades Tecnológicas), which can be compared to the German universities of applied sciences (Wiemann 2020).

4.1 The 'dual part' of the Mexican skills ecosystem

MNCs from Germany, Austria and Switzerland have invested in Mexico since the middle of the 20th century. Large companies in the automotive, chemical, pharmaceutical and electronics industries, as well as mechanical and plant engineering, have been setting up subsidiaries there, in which several thousand employees now work. Medium-sized industrial companies are also increasingly investing in the metropolitan regions of the Central Highland; this internationalisation push came up especially in the 2000s. Many medium-sized companies followed the large MNCs as suppliers. They have set up smaller subsidiaries, most of which have a few hundred employees.

The large MNCs, such as Volkswagen, Bosch or Siemens, which have been located in Mexico for many decades, initially set up internal training workshops. The training of the employees took place in completely in-house workshops. Hence, the dual system, which companies are familiar with from their countries of origin, was initially often implemented as an in-house version. These companies have created their 'company training islands' (I_1). Hence, the MNC subsidiaries initially acted as outsiders and foreigners in the local environment (see Johanson and Vahlne 2009) and thus built up the necessary facilities internally.

However, younger subsidiaries from Germany, Austria and Switzerland, which have been established since the 2010s, have often built up personnel and infrastructure-related dual activities on site from the start, for example AUDI in the state of Puebla and BMW in San Luis Potosí. These subsidiaries work together with the local technical universities, for example for setting up training facilities, and practical training for local teaching staff (I_2). This illustrates that in Mexico, the institutional contexts have changed over time and improved the conditions and incentives for these companies to cooperate with neighbouring educational organisations and thus to embed locally (see Buchanan et al. 2017).

Today, many large MNCs, which have headquarters in Germany, Switzerland and Austria, are actively connecting with local training organisations in Mexico. MNC headquarters provide the subsidiaries with financial and human resources for the training infrastructure and activities when the subsidiaries are built up. In training management, both in headquarters and the subsidiaries, the idea of the usefulness of dual training is widespread. Local training managers, who have visited their colleagues in Germany, or who worked together with German expats in Mexico, perceive the specific technical competencies as relevant; the training serves to develop loyal, responsible and team-minded staff (I_3). In many cases, the training managers are also committed to enabling and empowering young people through vocational education and training so that they can better shape their lives in the local community through the skills they have acquired. For example, the interviewee (I_3), a training manager of an Austrian supply company, expressed his feelings about when the apprentices get their certificate after successfully graduating vocational education and training:

"I always enjoy attending these graduation ceremonies, because then you can feel it. The parents come and are proud and have tears in their eyes and these are lovely people. You notice that someone breaks out in the family and now [the former apprentice] is not becoming an unskilled worker or selling anything on the side of the road, but is able to master a technology and to develop further in it."

Most medium-sized MNC subsidiaries, however, do not have the resources to set up their own dual vocational education and training. Although they employ graduates from local vocational schools and universities, they hardly cooperate with them in terms of dual vocational education and training. Often, these subsidiaries only need a few experts and specialists in their production, for whom a place for an apprenticeship or shorter training is sought depending on the situation. For example, the subsidiaries place their (relatively few) trainees at other plants, either within the same MNC or in another subsidiary in the metropolitan area. In addition, MNC subsidiaries send their trainees to local private training providers who are familiar with the principles and practices of dual vocational education and training.

This skills ecosystem of the MNC subsidiaries forms a particular part insofar as the subsidiaries are actively involved in dual vocational education and training, and generate the practically skilled staff they need. As the quotation above shows, the in-company training managers and trainers show a high level of commitment, which is not only geared towards technical task solving, but also has the social well-being of the apprentice in mind. In this sense, they act as mission-driven change-agents (see Wedekind et al. 2021).

4.2 The politically driven spread of dual vocational training

Even if this 'dual part' in the Mexican skills ecosystem is an established subsystem, it is not closed but proliferates. Inspired by decades of dual vocational education and training and practiced by the MNC subsidiaries from Germany, Austria and Switzerland, over the last ten years the Mexican government has developed reforms to foster the dual activities country-wide (see Wiemann 2020). This is not simply a top-down reform processes. Even though the central government plays the key role, various multi-scalar actors are involved (see Wedekind et al. 2021). The Mexican reform policy is supported by a community of international stakeholders who are committed to the implementation of dual activities. Relevant international promotors are, besides the MNCs themselves, actors from vocational education and training policy, economic policy, research policy, policy for economic cooperation and development, as well as the associated organisations that are responsible for implementation of the dual activities. International promoters also include organisations for international university and vocational cooperation, the embassy, employers' associations and trade unions, foreign chambers of commerce, private vocational training providers and non-governmental organisations (NGOs). Besides actors from Germany who have long engaged in Mexico, actors from Austria and Switzerland have also recently become involved in Mexico, partly in coordination with the German partners. In an international comparison, Mexico is seen as promising for this international community, which is committed to the transfer of vocational training. An international expert involved in transfer activities expresses:

"The situation is very ideal in Mexico. We once said: If we don't make it in Mexico, it will be extremely difficult in other countries. We have a very distinctive industrial structure [in Mexico] that really has a demand for specialised technicians." (I_2)

The international stakeholders find their contact partners on the Mexican side in education and vocational training politics, technology politics, as well as the related ministries and further authorities responsible for economy, technology, education and training, in vocational schools and universities. They also find them responsible for certification institutions, in the industry and employers' association and in various industry-related associations. Chambers also play a role but, unlike in Germany, Austria and Switzerland, act more politically and like corporatist industry associations. Mexican trade unions act partly as free and partly closely linked to government policy and can appear as political players in particular contexts (I_4; (I_5).

As part of this complex constellation of actors, the Mexican government under President Enrique Peña Nieto (2012-2018) set up a vocational education and training programme in Mexico, the 'Modelo Mexicano de Formación Dual' (MMFD). The dual training was created as an official training variant in Mexico, inspired by the dual vocational training in Germany, Austria and Switzerland. The MMFD shows clear similarities to dual training as it is practiced in these three countries: Not only do vocational schools provide training, but companies also do their part by promoting the apprentices in the company. This takes place systematically, curricularly and comprehensively in terms of time, usually 2-3 years. Formally, the practical parts are considered internships in Mexico, but are much more extensive than the otherwise sporadic and short company internships in Mexico.

The MMFD has spread in companies located in the industrial and technology regions of Mexico, that is in Mexico City and the other cities in the Central Highland. It is also widespread in the North, where many export industries are located, including many high-tech companies that produce advanced products for the world market, such as in and around Monterrey. International subsidiaries of technology-intensive MNCs from German-speaking countries as well as from the USA and Japan committed themselves to the MMFD. Some (mainly larger) domestic companies also took part and have now trained several generations of trainees (I_1; I_6; I_7; I_8).

4.3 Beyond the dual 'high-road' part of the Mexican skills ecosystem: Practically-applied competencies for the disadvantaged

The MMFD only achieved numbers of several thousand trainees despite political efforts to further disseminate it country-wide. In 2018, with Andrés Manuel López Obrador, a new government was elected. The new government continued the international cooperation of vocational education and training but saw a slightly different need to reform the skills ecosystem, whose new contours are not yet clearly apparent (I_1; I_9). However, it already has become clear that the new government is also promoting shorter and low-threshold vocational train-

ing offers, especially for small businesses such as in the informal economy to combat poverty (I_10). On the one hand, the changing political agenda, along with an overloading of the Mexican working level (I_1; I_2; I_8) and the lack of personal continuity anchored in the Mexican political system, hinders a deeper institutionalisation of dual vocational education and training (I_10). The laborious administrative coordination and the 'third logic' (see FREIDSON 2001) of a changing political agenda limits the scope of dual training activities in the skills ecosystem of Mexico. On the other hand, the reoriented reform policy recognizes the fact that the Mexican economy and the skills ecosystem are split into a segment of foreign MNC subsidiaries and technology-intensive Mexican companies with a need for technical specialists and experts, and a large segment of businesses where the owners perceive little need for and hardly have any resources for comprehensive vocational education and training (I_11). An interviewee involved in international dual transfer activities from Germany expressed:

"Well, there are vast numbers of Mexicos. Only what is relevant for us, is Mexico that is part of international competition. This Mexico is open, is the country with the most free trade agreements, integrated in North America, integrated with the EU, in South America." (I_2).

Another international expert explained the segment of those of the poor and marginalised. For vocational schools in particular, which are largely attended by pupils from poor families and marginalized sections of the population, it is important that the young people have better opportunities in the local labour markets. An international expert explains:

"Of course, primarily (…) above all the universities that advanced relatively early on (...) train the engineers for tomorrow. (…) Mexico is in an upper league, but the dilemma is this enormous division in the country, that we just don't take a lot of the population with us at all. (...) And if you know about the drug crime problem in the country (...), then it is dangerous if half the young people in a city are not enrolled in education at an early age. (...) And that is the chance with the dual vocational education and training system, for social opportunities, inclusive development, all these buzzwords, which are always mentioned, but we have great value with dual training (...)." (I_8)

Between the segment of the poor and marginalised businesses and the 'upper league' segment, there are many other domestic and international companies. However, these companies also perceive obstacles to participation in dual vocationa education and training. A reason for some of them is that, in some vocational schools in Mexico, student learning outcomes are limited. For companies it is unattractive to invest in this workforce with further training. Another reason for the limited commitment of local companies for dual activities is that in Mexico, there is not the tradition of professions (Berufe) as is known from Germany, Austria and Switzerland (I_2; I_8). Accordingly, there is also no relationship between a 'master' in the company who looks after the trainee as a teacher and mentor for several years. Rather, in Mexico the broadly spread notions and the institutional system relate to the ability to perform certain activities. Activity profiles are certified accordingly (I_12). The actors involved in the international transfer of vocational training try to spread ideas about the learner's autonomous competence to act in Mexico as well (I_2; I_4). However, for the vast majority of manufacturing workers, the entry-level qualification means on-the-job training, usually supplemented by a short introductory course that provides information about the company, its products, occupational safety issues and so forth. In addition, the current Covid-19 pandemic has led to considerable financial and organisational problems for the companies. The interviewees consistently expressed that the priority of managers is now on acute crisis management and less than before on commitment to dual training activities.

However, with regard to comprehensive dual vocational education and training, many Mexican vocational schools and universities are extremely active in gaining access to domestic and international companies that have not yet been integrated into dual activities. They are committed to approaching companies to place their pupils and students in companies. Organisationally, the vocational schools and universities implement this cooperation offer to the companies in such a way that, in addition to the general teaching staff, there are also persons who are responsible for the content and organisation of the company internships and training activities. In this respect, there is a controlling and accompanying authority (I_2). At the same time, some low-paid vocational school teachers have additional jobs to survive. This affects the quantity and quality of vocational school education and has an impact on how they engage in dual activities and on how companies assess the reputation of vocational schools (I_4; I_7; I_8). This indicates that there is a considerable gap between vocational schools and companies regarding dual training activities until now.

5 Conclusion

This contribution investigated the skills ecosystem in Mexico. Table 1 illustrates its main characteristics, compared to the skill formation system as it exists in Germany, Austria and Switzerland that serves as model for the dual training activities.

The results show that the Mexican economic structure with its 'high-road' and 'low-tech' segments has an important influence on the reform efforts, since the willingness and ability of companies to participate in dual vocational eduction training differs significantly in both segments. However, the question that still remains is how a larger number of companies can be motivated to take an active role in the skills ecosystem. The results have shown that in Mexico, subsidiaries of MNCs only initially played a role as islands of dual training activities; instead, they increasingly acted as a role model in economy, politics and society. This is different to other emerging economies, such as India or Vietnam, where dual vocational education and training is clearly limited to single lighthouse projects (Pilz and Wiemann 2021; Wrana and Revilla Diez 2016). Obviously, in Mexico the strong reputation of companies with dual training activities is a condition for the proliferation of dual training activities to other sector–s and regions. The examples how the subsidiaries cooperate with vocational schools and universities (and with other actors), and thereby embed over time, even impact a generally school-based skill formation system. Therefore, a success condition is, besides the universities of applied sciences as cooperation partners, that many vocational schools require well-paid staffing and equipment, so that they can increase their performance and reputation (see Röhrer et al. 2021; Wiemann and Fuchs 2018).

Research on skills ecosystems can profit from a geographer's perspective through the insight that 'the local' matters (Capsada-Munsech and Valiente 2020). Policy reforms, inspired by experience and success in other skill formation systems, meet particular

Tab. 1: Visualisation of the main characteristics

Characteristics	**Skills ecosystem with emergent dual training activities: the case of Mexico**	**Skills formation system with established dual training activities, such as in Germany, Austria, Switzerland**
Role of actors, such as …	Local companies as recipients of knowledge	Local companies as generators and recipients of knowledge
… companies	MNCs as mission-driven change-agents	Foreign investors do not influence the German skill formation system
… educational institutions	School-based skill formation	Country-wide dual practices
	Dual practices prevail in the 'high-road' segment of economy; companies often see universities as more suitable partners than vocational schools	
… government	Strong role of the Mexican government	State and federal governments with different tasks
… further institutional actors	International actors and their partners in Mexico's state authorities, associations etc.	German chambers, employers' federations, trade unions etc.
Ties in the network	Strong role of the central government; laborious administrative coordination; changing political agenda and persons in charge	Established division of labour between the different institutional actors with regard to contents, examination etc.

settings in other regional contexts. Skills ecosystems cannot be transferred, like clusters and regional/territorial innovation systems cannot be transferred; it is even difficult enough to develop adequate practices within the process of dissemination (Hospers 2006). However, in a world that is increasingly (economically and socio-culturally) globalising, borders between skills ecosystems become permeable, and the varieties within the local socio-economic 'formations' increase (Buchanan et al. 2017).

The merit of introducing and developing the skills ecosystem approach in economic geography, is that it shifts the attention to skills and training, and how these are generated. Economic geographers have long claimed to pay attention to skills beyond formalised, academic knowledge (Asheim et al. 2017). Hence, studies on clusters and regional/territorial innovation systems can profit by questioning the prevalent view on 'supportive' knowledge generation for companies and shifting the view on the related responsibilty of companies. This change of perspective can also broaden the view on entrepreneurial ecosystems in economic geography. As this approach generally relates to Anglo-American notions of companies within liberal institutional frameworks (see Sternberg et al. 2019), the analysis of the critical interface between educational organisations and companies can inspire this view.

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Appendix

No. in acticle	Function
I_1	International actor in transfer of dual practices
I_2	Institutional actor from Germany in Mexiko
I_3	Austrian MNC
I_4	International actor in developmental cooperation
I_5	Non-governmental organisation
I_6	University in Mexico
I_7	Federation of Private Mexican Institutions of Higher Education
I_8	Institutional actor from Germany in Mexiko
I_9	Council for the Accreditation of Higher Education of Mexico
I_10	German Federal Institute for Vocational Training
I_11	Institutional actor from Germany in Mexiko
I_12	National Council for Standardization and Certification of Labour Skills