

**SUSTAINABLE AGRICULTURE:  
A POSITIVE ALTERNATIVE TO INDUSTRIAL AGRICULTURE**

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As we approach the turn of a new century, all eyes seem to be focused on visions of the future. High-tech, bio-tech, and info-tech are the "buzz words" most frequently used among those in the agricultural establishment to describe the future of U.S. agriculture. With few exceptions traditional agriculturists foresee a continued trend toward fewer, larger, and more specialized production units. They see current trends continuing until a half-dozen or so large, multinational corporations control virtually all processing and distribution of agricultural commodities in a single global food and fiber market. Many also forecast increasing vertical integration of production, processing, and distribution functions -- spanning activities from the design of germ-plasm to shaping of consumer preferences -- and increasing reliance on biological technologies and information technologies at all levels within the global agricultural system. Forecasts of the continued industrialization of agriculture permeate both professional agricultural publications and the popular farm press.

Such forecasts may be right, but a lot of well-informed, educated people see a very different future -- a "post-industrial" future for agriculture and the U.S. economy in general. They see a future in which "thinking," -- not just by the intellectually-gifted, highly-educated, and highly-paid few, but by people in general -- is the key to success. The human mind will be the source of progress for individuals, families, farms, businesses, communities, and nations. "High-think" rather "high-tech" will be "buzz word" of the 21st century. A "post-industrial" paradigm for agriculture implies a future very different from the typical "high-tech" vision of continued agricultural industrialization.

The "high-tech" future of agriculture assumes that trends of the past one-hundred years will continue. The biological and electronic tools are different but the objectives are still the same: to specialize, mechanize, separate, sequence, and control all processes of production -- to make farms work like factories and fields and feed lots run like assembly lines.

There were logical economic and social motives for industrializing U.S. agriculture during the twentieth century. And there are reasons to think the industrialization of agriculture might continue. But, there are also logical reasons to question further industrialization and to believe that the future will be very different from the past. An alternative paradigm for U.S. agriculture, a new paradigm arising under the conceptual umbrella of sustainable agriculture, represents a logical, realistic, positive alternative to industrial agriculture.

Three Reasons to Question the Continued Industrialization of Agriculture. New paradigms (mental models, mindsets, or ways of thinking) arise to replace old paradigms. New paradigms arise when it becomes apparent, at least to some people, that old paradigms are not capable of solving important problems, or that old paradigms have begun to create more problems than they solve.

Peter Drucker, a noted business scholar and time-honored consultant of twentieth century industrial managers, discusses the transformation from an industrial to a post-industrial society in his book: the Post-Capitalist Society. He states: "Every few hundred years in Western history there occurs a sharp transformation. Within a few short decades, society rearranges itself -- its worldview; its basic values; its social and political structure; its arts; its key institutions. Fifty years later, there is a new world.... We are currently living through just such a transformation." (1994 p. 1).

American agriculture is in the midst of this great transition. Three basic factors foretell end of dominance for the industrial paradigm of agriculture. First, the logical, economic and social gains from industrialization of agriculture have already been realized. There is very little left to be gained from further specialization, mechanization, and routinization -- industrialization -- of agricultural production and marketing. Second, there are increasing problems -- environmental, social, and economic problems -- associated with continuing the industrialization process. The marginal costs of industrialization may have exceeded its marginal benefits as far back as two or three decades ago. Third, there is growing evidence the Industrial era has already ended in many sectors of the economy outside of agriculture and that agriculture will soon follow.

The Old Job is Done. In the early 1900s, before we began to industrialize agriculture, the potential gains from continuing the industrial revolution in the larger society were undeniable. At that time we were still an agrarian society. More than half of the people of this country were either farmers or lived in rural communities and it took about half of our total resources - money, time, and effort, just to feed and cloth ourselves. If we, as a nation, were to realize the emerging opportunities of the industrial revolution - to become the modern society we know today - we had to do two things.

First, we had to free people from the task of farming to go to work in factories and offices of the emerging industrial economy. Second, we had to free up income and other resources spent on food and clothing so people could buy the things these new industries were going to produce. In short, we had to make American agriculture more efficient. We had to make it possible for fewer farmers to feed more people better at a lower cost.

The industrialization of agriculture allowed us to accomplish those two things. Through specialization, mechanization, simplification, and routinization we bent nature to serve our needs. We gradually harnessed the vagaries of nature and transformed farms into factories without roofs. Fields and feed lots became biological assembly lines with inputs coming in one side and commodities coming out the other. We achieved the economies of large-scale, specialized production as we applied the principles, strategies, and technologies of industrialization to farming.

This industrialization of American agriculture resulted in the most efficient agriculture in the world, at least in terms of the dollar and cents costs of production. This in turn made it possible for this nation to build the strongest economy in world. The agricultural sector can be proud of its past successes. But the objectives of industrialization have been achieved. The benefits that industrialization could offer America have been realized.

Today, less than two percent of the people in this country are farmers. As a nation, we spend only about ten percent, or a dime out of each dollar, of our disposable income for farm produced food. Equally important, the farmer gets only a single penny out of that dime, while nine cents goes to the marketing and input firms. We now pay more for packaging and advertising than we pay the farmer to produce the food.

Future gains from the further industrialization of agriculture must be squeezed from the farmer's penny. There just isn't much left in to be squeezed out to benefit either farmers or society. It simply doesn't make much difference to society anymore whether there are more or fewer farmers or whether farmers are more or less efficient. There are no good paying factory jobs left for displaced farmers or for anyone else. If farmers got nothing for their part in producing food, the average consumer would only save a dime of each dollar spend for food and a penny of each dollar they spend in total. We just can't make food much cheaper by putting more farmers out of business.

Industrial Agriculture Now Creates More Problems Than It Solves. At the same time that the benefits to society of an industrial agriculture have declined, the perceived threats of agriculture - - threats to the environment, threats to the natural resource base, and threats to the quality of life of farmers, of rural residents and society as a whole -- have risen. The same technologies that support our large-scale, specialized system of farming -- the industrial systems through which we have increased agricultural productivity -- have now become the primary focus of growing public concerns.

Industrial systems historically have degraded their environment and depleted their natural resource base. Commercial fertilizers and pesticides -- essential elements in a specialized, industrialized agriculture -- have become a primary source of growing concerns for environmental pollution. Industrialization has transformed an agriculture created for the purpose of converting solar energy to human-useful form, into an agriculture that uses more non renewable fossil energy than it captures in solar energy from the sun. Industrial systems of crop and livestock production also degrade the human resource base. Factory farms transform independent decision makers into farm workers -- people who know how to follow instructions or directions but not necessarily how to think. Henry Ford is quoted as once saying "the biggest problem in running a factory is that you have to hire whole people when all you need is two hands".

Agriculturally dependent rural communities have withered and died as farms have grown larger and more specialized. Larger farms mean fewer farms and fewer farm families to support local schools, churches and public institutions, and retail businesses. In addition, larger farms tend to bypass local communities in purchasing production inputs and in marketing their products. The fundamental purpose of agricultural industrialization was to make it possible for fewer people to produce more. But it takes productive people, not just production, to sustain local communities. The social costs of industrialization continue to grow as rural communities wither and die.

Emergence of a New Post-Industrial Era. If current trends were to continue indefinitely, the future of rural America would appear to be dismal. However, no trend goes on forever. A couple of scientists recently proposed to the world scientific community a list of their "Top 20 Great

Ideas of Science." Some of the ideas on their top 20 list were the first and second laws of thermodynamics and the universal laws of motion. But also on that list was the proposition that "everything on earth operates in cycles" - physical, biological, economic, and social (Science, p.1309). Not all scientists agreed, but, if this proposition is correct, the industrial era will end. The question is not whether but when.

Alvin Toffler -- a futurist quoted frequently by people with views as different as House Speaker Newt Gingrich and President Bill Clinton -- points out that many forecasters simply present unrelated trends, as if they would continue indefinitely, without providing any insight regarding how the trends are interconnected or the forces likely to reverse them. The professional and popular agricultural press is filled with such forecasts for the future of agriculture.

Toffler contends that the forces of industrialization have run their course and are now reversing, that the industrial models of economic progress are becoming increasingly obsolete, and that old notions of efficiency and productivity are no longer valid. He contends that mass production is no longer a symbol of "modern" business operation. The new "modern" model is to produce customized goods and services aimed at niche markets, to constantly innovate, to focus on value-added products and specialized production. Toffler contends that mass production of basic commodities were the trends of the past, not the trends of the future.

He states: "the most important economic development of our lifetime has been the rise of a new system of creating wealth, based not on muscle, but on the mind" (Toffler, p. 9). Drucker agrees: "the biggest shift -- bigger by far than the changes in politics, government and economics -- is the shift to a knowledge society". The social center of gravity has shifted to the knowledge worker." (Drucker, p. 173). The conventional factors of production -- land, labor, and capital -- become less important and less limiting as knowledge becomes the dominant source of productivity.

Drucker points out an important, fundamental difference between knowledge work and industrial work. Industrial work is fundamentally a mechanical process whereas the basic principle of knowledge work is biological. He relates this difference to determining the "right size" of organization required to perform a given task: "Greater performance in a mechanical system is obtained by scaling up. Greater power means greater output: bigger is better. But this does not hold for biological systems. There, size follows function. It would surely be counterproductive for a cockroach to be big, and equally counterproductive for the elephant to be small. As biologists are fond of saying, 'The rat knows everything it needs to know to be a successful rat.' Whether the rat is more intelligent than the human being is a stupid question; in what it takes to be a successful rat, the rat is way ahead of any other animal, including human beings" (Drucker, 1989, p. 259).

He concludes that differences in organizing principles may be critically important in determining the future size and ownership structure of economic enterprises. Other things equal, the smallest effective size is best for enterprises based on information and knowledge work. "'Bigger' will be 'better' only if the task cannot be done otherwise" (Drucker, 1989, p. 260).

Some point to the trend toward large industries tailoring specialized products for niche markets as the trend of the future. But the advantage of being big comes from being able to produce large quantities of the same basic things rather than from producing small quantities of lots of different things. Large firms realize that profitable markets of the future are in the niches, but most also realize that, as they target these markets, they become increasingly vulnerable to competition from small firms and independent producers. Thus, we see large firms beginning to decentralize, down-size, outsource, and otherwise begin to dismantle themselves to forestall their eventual competitive destruction by more flexible, innovative, creative, dynamic, smaller competitors. Toffler refers to "mass customization" as only a "half-step" toward a future where wants and needs of consumers are met individually.

Dee Hock, former CEO and founder of the VISA Corporation states: "The most abundant, least expensive, most under-utilized, and frequently abused resource in the world was human ingenuity: the source of that abuse the archaic, Industrial Age institutions and management practices they spawn" (Hock, p.10). He contends that the era of knowledge and information-based human progress ahead may well be fundamentally incompatible with the industrial model or organization.

Opportunities for the Future. Opportunities for the future arise from both successes and failures of the past. First, as a result of past successes in reducing food cost, almost anyone can now afford to pay for the quality of food they really want or need. It may well cost more to grow food on farms than to manufacture food in factories. However, if farmers expand their margins by reducing their reliance on purchase inputs, and by reducing the costs of marketing services, consumers need pay no more for food at retail, and quite possibly could pay less. Even if food prices increased by an amount equal to 50 percent of the farmers gross margins, retail food prices would only be five percent higher, and the average consumer would only spend one-half percent more of their income for food. Industrialization has made food so cheap that consumers can now afford to pay more to get what they need or want.

Second, the environmental and social costs of industrialization are becoming a growing concern among the general public. As these concerns become more widely reflected in regulations to protect the environment, the economic costs of industrial agriculture will rise, allowing more ecologically sound systems of production to become more economically competitive. Concerns among consumers regarding the negative impacts of industrial agriculture on the environment and on family farms and rural communities is creating a niche market for products produced by ecologically sound and socially responsible means. Also, as industrial systems of production have been applied in situations where they just don't fit, the benefits are few and the problems are great. These situations mark prime opportunities for application of a new and fundamentally different paradigm for agriculture.

Third, the emergence of a post-industrial paradigm in other sectors of the economy provides models of success which farmers may adapt in solving problems and realizing opportunities in farming and marketing. The success of post-industrial approaches elsewhere also sends a message of hope for the continued success of those farmers who already are venturing into the new era of agriculture. They march under the banners of organic farming, alternative agriculture, biodynamic farming, community supported agriculture, local food systems, and a host of other

movements which, by one means or another, address the broad question of agricultural sustainability.

The Post-Industrial Alternative: Sustainable Agriculture. Why are we seeing the rapid industrialization of some sectors of the agricultural economy, specifically in hog and dairy production, if the industrial era is ending? In his book, Paradigms, Joel Barker points out that new paradigms (including developmental models) tend to emerge while, in the minds of most people, the old paradigm is doing quite well. Typically, "a new paradigm appears sooner than it is needed" and "sooner than it is wanted." Consequently the logical and rational response to a new paradigm is rejection (Barker, p. 47).

New paradigms are first applied in situations where they are best suited to solve the most important problem. Over time, established paradigms are applied in situations where their marginal advantage becomes smaller and smaller. Eventually aging paradigms are applied -- mostly out of habit -- in situations where they are ill suited, creating major new problems while contributing little in terms of new solutions.

American agriculture provides a prime example of over application of the industrial paradigm. The early gains of appropriate specialization in agriculture lifted people out of subsistence living and made the American industrial revolution possible. But agriculture was the most ill-suited of all sectors for fully-industrialized, factory-like operations. Thus, full industrialization of agriculture occurred last, generated fewer benefits, created more environmental and social costs, and as a consequence, will likely last for a shorter period of time.

However, many agriculturists cling to the industrial model, firmly convinced that it only needs a bit of fine tuning to make it fit agriculture.

The paradigm of sustainable agriculture has emerged to solve problems created by the industrial model, primarily pollution of our environment and degradation of our natural resource base. However, this new paradigm seems capable of creating benefits the industrial model is inherently incapable of creating, such as greater individual creativity, dignity of work, and attention to issues of social equity.

Agricultural sustainability is a goal rather than a specific set of farming practices or methods. Sustainability, as a goal, implies some basic principles and characteristics of sustainable systems. A sustainable agriculture must be ecologically sound, economically viable, and socially responsible -- all are necessary and none is sufficient. Short run profitability is necessary, but not sufficient, to ensure long run sustainability. In the sustainable paradigm, the environment and society are not seen as "constraints" to profitability, but are seen as essential prerequisites to long run economic viability . The sustainable paradigm balances economic, environmental, and social concerns in moving toward systems which can sustain a desirable quality of human life on Earth indefinitely.

The sustainable agriculture paradigm is consistent with the visions of Toffler, Drucker and others of a post-industrial era of human progress. Sustainable systems must be individualistic, site-specific, and dynamic. Thus, sustainable farming is inherently information, knowledge, and

management intensive rather than management extensive. Complexity, interdependence, and simultaneity are fundamental elements of the sustainable model, which is clearly biological rather than mechanical in nature. For such systems, size must follow function. Sustainable farms are inherently diverse -- biologically, economically, and culturally -- both within and among farming operations. Diversity allows sustainable systems to rely far less on the fossil fuels and manufactured inputs upon which large-scale, mechanized agricultural production is totally dependent.

Industrialization separates people from the land and from each other -- within families, within communities, and within nations. Sustainable agriculture reconnects people to each other and reconnects people to the land. Sustainability links people with purpose and place. It poses the question of *what can we do here*, in this place, that can be sustained indefinitely?

Economics of Post-Industrialization Farming. The principles of sustainable agriculture are becoming fairly widely accepted and generally understood. However, the challenge of turning those principles into practices still lies ahead. How can farmers develop farming operations that will be ecologically sound, socially responsible, and economically viable over time?

At this point an agricultural economist usually enters the discussion and says: "All this dreaming about a healthy environment and strong communities is quite noble, but there is no way these 'sustainable' farmers are going to be able to compete with large-scale, corporate agriculture in the future." The logical response is: "They are not going to 'compete' with industrial agriculture. Future opportunities for farmers of the future will come from farming in ways which are fundamentally different from ways of both past and present." The economic logic for a post-industrial agriculture today is just as sound as was the logic for agricultural industrialization a century ago.

Four fundamental characteristics determine the value or "utility" of any good or service: form, space, time, and possession. This basic economic concept will not change. Form is the physical characteristic of a thing. What is it? Space refers to the location at which the value of something is determined. Where is it? Time refers to point in time when the value of something is determined. When is it available and when is it needed? Finally, possession refers to the people involved in evaluating something. Who has it and who wants it? What is it? Where is it? When is it there? Who has it and who wants it? We must know the answers to all four of these questions before we know the value of anything -- know how much it is worth.

Something can be of great personal or human value but be of little economic value. Air, for instance, is absolutely essential for human life, but under normal conditions, has little "economic" value. Diamonds, on the other hand, are used mostly for trinkets which most would agree are of little basic human value, but diamonds may have great "economic" value. Why the difference between basic human value and "economic" value? Economic value -- the price of something -- is determined by "scarcity."

Something is scarce only if there is not enough of it for people to have all they want without doing without something else. In general, air is not scarce but diamonds are. Scarcity is not a matter of a lot of people wanting something or only a few people wanting it. Scarcity is all a

matter of how much there is available relative to how much people want. Something can be scarce even if a few people want it, if there is not very much of it available.

Scarcity is also affected by the availability, or unavailability, of good substitutes. If the price goes up for a good or service that has a lot of good substitutes, far fewer people will want it. They will just buy something similar from someone else. On the other hand, if the price goes up on something with few good substitutes, most people will continue to buy it. It will remain scarce even at a higher price. Every grain farmer knows that his corn and wheat are pretty much the same as other farmers' corn and wheat. If one farmer were to try to price his grain above the going "market" price, buyers would simply buy from other farmers -- either down the road or on the other side of the world.

Economic Keys to Success. Why are concepts of value, scarcity, and substitution important? Because they help explain why industrialization succeeded in the past and why it is now failing. These same concepts provide the economic logic for the successful practice of sustainable agriculture in the post-industrial era of the future.

First, industrialization succeeded, in large part, by focusing on creating value by changing the form (processing, manufacturing, packaging), place (assembly, transportation, distribution), and time (accumulation, storage, allocation), of things. The benefits of industrialization have come from being able to carry out activities such as processing, transportation, and storage more efficiently, by specializing and doing them on a larger scale. Mass production and mass marketing are fundamental characteristics of industrialization. Mass production and mass marketing means that a lot of different producers have to produce the same basic things (or that producers have to be very large), and that a lot of consumers have to be willing to buy the same basic thing.

Second, farmers who followed the industrial model were able to cut costs by increasing the size of their operations to capture the economies of large scale production. But, as they expanded production, food and fiber, in general become less scarce, and prices fell, forcing them to reduce costs even more to stay in business. This is the process by which the industrial model succeeded in providing for the food and fiber needs of people at a continually declining economic cost.

Third, as food became less scarce, consumers benefited but farmers did not. There were almost always good substitutes for whatever farmers had to offer for sale. There are no good substitutes for food and fiber, in general, but one farmer's agricultural commodities were pretty much the same as those of other producers. Thus, while food and fiber in general, had economic value, no individual farmer was able to capture that value in terms of a sustainable profit. The only way farmers could survive during the industrial era was to continue to find ways to reduce costs.

Positive Alternatives to Industrial Agriculture. The strength of an industrial agriculture was its ability to provide for the basic food and fiber needs of people at a low dollar and cents cost. But its primary weakness was that it had treated things as if they were the same, even if they are inherently different, to achieve those low costs. Some things are pretty much alike and there may be no great harm in treating them as if they were the same. But the more we industrialized, the more things that were fundamentally different were treated as if they were the same. Finally, the

fundamental objective of industrialization was cheap food rather than profitable farming. Sustainable farm profits are inherently inconsistent with an industrial agriculture.

Opportunities for successful farming in the future arise directly exploiting the weaknesses of industrialization by focusing on the relative strengths of the post-industrial, sustainable agriculture alternative.

Focus on value rather than costs. Market in the niches. Remember, most people can afford to pay for the food they really want -- for food they value. We value things differently because we have different needs and different tastes and preferences. Industrialization is efficient only if large numbers of us are willing to settle for the same basic goods and services. If it can be mass produced and mass marketed, it can be produced at a lower cost. Customers have to be persuaded, coerced, and bribed to buy the same basic things rather than the things they really want. Thus, industrialization creates economic opportunities for farmers who can meet the different needs and wants of individual consumers that cannot be met by mass markets.

Niche marketing simply means tailoring the product to conform to the values of the customer, rather than bending the preferences of the customer to conform to the product. A niche market is any market that is too small to be served effectively by impersonal, mass marketing methods. A niche market only needs to be large enough to meet the needs of a single producer to be a viable market. Larger market niches may be served either individually or cooperatively by a small group of producers. The best opportunities for 'value-added' marketing also are associated with niche markets. Profitable value-added activities require more than just replacing the existing "middlemen." The functions those middlemen perform add value as well as cost. If a farmer can't add value at a lower cost, nothing is gained by their value-adding efforts. The odds of success are far better when value-added marketing is coupled with profitable niche markets to give customers something they can't get elsewhere.

Focus on what *you* can do. We are all different -- as producers as well as consumers. We have widely diverse skills, abilities, and aptitudes. Industrialization had to "bend people" -- train, bribe, and coerce them -- to make people behave as coordinated parts of one big machine rather than as fundamentally different human beings. Many social problems of today are symptoms of people being used by industrial systems in ways that are inherently degrading to our uniquely human productive capacities. Thus, industrialization has left tremendous untapped economic opportunities for farmers and others who can use their unique capacities to be productive rather than attempt to conform to systems of production that just don't fit.

Focus on working with nature. The natural resource base that ultimately must sustain productivity is also diverse. Industrial systems have had to "bend nature" -- to augment, supplement, alter, and force it -- to create an illusion of conformity out of diversity in order to meet the demands of large-scale, industrial production. The ecological problems arising from industrialization are symptoms of natural resources being used in ways that are inherently degrading to their productivity. Thus, industrialization has created opportunities for farmers who learn to utilize the inherently productive capacity of a diverse natural resource base, rather than wasting time and money trying to force nature to conform.

Focus on creating value through uniqueness. Link people and purpose with place. The linking of unique productive capacities with unique sets of natural resources in serving the needs and wants of unique groups of customers creates a unique system of meeting human needs that cannot be industrialized. Economic value arises from scarcity. Scarcity exists only if people want more of something than they can get without giving up something else. Scarcity is sustainable only if the process and product cannot be replicated. Scarcity can sustain profitability only if there are few good substitutes for whatever is valued. The more unique the combination of person, purpose, place, the more sustainable will be the value to customer and producer alike. The sameness of industrialization creates opportunities for farmers who can create unique linkages with both resources and customers.

Focus on building personal relationships. There are no good substitutes for personal relationships. Many consumers are alienated from current mass marketing systems not only because they don't meet their specific needs, but because they have lost faith in the impersonal system of mass production for mass markets. They do not believe large corporations monitored by big government will really protect the natural environment or fulfill important social responsibilities. They trust neither corporate or government assurances that foods in the supermarkets are safe and healthful. They feel more personally secure and socially responsible when they support local and regional food systems rather than rely on international markets dominated by the multinational corporations. In other words, they want to "know their farmer." Farmers who produce in ecologically sound and socially responsible ways have much to gain and little to lose from cultivating personal relationship with their customers.

Finally, fight the urge to fall back into an industrial mind-set. The desires to get bigger and make more money have been the driving forces of industrialization. Knowing when to say "enough" may be the mark of success in the post-industrial era. Niche markets may grow over time. There will be a strong urge to promote their growth or to at least grow with them. The current attempt to establish national organic certification as a means to expand the organic food market may be a case in point. Maybe organic production is at a point where it needs to expand its niche. But, as niche markets become larger, they become vulnerable to competition from "mass customization," and, if they grow larger still, become mass markets best served by industrialization.

The most secure markets of the future will be those based on personal relationships. Producers who develop personal relationships with their customers need not see other producers as their competitors. They can collaborate rather than compete. No two people are alike, thus, no two producers are likely to be viewed as close substitutes in the minds of their 'relationship' customers. Meaningful relationships can only be spread so thin. Thus, there will be natural constraints, or limits to growth, in relationship markets. The necessity of maintaining personal relationships offsets the natural tendency to get bigger and make more money. Local and regional markets will be sustained over time by people who prefer to deal with people they know.

Industrialization separated people from each other. Perhaps this necessity of separation was the most important single flaw of the industrial paradigm. If so, reconnecting people to each other may be the most important single strategy one can pursue in breaking away from industrialization and moving toward sustainability. Valuing people over things may be the most

important single key to realizing the value of sustainable agriculture as a positive alternative to industrial agriculture.

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