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From Polanyi to policy: A tool for measuring embeddedness and designing sustainable agricultural policies

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Agricultural systems are deeply enmeshed in complex social processes and institutions, something Polanyi called embeddedness. Designing policy for sustainable agricultural activity requires understanding and measuring such embeddedness. Due to the difficulty of measuring complex social dynamics, however, most policy is aimed at measurable metrics such as price and production. The focus on these metrics imports the rational actor conceptualization of economic activity and fails to incorporate the values, motivations, and socio-cultural components of agricultural decision-making. This paper develops a tool for measuring embeddedness called the Embeddedness Type Matrix (ETM). The tool utilizes survey responses to elucidate economic actors' instrumentalism (decisions motivated by self-interest) and marketness (decisions motivated by market factors). Instrumentalism and marketness are considered together along perpendicular axes to determine the embeddedness quadrant of economic actors. The ETM allows researchers and policy-makers to better understand producers and consumers and design sustainability policies that are aligned with their values and motivations.

KEYWORDS
embeddedness, agriculture, economic sociology, methodology, neoclassical economics, values

Introduction

Agricultural systems are deeply embedded in social processes and the institutions that govern them. Measuring these processes and understanding the extent of that embeddedness is critical to crafting policy for sustainable agricultural systems. The bulk of measurement in sustainability research, however, focuses on economic and environmental indicators such as farm profitability and environmental quality. Since policy is most often aimed at what is measured, it tends to focus on issues like price, production, and market access. While price and economic return are critical components, they are not the only important variables in sustainable agricultrual systems. Policies aimed at social issues such as community reciprocity are often outside the scope of policy design. And when policies *are* aimed at social issues, they tend to rely upon price or environmental metrics.

The theoretical backdrop of the focus on price and production is an economic model, known as the rational actor model, in which individuals are perfectly rational and asocial, and make decisions based solely on maximizing individual utility. This model forms the basis of the neoclassical economic thought that has dominated economic policy since WWII, with its focus on price and supply supports, and demand creation.

Producers and consumers, however, are deeply connected to one another, hold values that are outside the scope of individual utility maximization, and make decisions based upon values and culture. Policies that are aimed at price, profits, and market penetration, while important, often fail to address the values, motivations, and cultural and social components of real-world decision making. The institutions governing these social processes and the degree to which individuals and businesses are embedded in society are incredibly important, yet poorly understood and measured.

The problem is that, while understanding embeddedness is critical, policy is most often enacted on what is measured. Without tools to measure embeddedness, what is measured are outcomes such as profit, production, and price that are easily quantified. Policy thus includes price and production supports and market access, while missing the embeddedness that is essential to agriculture.

This gap between social measurement and policy is not for lack of care. The importance of people, their institutions, and the relationships between and among them and the environment have been explicitly recognized for decades. In its conceptualization of sustainable development, the Brundtland Commission's report for the United Nations (Brundtland, 1987) identified social sustainability as one of three core pillars. Attempts to capture the social dimensions of sustainability include the popular sustainable livelihoods and social capital frameworks. Nevertheless, social sustainability has received little attention, especially compared to economic and environmental sustainability (Kandachar, 2014). This is largely due to the difficulty of measuring complex social systems—*How does one measure values, social cohesion, or decision-making?* Because of this difficulty, more straightforward economic and environmental measures dominate research and policy (Boström et al., 2015).

These policy and methodological difficulties present a problem: measurements import the theoretical framing of their intellectual development. If a measurement tool is based in an economic framework of maximization, it will fail to explain factors outside of economic maximization and reinforce the assumptions of that model. When our measurements are partial, our understanding of systems is weak; and when our understanding is weak, our policy proposals will be limited in their effectiveness.

A policy's effectiveness is largely determined by how well it matches the motivations of the people for whom its benefits are intended (Long, 2001). Policies that seek to activate self-interest in a set of individuals with more complex goals than maximizing their gain are likely less effective than those that incorporate a more nuanced approach.

We argue that better sustainability outcomes require a new theoretical model that will inform a more comprehensive sustainability policy framework that understands and measures factors outside of price and profit to include the values and motivations of agricltureal producers and consumers. This paper outlines a theoretical framing for understanding these complex social processes and develops a methodology for measuring social embeddedness. Coined by sociologist Polanyi (1971), embeddedness is the extent to which economic systems like markets are governed by non-economic systems such as culture and social cohesion.

The concept of embeddedness provides a theoretical framework for engaging with sustainability policy in a way that captures the complex social and culture dynamics that shape economic activity. Embeddedness conceives of all economic activity as deeply embedded in social context including rules, norms, beliefs, community, and institutions. This means that rational choice frameworks, and the policies they inform, fall short of explaining how social life functions because institutional contexts, and thus people's behavior, are diverse and culturally specific. While the rational actor of asocial markets maximizes utility and profit, embedded economic actors make decisions based upon a set of values and are motivated by considerations including but not limited to maximization.

This paper synthesizes the embeddedness literature to develop a measurement tool that can characterize the social context of food system actors and their values and motivations. The tool uses Likert scale surveys to understand the degree to which producers and consumers are motivated by self-interest—what we call Instrumentalism—and the extent to which they are market-oriented—what we call Marketness. Survey responses are analyzed using a Factor Analysis to generate Instrumentalism and Marketness scores for each survey respondent on a scale of -1 to 1. Those scores are then plotted along instrumentalism and marketness axes on the Embeddedness Type Matrix to generate an embeddedness type for each economic actor. Plotting all producers and consumers of a particular industry on the Embeddedness Type Matrix provides an understanding of the motivations, values, actions, and interactions of the individuals in that industry.

This embeddedness measurement tool offers a new method for studying agricultural systems and allows policy makers to increase sustainability efficacy by replacing the rational actor theoretical framing with a social embeddedness framing that integrates values, social context, and behavior alongside price and profit considerations. This will allow policy makers to more closely align sustainable agricultural policies with the motivations of producers and consumers to generate sustainable outcomes.

The rational actor Trojan horse of sustainability

The rational actor

Current measures of sustainable agricultural systems largely rest upon a flawed model of human society and individual motivations, and therefore, policy prescriptions that address those measurements are equally flawed. This chasm between policy, measurements, and reality has critical implications for sustainability outcomes.

The rational actor model of neoclassical economics dictates that producers and consumers are atomistic actors who make decisions based solely on selfish utility, or wellbeing, maximization. Society is simply a collection of "homogenous globules of desire" (Veblen, 1898) without values who operate in an anonymous market. In fact, prominent economist Gary Becker argued that social dynamics are so inconsequential in economic action and analysis that individuals in his models produced children without mating (Becker and Tomes, 1979; 1161).

These assumptions about how people and markets operate, however inaccurate, were made in order to measure otherwise immeasurable systems (Ament, 2019). Additionally, since wellbeing is impossible to objectively measure and cannot be compared between individuals, neoclassical economists used price as a proxy for wellbeing (Farley et al., 2015) by assuming that individuals would perfectly express their desires through buying and selling on the market.

The utility-revealing price mechanism became the hegemonic centerpiece of the supply and demand model that dominates agricultural policy today. In this model, price allows producers to maximize profit and consumers to maximize consumption given budget constraints. Price, therefore, in economic models and the policies they inform, is assumed to stand in for all other motivations and values and is the central organizing principle of economic activity. This has critical implications for how we measure outcomes and design policy for sustainable agriculture.

The social side of production

Markets reveal value through the price mechanism by commodifying labor and resource productivity. Labor and resources are treated as economic inputs (Mellor, 2006) and are remunerated according to their marginal productivity. Markets accordingly separate productive processes from the re-productive processes that make productivity possible (Biesecker and Hofmeister, 2010) such as relationships with friends and family, emotional care, and biological and metabolic processes like eating and sleeping. This process leads to the externalization of the re-productive and social processes as those processes are categorized in the realm on non-value and unremunerated since they are not for sale on the market, i.e., one cannot buy rest or metabolism.

Viewing production as critically dependent upon reproduction informs the notion that agricultural sustainability is an *outcome* of underlying *processes*. Those processes involve more than what is for sale in a market. This includes reproductive labor in the home (Mellor, 1997), the role of the civic apparatus in communities (Lyson, 2004), and the role of ecological structure (Farley and Daly, 2011, 61), among other processes that are critically important yet invisible to the market. Sustainable agricultural practices, therefore, must recognize all processes that makes production possible as valuable, including both productive and re-productive, and consider the social and civic context within which production operates (Perkins, 2007). That those processes—and not simply the outcomes they generate—must be measured is the central argument of this paper.

Social measures that imply a rational actor framework

Much of the literature and organizational reports that measure and advocate policy related to the social dimensions of sustainable agriculture, at both the international and local levels, considers social topics such as food security and nutrition, sustainable food systems, sustainable livelihoods, and social capital. The measurements employed in this literature include poverty and income, mobility, caloric intake, and access to assets.

While these social categories and metrics are indeed cognizant of social dynamics, they nevertheless rest upon a low-level rational actor model in which individuals are calculative agents who weigh their individual interests against collective interests (Bridger and Luloff, 2001). Importantly, many of these social indicators treat "social" as a static outcome, a thing that can be measured, as opposed to a process underlying many of the social outcomes in question.

The sustainable livelihoods framework offers measures of resilience. Livelihoods, in this context, is defined as "the means of gaining a living" (Chambers, 1995). Doing so sustainably includes utilizing capabilities and assets in a way that can cope with shocks while not "undermining the natural resource base" (Scoones, 1998). Similar discussions of self-sufficiency center around metrics including economic performance, access to non-aid finance, institutional performance, aid dependence, and vulnerability (Reynolds et al., 2017).

These approaches tend to miss the broad social contexts that influence the ability of individuals to gain a living (Scoones, 2009). Similar to the rational actor model of asociality, the sustainable livelihood framework tends to overlook the influence of power and politics in livelihood outcomes (Scoones, 2009; Serrat, 2017). A sustainable livelihood is treated as an outcome, but the processes leading to that outcome lack attention.

The sustainable livelihoods approach focuses on using five capital assets—human, social, natural, physical, and financial—to achieve livelihood outcomes. Accordingly, the framework approaches the world as a series of resources to be leveraged for individual, rational gain. Even social capital, which considers things like trust, shared values, and networks of connections (Serrat, 2017) is conceptualized as an input to be leveraged for increased production.

Social capital is a widely used framework that conceives of networks of social relations that bind people as a community. These relations are as "essential for…the production of…goods…[as] other forms of capital" (Farr, 2004). The social capital framework aims to use social dynamics to improve productive efficiency (Robert, 1993, 167; Hyun-soo Kim, 2016, 233) much like financial or physical capital might (Putnam, 2001, 21).

Social capital finds its roots in the works of neoclassical economists Alfred Marshal and John Hicks who used the term to distinguish between different types of capital stocks (Woolcock, 1998). In a modern formulation of social capital, Coleman (1988) sought to embed the rational actor into social conditions. Importantly, social capital frameworks focus on how investments in social networks deliver market access or resource mobilization (Lin, 2002).

The social capital framework is more about how relationships allow economic actors to gain access to resources than about the relationships themselves (Acquaah et al., 2014). In action, rather than drawing upon a network analysis, social capital draws upon an accounting framework in the employment of returns (Xin and Qin, 2011). It is, again, outcomes based: one increases productive capacity by investing in a social network.

Further, social capital has become one of the "trendiest terms" in the development literature (Farr, 2004). The way it tends to be used conflates social outcomes and the productive capacity that social capital can generate with the embedded processes upon which those outcomes rely (Hyun-soo Kim, 2016; Tregear and Cooper, 2016; Gretzinger et al., 2018, 24). As Portes and Sensenbrenner (1993) write, "social capital is the result of embeddedness". Czernek-Marszałek (2020) writes similarly, arguing that interpersonal relationships that generate group-level benefits stem from an actor's social embeddedness.

The failures of social outcome measurements

Sustainable agriculture must be thought of in terms of both processes and outcomes. As processes lead to outcomes (Himes and Muraca, 2018), simply addressing outcomes such as social capital or sustainable livelihoods—the focus of mainstream social frameworks—conflates the processes that lead to outcomes with the outcomes themselves.

This is not to say that outcomes like profitability are not important or should not be measured. But using those measures as proxies for underlying processes fails to address social dynamics and thus defaults to familiar policy solutions such as price, market access, production increases, and capital infusions. Considering labor practices again, understanding the role of family and volunteer labor in the social fabric of a community may inform alternative policy solutions such as labor subsidies, basic income for farm workers, or tuition deferment for student farmers.

Measuring the social dynamics of agricultural systems, not as a productive input, but as a dynamic process, is critical. We must measure and understand shared norms, not simply the outcomes of shared norms.

At the same time that farmers make decisions based upon price, production, and profit, they also make decisions outside of those confines because, for many, the goal of farming and the values that inform farming decisions are not solely profit based (Bell, 2004). While the price and production approach to assessing agricultural systems is limited to the activity observable in markets and reflected in traditional economic measurements, significant economically-invisible agricultural processes exist that are critical to successful sustainable agricultural initiatives (Müller and Sukhdev, 2018). Similarly, agricultural processes are not contained solely within agricultural policy and practice but are embedded within a larger system that includes the social, cultural, and environmental processes of society. The following section explores those processes.

Embeddedness

What is embeddedness?

Sociologist Karl Polanyi pioneered the idea of embeddedness by arguing that "the human economy…is embedded and enmeshed in institutions, economic and non-economic" (Polanyi, 1957, 250). In stark contrast to the rational actor model in which atomized actors make selfish decisions to maximize utility, embeddedness is often thought of as the degree to which economic activity is constrained by non-economic factors (Chen and Scott, 2014) such as friendship, aesthetics, affection, loyalty and reciprocity (Kloppenburg et al., 1996, 37). Economic activity, in this view, exists within an extensive web of social relations, institutions, and norms in which the individual actor is embedded. Importantly, embeddedness differentiates economic outcomes, such as material need satisfaction, from the social and environmental processes that create those outcomes (Jones and Tobin, 2018, 70).

Polanyi described how human society transformed from economies of reciprocity and redistribution to market society. In those former systems, economic activity was organized through deeply embedded traditions of gift exchange, debt payment and cancellation, and trust (Mauss, 1990; Dodd, 1994; Graeber, 2014). In market economies all production and distribution is organized through the price mechanism of the market. This transition is historically novel: "instead of economy being embedded in social relations, social relations are embedded in the economic system" (Polanyi, 2001, 60).

Since, in a market economy, all production and distribution occurs within the market, all production must be produced for sale on the market. This implies that all income is derived from the market. Since all production requires land and labor, and all distribution requires money, the key distinction of a market economy is that the price mechanism must exist, not only for the commodities that are sold, but for land, labor, and money as well; their prices being, rent, wage, and interest, respectively (Polanyi, 2001, 72). Polanyi called these "fictitious commodities" because, while they are critical to the functioning of markets, their production does not take place on market, and they are not produced for sale. Land is nature; labor is human activity; and money is a social relation (Ingham, 1996; Ament, 2020). Commodification disembeds these "commodities" from their social, biophysical, and environmental contexts and aligns them unnaturally with the mechanism of the market. It is the commodification of land, labor, and money that allows all production and distribution to be organized through the market and what distinguishes a market economy from an economy with markets. For example, the restructuring of land from a cultural and productive resource into speculative commodity is largely responsible for the 1980s Midwest farm crisis (Barnett, 2000) and the social dislocation, unemployment, and health issues that followed (Meyer and Lobao, 2003).

Values and social context

While market economies are distinct from reciprocal and redistributive economies, markets are nevertheless infused with norms and values and are deeply embedded in the social context within which they operate, even if that context is individualistic. The values of economic actors can be divided into instrumental and relational values (Jax et al., 2013) and drive the economic processes that occur within society (Jones and Tobin, 2018). Instrumental values concern individual needs and desires (Arias-Arévalo et al., 2017), while relational values concern relationships with individuals and the environment. These values are a function of the benefits that actors seek: while instrumental values concern individual benefits, relational values concern generating benefits for multiple parties (Jones and Tobin, 2018, 69).

Individual values exist on a spectrum from instrumental to relational and are spatio-temporally malleable. Economic decisions involve a negotiation between these individual values and the social context within which decisions are made. In the context of a market society, individuals justify market exchanges in relation to the social and environmental values they hold (Kloppenburg et al., 1996; Galt et al., 2016, 348).

These negotiations constitute not just individual, but society-level negotiations as well, and frame how this paper proposes to measure embeddedness. Values are not individually subjective, nor are social structures objective in a positivistic sense (Berger and Luckmann, 1967). Rather, individual values—and the benefits that individual actors seek—and social structures interact constantly to form the macro social context within which economic decisions are made (Krul and Ho, 2017, 844). An individual farmer cannot operate a farm that is outside of the commodity food system while borrowing money for land and paying labor according to its productivity. It is this context that determines which values individuals can express in economic activity.

Instrumentalism and marketness

Just as the market economy does not follow the dictums of self-interested economic actors operating in an anonymous market, "embeddedness does not entail the complete absence of market sensibilities" (Hinrichs, 2000, 297). Rather, individual economic transactions take place according to degrees of marketness and instrumentalism (Block, 1990).

Instrumentalism concerns the nature of individual motivation in an economic action and ranges from altruistic to egoistic (de Groot and Steg, 2007; Steg et al., 2011). Economic actors with high levels of instrumentalism prioritize individual economic goals while those with low levels prioritize concerns for friendship, family, community, or morality (Hinrichs, 2000, 297). Marketness concerns the extent to which price is the dominant consideration in how individual motivations are expressed. High levels of marketness indicate that price considerations dominate economic decision making, while at low levels of marketness, non-price considerations such as trust, identity, and social connection take on greater importance (Block, 1990, 51).

Instrumentalism and marketness are spectrums that together help to explain the negotiation between and among instrumental and relational values and the macro social context discussed above. The concepts also illuminate how economic behavior can be simultaneously price conscious and community-minded (Mariola, 2012, 578) as the expression of individual values such as care for environmental resilience is constrained by a social context in which markets dominate exchange. Accordingly, embeddedness on the one hand, and instrumentalism and marketness on the other are not diametrically opposed but rather, coexist in degree to form the complex social texture within which economic decisions are made.

Embeddedness: Negotiating market and non-market motivations

Embeddedness exists at the relational scale in which economic agents interact with one another, but also at the structural scale in which individuals negotiate actions according to the context within which they exist (Granovetter, 1985). It is this interplay between relations and structure, and motivations and values that highlights that embeddedness is not distinct from markets and prices and does not imply qualities like good or bad. Farmers are embedded in their communities while selling into markets and fetching a price for their goods. Embeddedness does not imply a friendly antithesis to markets, and prices are not the iniquitous alternative to a virtuous embeddedness. Even amidst strong communal ties, prices and self-interest are apparent.

Embeddedness, then, concerns the context in which actions take place, the values that drive those actions, and the manner in which the two affect and are affected by one another. In the embedded market, it is the expression of coexisting instrumental and relational values that drive the degree of instrumentalism or marketness that plays out in economic activity at the relational and structural scales. Price and individual goals are important in the context of embeddedness, but their full expression is limited by relational values [(Migliore et al., 2014b), 551]. Similarly, relational values are limited in their full expression by price and individuals' goals and the structural context within which those values are held (McKee, 2018).

This give and take is important when considering sustainable agricultural systems in a market society where profit and prices are essential components of decision-making. Mortgages must be paid, wages must be earned, capital must be borrowed, and prices must be competitive. Farmers who are deeply embedded in their social communities must nevertheless earn a profit to continue their operation. And consumers whose values are communal still make decisions based on price. Prices and profit are embedded in market systems and are part of the complex social fabric in which decisions are made. This negotiation, the continuous jostling of values and contexts, is tremendously important when developing indicators of sustainable agriculture.

Embeddedness and sustainability

While the above sections have discussed how social connection, trust, and community are essential to economic life in general, understanding those values and systems is critical to alternatives such as sustainable agriculture (Sage, 2003; Payán-Sánchez et al., 2018).

Sustainable agricultural processes require relationships, trust, and connection to the environment (Brinkley, 2017, 315; Payán-Sánchez et al., 2018) and the individualist motivations of the rational actor model are negatively correlated with social and environmental concerns (Steg et al., 2011; Raymond and Kenter, 2016). Communities with stable populations and strong community relationships have been shown to be more conducive to transitions to sustainable agriculture (Lorendahl, 1996; Huggins, 2000; Laschewski et al., 2002; Phyne et al., 2006; Ring et al., 2010; Tregear and Cooper, 2016).

For agriculture to be sustainable, producers and consumers must be motivated by community and environmental values and act in ways that reflect those values. This includes everything from farming and labor practices to market access and sales techniques. Accordingly, embeddedness is an important piece of sustainable food systems. This does not mean that embedded food systems are sustainable. But if sustainability is a goal for a food system, it must actively recognize agricultural production as deeply embedded in social, cultural, and environmental processes.

In achieving sustainable outcomes, it is necessary to value inputs from the perspective of their embeddedness in these processes rather than their contribution to commodity production (Jochimsen and Knobloch, 1997). This means, for example, viewing soil as part of a complex ecosystem that supports food production rather than a medium in which to grow food. Such a view requires stewardship and decision making based on relational values and motivations outside of price *despite* the context and instrumentality of the broader system.

Policy has an important role in ensuring that sustainable processes lead to sustainable outcomes due to its ability to actively recognize embeddedness and align the organizational principles of the system with the values and motivations of those within the system. This includes increasing equitable access to land, regulating non-sustainable production, and supporting sustainable labor and farming practices. Measuring those values and motivations, and the dynamics inherent in values and actions is thus critical to sustainability. We turn to that now.

Developing a tool for measuring embeddedness

The rational actor model upon which much agricultural policy—price, profit, market access—is rooted fails to consider the social nature of producers and consumers in markets. Those frameworks that do include social considerations often imply a low-level rational actor framework and fail to consider complex social dynamics of agricultural processes—including values and motivations—and thus measure outcomes in much the same way economic models do.

It is necessary to measure the embeddedness of individuals in order to incorporate the embedded nature of social processes into sustainable agricultural policy. Yet, due to the complexity of embeddedness—including negotiating values and motivations between individuals and society across space, time, and context—no tools for measuring embeddedness currently exist. This section develops a tool for measuring embeddedness that includes the development of an embeddedness matrix (Section The Embeddedness Type Matrix), creation of marketness and instrumentalism scores (Section The embeddedness scores), and a strategy to use the matrix and scores to inform policy (Section Operationalizing the embeddedness tool).

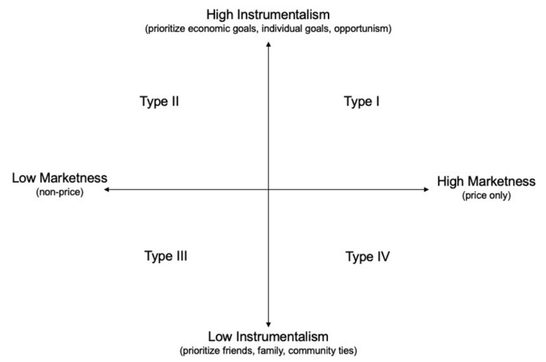

FIGURE 1
Embeddedness Type Matrix.

The Embeddedness Type Matrix

Developing an Embeddedness Type Matrix

The Embeddedness Type Matrix (ETM) is designed to assess how farmers, consumers, and agricultural industries in general are embedded. As discussed, embeddedness is not a quality, but, rather, a characteristic. Embeddedness is neither positive nor negative and does not exist on a continuum of more or less embedded. Importantly, embeddedness is not a characteristic that exists in opposition to markets; markets are deeply embedded in social context. Distant commodity grain markets and local farmer's markets are both embedded, though in different ways. Accordingly, it is more appropriate to consider embeddedness, not in degree, but in type. This is consistent with (Sage, 2003; Velvin et al., 2016; Pinna, 2017; Kitsos et al., 2019).

The framework for embeddedness draws upon Block's (1990), Hinrichs' (2000), and Galt's (2013) discussions of instrumentalism and marketness—specifically that neither instrumentalism nor marketness exist in opposition to embeddedness. Instead, the framework conceives of embeddedness as framed by degrees of instrumentalism and marketness. Block (1990) argued that economic activity exists in degree along a spectrum of marketness. Importantly, economic activity also exists in degree along the spectrum of instrumentalism. Thus, instrumentalism and marketness define two axes in a matrix to develop the four embeddedness type quadrants in Figure 1.

The quadrants in Figure 1 draw upon Akgün et al.'s (2010) approach to categorizing embeddedness that incorporates local embeddedness (Kalantaridis and Bika, 2006), social embeddedness (Block, 1990; Uzzi, 1996), ecological embeddedness (Whiteman and Cooper, 2000; Penker, 2006), and spatial embeddedness (Sonnino and Marsden, 2006; Sonnino, 2007) to create a typology with four types of embeddedness along the instrumentalism and marketness axes: Type I, Type II, Type III, and Type IV. Numerical embeddedness "types" were chosen as quadrant names in order to avoid any assumptions, qualifications, or "ideal types" that could accompany descriptive quadrant names.

These embeddedness types do not imply quality as processes are always and everywhere embedded. Rather, they represent the extent to which values and behaviors are oriented toward and engage with embeddedness. For example, the values and behaviors of individuals in the Type I quadrant, while embedded in a specific social context, are oriented away from and disengaged with that embeddedness. An industrial farm that sells corn on the global commodity markets is embedded in the community in which it operates but may perceive itself outside of, and therefore disengage from, that community.

The Embeddedness Type Matrix places each embeddedness type within an instrumentalism/marketness quadrant. Figure 1 shows how embeddedness in this matrix is not a degree in itself, but, rather, a function of the degree of instrumentalism and marketness. Since all market interactions are embedded, the ETM provides a framework for considering values and motivations of economic actors, and understanding how, not if, they are embedded.

Understanding the Embeddedness Type Matrix

The ETM determines embeddedness type as a function of how an individual's degree of instrumentalism or marketness interact. For example, a Type II producer is motivated by individual economic goals but expresses those goals in a non-price manner. This section explores ETM to understand how this paper proposes to measure embeddedness.

The Instrumentalism axis identifies the values that drive individual motivation. Actors with high levels of instrumentalism prioritize economic goals based on

	Marketness	Instrumentalism	Primary Motivator	Goals	Characteristics	Example
Type I	High	High	Price	Individual	Profit/Utility Maximizers	Industrial dairy funded with non-local capital
Type II	Low	High	Non-Price	Individual	Profit 'Sufficers'	Community Supported Agriculture
Type III	Low	Low	Non-Price	Community/ Environment	Shock Sensitive, Access to Alterantive Inputs	Roadside farm stand
Type IV	High	Low	Price	Community/ Environment	Conscious Maximizers	Indistrial organic production

FIGURE 2
Summary of embeddedness type quadrants.

instrumental values with benefits intended for themselves (Jones and Tobin, 2018). Individuals with low levels of instrumentalism prioritize family and community ties based on relational values whose benefits are intended for multiple parties (Jones and Tobin, 2018). While high levels of instrumentalism undermine social ties, low levels strengthen those ties (Hinrichs, 2000, 297).

The Marketness axis identifies the relevance of price in expressing values. Individuals with high levels of marketness prioritize price and profit when making decisions. Individuals with low levels of marketness prioritize quality, community, and environment when making decisions. At low levels of marketness where price is a less important driver of action, values are expressed in a more complex web of social relations (Block, 1990, 53).

In the high marketness/high instrumentalism, "Type I" quadrant, price is the primary motivator and individual goals drive actions. In this quadrant producers are profit maximizers and consumers are utility maximizers. This is not to say that these actors are not embedded, but rather, hold values and express those values in a way that is individual-based, for example large scale dairy operations or industrial maple production funded by non-local venture capital.

In the low marketness/high instrumentalism "Type II" quadrant, price is not a primary motivator and individual goals are driven by individual values. Type II producers may be described as "profit sufficers" (Sage, 2003) who pursue economic success by way of factors other than price, while Type II consumers prioritize individual health or taste in alignment with their values. The prioritization of economic goals in this quadrant may include the use of non-local markets to sell a product using local inputs and labor (Sage, 2003, 53; Akgün et al., 2010, 541).

The "Type III" quadrant includes individuals for whom price is not a primary motivator and the values that drive actions are communal. While actors in this quadrant are limited in their success by their social closure (Akgün et al., 2010) and can have difficulty responding to shocks (Kitsos et al., 2019), they may have access to alternative forms of labor and markets due to their social ties. Nevertheless, some degree of instrumentalism or marketness is critical to success in a market economy (Bloom and Hinrichs, 2011).

Finally, in the "Type IV" quadrant, individuals display high marketness and low instrumentalism. Accordingly, price is the primary motivating factor, but values are community-based. Individuals in this quadrant are conscious maximizers. Examples might include industrial organic food, rural marketing, or models of sustainable (or green) capitalism.

As this section has explained, embeddedness type results from a complex dynamic of interaction between values, motivation, and action. This interaction is summarized in Figure 2 above. Embeddedness is not static and can change in space and time, and according to context and product. Similarly, the axes between embeddedness quadrants should be thought of as opaque and fluid boundaries across which individuals may cross rather than strict demarcations of type. It is also critical to remember that no quadrant is good or bad and should not be interpreted as degrees; they are simply types of embeddedness.

The embeddedness scores

Developing embeddedness scores

To measure embeddedness, this tool utilizes a survey of small and medium-sized farms and their customers. The survey uses a unipolar 1–5 Likert-scale survey to estimate marketness and instrumentalism and place farmers and consumers in one of the four quadrants on the ETM.

Measuring embeddedness, instrumentalism, or marketness directly is difficult due to the complex and abstract nature of the terms. Accordingly, the tool utilizes a factor analysis

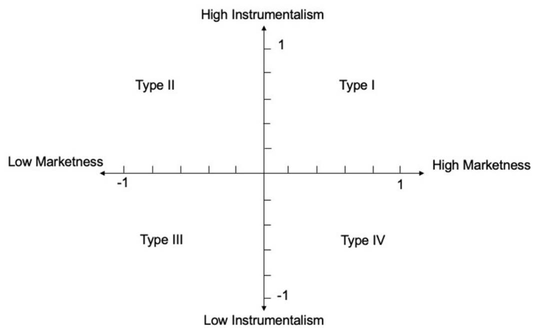

FIGURE 3
Embeddedness score grid.

that uses observed, Likert-scale questions to measure the latent or underlying factors. While a factor such as instrumentalism cannot be easily measured directly, as a latent factor, it causes behaviors that can be measured through survey responses. Factor analysis measures the relationships between observable items in order to provide a measure of an unobservable factor (details in Section Methodology and method below).

The survey provides producers and consumers with a score of −1 to 1 for both instrumentalism and marketness. Taking both scores together assigns individuals to one of the four embeddedness quadrants in Figure 3.

Factor categories

A literature review of embeddedness and sustainable agriculture informs the factors and categories that a survey of producers and consumers should address. This set of literature, both theoretical and empirical, identified several attributes that are critical to understanding and measuring embeddedness.

The literature revealed five broad categories for the Instrumentalism factor and four categories for the Marketness factor. These are listed below, along with their associated attributes.

Instrumentalism Factor categories and attributes

- Shared commitment: information transfer, risk, trust, uncertainty
- Goals: concern for the environment, economic goals, health, local production
- Inputs and Outputs: local inputs as percent of production, length of supply chain, core and repeat customers, output sold locally, length of distribution chain
- Social Connection: bond between producer and consumer, community connection, industry importance, networks of relations, redistribution
- Values: community importance, instrumental and relational values in action, land stewardship, non-production values, salary concerns

The Marketness Factor categories and attributes

- Costs: by-products as inputs to production, operating costs, transportation costs
- Decision drivers: profits, prices
- Fictitious commodities: cost of land, access to money and credit, labor usage and relations
- Market dynamics: demand, perceived competition

Survey development

To develop Instrumentalism and Marketness scores and assign consumers and producers to a quadrant on the Embeddedness Type Matrix, surveys are designed to elucidate the categories outlined in Section Factor categories and highlight producer and consumer values, motivations, and behavior. The surveys are comprised of affirmative statements (Lahne et al., 2017) of the form "I feel a sense of obligation to my consumers" across all appropriate categories and attributes above. All questions are unipolar 1–5 Likert scale questions with response options from "Strongly Disagree" (1) to "Strongly Agree" (5). Questions are specified for the industry and geography in question, and specific to consumers and producers.

The factor categories and attributes listed above are neither complete nor exhaustive. Surveys are designed specifically for a particular study and categories and attributes are added or removed according to the industry, geography, and research question. Survey responses provide valuable insights into the motivations, values, goals, and relationships within the agricultural system being studied.

Following best practices from Chen (2013) and Chen and Scott (2014), initial survey questions are reviewed by subject area experts to further develop the surveys. Revised surveys are administered to a development sample of producers and consumers to determine question-factor correlation using confirmatory factor analysis.

Methodology and method

Factor analysis is a "best practice" in the methodological literature for reducing the number of observed variables to a smaller set of latent or underlying factors (DeVellis, 2011; Lahne et al., 2017). While latent variables, such as instrumentalism and marketness, cannot be directly measured, they can be indirectly measured by examining the relationships they cause in observed variables, e.g., survey responses.

Factor analysis is more appropriate for the development of the Embeddedness Type Matrix than principal component analysis due to the causality of factors on observed variables.

While principal component analysis assumes that observed variables influence latent variables, factor analysis assumes that latent variables influence observed variables and are, thus, revealed by observed variables. This approach to embeddedness understands that individual values and the social structure within which those values operate to influence the expression of those values in the form of actions and survey responses. In other words, latent instrumentalism causes observable survey responses, for example.

Confirmatory factor analysis (CFA) is used when a theoretical structure, such as the one developed in Section Factor categories, informs the variables in a factor model (Ferguson and Hansson, 2015). The Embeddedness Type Matrix utilizes CFA to analyze the embeddedness survey responses to "confirm" that observed variables are correlated with the instrumentalism or marketness factor theorized above (de Groot and Steg, 2007). In other words, to determine if the questions that aim to discover instrumentalism indeed describe instrumentalism and not marketness.

Using a CFA with oblique rotation and a target of two factors assigns a factor load of 0–1 for each variable and explains the variable's correlation with each factor (Migliore et al., 2014a). Factor loadings are compared to the theoretical structure to confirm that the variables with the highest loadings are assigned to the appropriate theoretical factor, and variables are realigned to factors with which they have the highest loading, if necessary (Lahne et al., 2017).

Factor loading can be used to determine a factor score in multiple ways (DiStefano et al., 2009). The Embeddedness Type Matrix tool uses a weighted load-weight sum factor score in which observed variable values (1–5 Likert responses) are multiplied by their weighted factor loading to assign a score of 1–5 for each factor. These scores are normalized from−1 to 1 to assign a factor score for each individual for each factor, instrumentalism and marketness. Individuals are then placed on the ETM to determine embeddedness type for each individual.

Operationalizing the embeddedness tool

This section explores how to read the ETM, identify the sustainability region of the matrix, and understand how policy can affect producer and consumer placement within the context of sustainability.

Reading the matrix

We offer a hypothetical example to demonstrate how to read the ETM. Consider a dairy farmer whose 74 survey responses yield an instrumentalism score of 0.37 and a marketness score of −0.02, after being scored using the method outlined above. This farmer, denoted by a star, would be deemed Type II. Continuing this example with 50 dairy consumers and 50 dairy producers, produces the example dairy industry ETM in Figure 4.

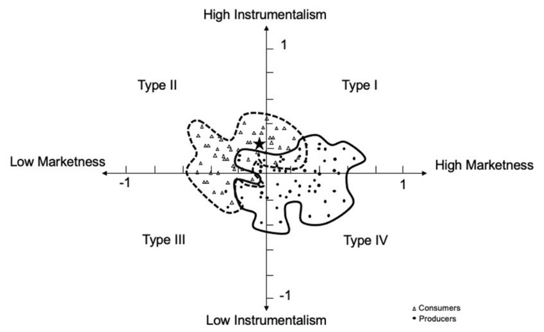

FIGURE 4
Example embeddedness tool results.

As this example figure shows, dairy consumers in this study, with individuals represented by triangles and encircled by a dotted line, fall more frequently in the Type I and Type II quadrants. Dairy producers in this study, represented by circles encircled by a solid line, fall more frequently in the Type III and Type IV quadrants. Consumers display higher levels of instrumentalism, in general, while making decisions across the marketness spectrum. Producers display lower levels of instrumentalism while making decisions more heavily weighted toward price considerations. This differentiation between consumers and producers may indicate that, as a whole, producers are not able to meet the values of an embedded consumer base. From a policy perspective this may mean, for example, increasing opportunities for small farmers including subsidized land and labor costs, and access to local markets.

Sustainability

Agricultural systems are sustainable if they provide food in such a way that the economic, social and environmental bases to provide food in the future is not compromised (Nguyen, 2018). Accordingly, a sustainable food system must be profitable, socially beneficial, and environmentally just (Hinrichs, 2000, 295). Due to the interaction of these three critical components, we outline the region of sustainable agriculture as the shaded area in Figure 5.

As Figure 5 shows, and as this paper has argued, embeddedness is not synonymous with sustainability and low levels of marketness and instrumentalism do not guarantee sustainability.

Indeed, sustainability rests upon relational values with society and the environment, and expresses those values by means other than price. At the same time, however, some

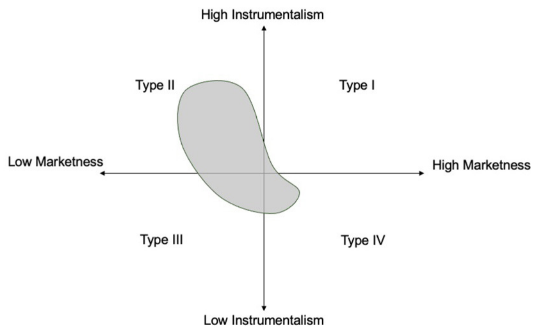

FIGURE 5
EMT sustainability region.

degree of instrumentalism is critical to the economic success of small and medium farms. Similarly, some focus on price is required to be profitable in the long term. While too much instrumentalism and too much marketness certainly undermine the social bonds and environmental relationships that are precursors to sustainable food systems, too little focus on price and economic success can undermine a viable farm. It is this dynamic between social and environmental values, on the one hand, and economic success, on the other, that exemplifies embeddedness in a market economy and informs the region of sustainable agriculture on the ETM.

Sustainable agricultural practices can be tested using regressions where the dependent variable is sustainability outcomes and the independent variable is embeddedness type. Similarly, hypotheses regarding the relationship between embeddedness and sustainability can also be tested using the embeddedness score. The ETM can also be used with predictive modeling to predict the impact of policy changes, to be explored now.

Policy implications

The Embeddedness Type Matrix, with its visible demonstration of the sustainability region, will assist policy makers in designing and implementing policy to "nudge" actors in the direction of sustainability by means other than the traditional price and production goals. This includes labor policy, land access, and subsidization of socially embedded industries.

Analyzing the data underlying embeddedness scores, including factor loads and individual question responses, reveals the dynamics where policy can have the most impact in embeddedness and sustainability. For example, if a large portion of agricultural producers were to exhibit high levels of marketness and the factor loads and survey responses concerning mortgages revealed that the cost of land was considerable factor in being placed outside of the sustainability region, policy could be directed at interest rates on farmland mortgages or subsidized or free farm land. This could have the effect of reducing the importance of mortgage decisions in farm operations and, in effect, "move" farmers to lower levels of marketness.

From the perspective of consumers, if it is revealed that the price of food limits individuals' ability to express their social and environmental values, policy could be designed that could have the effect of limiting the level of marketness in consumer behavior. This could include subsidized production or consumption policies that decrease prices for consumers. It may seem counter-intuitive to use price policy to address the failings of price, but in a market economy, price is the central organizing factor. Sustainability policy should be partially aimed at making price less important in decisions so that other values can be expressed.

Overall, the Embeddedness Type Matrix allows policy makers to view the social landscape of a particular agricultural industry, understand what drives embeddedness type, and consider policy that will move individuals and industries into the sustainability region.

Conclusion

This paper fills what we believe to be a methodological and theoretical gap in understanding and measuring the social aspects of sustainability. By drawing upon the social embeddedness literature, this paper develops a theoretical framework for understanding the complex social interactions that take place in small- and medium-sized farms. This is in contrast to the rational actor model upon which much economic analysis, and therefore policy prescriptions, are implicitly based. This approach allows policy makers to design polices that are well-aligned with the issues facing farms and those who consumer their food.

That this paper develops a methodology for measuring embeddedness does not imply that price, production, and market access measurements and policies are not important. Nor does it imply that outcomes measurements such as poverty and access to markets are not useful. Those measurements and indicators and the policies they inform are critical to sustainable agricultural systems. This paper is meant to complement that work in order to provide a broader understanding of agriculture, specifically the complex social dynamics that support agricultural production and consumption.

The policy implications of a broader understanding of the social dynamics of agricultural landscapes are exciting. By understanding how farmers make decisions and what motivates their actions, policy can be aimed at things like sustainable land conservation, just labor practices, and culturally-appropriate distribution systems. Measuring social embeddedness in the manner outlined in this paper can provide an understanding that has been missing but is critically important for designing policy based upon what actually motivates producer and consumers. Importantly, it has the potential to shed light upon the social and economic components that both guide and limit the transition to sustainable agricultural activity.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

Author contributions

JA developed the methodology within the paper and wrote the manuscript. AT and DT provided supervision, theoretical framing, literature suggestions, review of early drafts, and also contributed writing. CMorg and CMors both contributed to writing and editing as well as providing invaluable perspective on sustainable agriculture and related literature. SM and T-LL contributed statistical assistance in the development of the methodology and contributed to writing and revision. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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