The Collapse Of Complex Societies

Ross Welcome to Renegade Inc. Hubris in the West today means we think that we're so advanced we can escape the collapse of complex societies. Our recent history has cemented an air of invincibility. But if you look closely, all the signs are present that the empire is far more vulnerable than we think. So is our societal decline preordained or will we be the first civilisation to cheat the inevitable?

Ross Dr. Joseph Tainter, welcome to Renegade Inc. Really great to have you.

Joseph Tainter Thank you,

Ross Doctor, when you wrote your book, famous world renowned book, The Collapse of Complex Societies back in 1988, if you jump forward to 2021 having written that book, you mustn't be very surprised to find yourself here.

Joseph Tainter No, I'm actually not. I guess most of my career has been immersed in global catastrophes, large scale catastrophes. Certainly that was the topic that I undertook in the book. And so the advent of the pandemic really did not surprise me that much.

Ross Is it a natural progression because of the load that we've put on our environment and the way that we've designed society, how we interact with each other? Has Covid been a natural symptom of what we're doing to each other and the planet?

Joseph Tainter I would say that given globalisation, the pandemic was essentially inevitable and it probably won't be the last one. We're fortunate that it is essentially the last major pandemic since the 1918 one. We're lucky that we got through more than a century without a major pandemic. But I don't think this will be the last one and we may not have a full century before the next one comes along.

Ross Often we hear people like Mr. Taleb talking about Anti-Fragility. We no doubt live in a complex system. Not much of that system from where I'm looking since 2008 has been fixed. I would argue that the fragility, if anything, has increased. What's your view on that?

Joseph Tainter I tell my students that two of the things that concern me the most are just-in-time delivery in our economic system and lack of warehousing or stockpiling of the things that we essentially need. And you can see in the United States what the effect of this was immediately when the number of cases of people with Covid-19 began to climb, the medical industry, the medical establishment, simply did not have enough ordinary supplies like masks and gowns on hand to cope with it. And I've been concerned all along that just-in-time delivery and lack of warehousing would lead to a situation where we have a breakdown in communications and a breakdown in economic flows, and the basic things that people need day to day, things from the market, are no longer available or not available in adequate numbers. And we do see that in the coronavirus that there are many, many shortages. We all remember the initial shortage of toilet paper when the virus hit and now there is shortages of meat throughout. The auto industry has a shortage of computer chips and so there's a shortage of new cars. This is caused the price of used cars to go up. All of this is symptomatic and

shows the problems of a lack of warehousing and in just-in-time delivery. And we're fortunate that we're getting really an early warning from this incident, because none of these is catastrophic. Most of us don't need to buy a new car right now, but they show what can happen in a situation where economic flows break down.

Ross So these really are the canaries in the mine, aren't they?

Joseph Tainter That's a good way to put it.

Ross Well, because once you have supply chain fragility in the way that we do now, which is backed by an economic system, which is, let's say, fundamentally neoliberal - because what we're trying to do is juice as much profit out of this system as is possible - then you don't have the necessary breaks, the necessary buffers within that system for it to cope with this kind of shock do you?

Joseph Tainter In fact, there are disincentives to being ready to cope with this kind of shock. These disincentives are ongoing costs of warehousing - warehousing of, say, medical supplies or groceries that aren't needed immediately and that costs money just to stockpile.

Ross A different way of putting that is the word rent.

Joseph Tainter Yes, yes.

Ross And we are in a system that fundamentally extracts rent. And whichever organisation you work for, what you're trying to do is stop that bleed at every juncture. So therefore, you're keeping the supply chains as lean as possible. But ultimately, people's lives are at risk.

Joseph Tainter That's true. And it's a classic case of taking short-term gains at the price of long-term fragility.

Ross What does that then say when we think about your thesis in The Collapse of Complex Societies? What does that economic component do to us as a society?

Joseph Tainter What I focused on in the book was asking why do societies suddenly become less complex, suddenly simplify? This is what I mean by a collapse and I focused on the economic factors that underlie complexity. What's generally not understood is that to be a complex society has a very high what we might call a metabolic cost. In the past, human societies haven't paid for that metabolic cost through their own labour. Now we pay for it through fossil fuels so we're largely unaware of it. But when there is a situation where the economic flows begin to break down or become disrupted, particularly when it comes to something like the supplies of petroleum, then prices go up, costs go up, and the economy is harmed. And we see that happening now, at least in the United States. The price of petrol has gone up, oh, I would guess perhaps a dollar 30 a gallon over what it was a year ago. And that affects the whole economy.

Ross Let's come to economics because ultimately we can't get away from the subject. What you're actually talking about is inflation. Central bankers, policy makers, have gone on one of the greatest monetary experiments in human history and are now standing around looking

shocked. There's indeed consternation from various central banks saying the inflation genie's back. But don't worry, just temporary. But we are going to keep an eye on it. Are you surprised that inflation is back? And if it is and and you think it is, what effect does that have on a collapse of a complex system?

Joseph Tainter I'm not surprised that inflation is back. And the government economists are now claiming that they're not surprised, although I doubt that's correct. But given that there are shortages and many people returning to participating in the economy, particularly in areas of recreation and other activities that involve mixing with a lot of people, it's not surprising that shortages have led to inflation. I don't see this having an effect on the propensity of a society to collapse in the short-term. We went through much worse inflation in the 1970s and we're ultimately able to control it. But it took a lot of pain to bring it under control. What I focused on in The Collapse book was how complexity grows to solve problems or to take advantage of opportunities. And complexity always has an economic cost. As I said, we mostly pay for it today through energy, through fossil fuels. So we're largely unaware of that. But the economic cost is still there. And as the complexity of a society increases, it comes to cost more and more per capita. And in past societies we saw this increasing to the point where complexity was simply no longer feasible. It was not economically feasible any longer. And so these societies would collapse.

Ross Where are we, do think, on that timeline? And I'm only asking you to get your crystal ball out and tell us how the future is going to pan out.

Joseph Tainter Well, I'll go back a few years because I'll tell you, back in 2008, I was very concerned and not because of the economic crisis of 2008. I was concerned because the price of oil had gone to 150 dollars a barrel and gasoline petrol in the United States was up to four dollars and 50 cents a gallon. And I was looking at the fact that there's a declining energy profit of producing oil. And I wondered at that time, are we facing a situation in 10 to 15 to 20 years where we will be facing a collapse simply from lack of the energy that we need to maintain the complexity of our society and our economy? Well, what happened then is that hydraulic fracturing came along. Fracking came along and saved us and really gave us a reprieve. Now, we know that given the problems of climate change, that we can't go on using fossil fuels forever at our current rate. But fracking has given us a reprieve and an opportunity to begin to shift to other energy forms.

Ross It's not a sustainable model, though, given the climate breakdown analysis, is it? Is it just a stop-gap, is it the case that hydrogen is going to come in at some point in the future or we're magically going to be saved by Jeff Bezos's ability to create rockets, etc? How do we get away from this addiction to fossil fuels?

Joseph Tainter Well, it's not just a question of how do we get away from it. I think we can get away from it. And I believe the transition is underway now, particularly you see it in the automobile industry. I believe a genuine transition is underway. The problem that I see, one problem that I see, is how do you rapidly increase energy production in, let's say, a solar energy economy or a hydrogen energy economy if there's an immediate crisis? An example that I like to use is that in 1940, the United States produced oil and gas at an energy profit of one hundred to one. It's what we call energy return on investment. For every barrel of oil that we would invest in finding and producing oil, we got one hundred barrels back. And that that

is essentially how we fought in World War Two. We produced not only all the oil we needed, but we produced most of the oil for our allies in the war. In a future crisis, could we increase production rapidly? Would we have that kind of economic reserve to increase energy production rapidly to come to grips with the crisis? At that time, in 1940, something like one third of the United States oil production was shut in. So all we really needed to do to fight World War 2, was to open valves, to let out that reserve supply. We no longer have that reserve supply. Our energy return on investment now is down to 15 to one, and that trend is irreversible and will continue to go down. So this this has been my major concern about the future of our society or one of my major concerns. The other concern I have is about the productivity of our system of innovation. Believe it or not, our system of innovation is actually declining in its productivity. And this is something that people don't realise, the economists don't realise. And every time you go into an electronics store, you will see that there are new products that you can buy. So it's not generally recognised amongst the public. But the research that I've done, which grew out of the Collapse book, showed that it is actually costing more and more to achieve great innovations. And this is a trend that can't continue forever.

Ross Why do you think that is the case?

Joseph Tainter Innovation is a complex system like other complex systems, or I should say, it's a system that grows in complexity like other problem-solving systems do. If we think back to the 19th century, the age of the individual naturalist such as Charles Darwin, people like that, scientific breakthroughs were accomplished by individual scholars working alone, often with little or no institutional support. Innovation today is largely conducted interdisciplinary. It's conducted in large institutions that have budgets and buildings that have to be maintained and staffs. And so the cost of innovation goes up and up and up. And I have investigated this with some colleagues who have access to patent statistics in the United States. And half of all American patents actually go to overseas entities. So it's really an indicator of a worldwide investment. And what we're finding is that it is taking more and more higher and higher costs in the form of individual inventors to achieve some kind of breakthrough that merits a patent. So that the productivity of innovation, which we measure as patents for inventors, has actually been going down. And it's been declining since about the early 1970s, as far as we can tell.

Ross Dr. Joseph Tainter, welcome back to Renegade Inc. One of the things that struck me during the first half is when you talk about productivity and the fact that innovation hubs now that are festooned with bureaucracy and layers of management. How do you begin to strip that away to allow productivity to thrive again? Or is it the case with your thesis that complex systems, complex societies, actually have all that added complexity and that's just the natural order of things?

Joseph Tainter Well, the complexity is built in and to a certain extent today it emerges from economic opportunity in the form of diversification and proliferation of different kinds of goods and services that companies offer to the public. At the same time, complexity also increases to solve problems, and this is the major factor that I looked at in past societies. Energy always has a cost or complexity always has a cost - it always has a metabolic cost and an economic cost. And this is the problem that we are facing now, where the the productivity of our system of energy production in respect to oil has gone from an energy return of 100

barrels to one in 1940, down to 15 barrels to one today, and energy production in the future, if it relies on renewable resources, those are generally not very productive. It takes a lot of land area to produce the amount of energy per capita that we've been used to today. And there's one estimate that if England, Scotland and Wales had to rely entirely on renewable energy to produce the energy per capita that is enjoyed today, it would take all the land area of England, Scotland and Wales. In other words, completely renewable energy is not possible for England, Scotland and Wales. In the United States, where we have more land area, it's more feasible, but for a lot of places it's simply not going to be feasible to produce renewable energy at the per capita rate that we enjoy today. And so I say that the two keys to a sustainable society are energy and innovation. And in both areas, I think that over the next several decades there are reasons for concern.

Ross When you look back, people always cite the Roman Empire, the decline of the Roman Empire, as a sort of landmark when we're talking about collapse. When you think about the energy in the context of the Romans, was that energy land, access to land, food, land rents? What was the energy of the day in other societies that have collapsed?

Joseph Tainter Well, 90 percent of the economy was based on agriculture. And this is a major difference between ancient societies and us today. Today, what three percent of our economy is is based on that which consists of energy, although energy is, of course, fundamental to everything.

Ross Right.

Joseph Tainter But economically, in terms of cost, energy it doesn't overwhelm the economy as it did in past societies. In an ancient society where agriculture was 90 percent of the economy, it was simply not possible to raise enough taxes to pay for something like the Roman army as crises mounted and more and more enemies appeared on the frontiers. And ultimately, this produced the point where the Roman Empire reached the point of diminishing returns simply for being the Roman Empire. It ultimately reached the point where it couldn't sustain itself.

Video clip The people of Rome were constantly being distracted by the gladiatorial events, and the politicians knew that they did this, whenever there was unrest amongst the people and a huge event going on, they created a new event with lots and lots of gladiators every day. We're doing that. That is a common trait of declining empires. And so today in the United States, for example, you find a tremendous emphasis on all kinds of television programmes that distract people from what's really going on. Sports is a big part of that, as it was in gladiator times. In essence, we've been lulled into a lethargy and we've accepted it.

Video clip narration Just as our sports stars today earn vast sums, so did Roman charioteers. In the second century, one by the name of Gaius Appuleius Diocles amassed a fortune of 35 million sesterces in prize money equivalent to several billion dollars today. Strangely, perhaps, there's another profession that is disproportionately haloed is an empire declines. The Romans, the Ottomans and the Spanish all made celebrities of their chefs.

Video clip And this, again, is typifying the end of an empire where things were so great, we have this last umph of momentum that we used to be great and we felt great and we don't feel

it anymore. So everyone is out searching for it. Well, maybe it's in the best food or the best clothes or the best music or the best movies or reality TV show or another magazine. But you can never get enough of what you don't need. What you need is a strong moral conviction that is pervasive throughout the society and integrity reigns.

Video clip There's a vast apathy. There's a vast amoralism, even a political nature to it. That is to say, there are vast numbers of people who don't give a damn. And so there's this natural, I suppose, entropy, any living organism which an empire is, of course, over time dies. The question is, how does it die? Does it die in a cascade of events or does it die over a long period of time?

Ross With that learning and with your brilliant historical context, there's a moment now where you could argue that actually we're in a position where we have that knowledge. Provided we have the wherewithal and the leadership, it's possible to jump this inevitable collapse. What's the probability of that? Or are we so festooned with complexity now, actually, it's baked in and we just have to go through this?

Joseph Tainter Collapse is always a possibility. By a collapse. I mean, a rapid simplification and a collapse today would be simply catastrophic. I mean, hundreds of millions of people would die if there was a collapse of our economic flows. It would simply be a catastrophe. What I would like to think is the more likely scenario looking through the end of this century, is a transition to an energy system that is actually less productive overall and a decline in our ability to innovate our way out of these kinds of problems. And so what I speculate about with my students is, are we heading for what's sometimes called a steady state economy? And is that desirable? Is an economy without economic growth desirable? I don't know that that's what we're headed for. But when I look at the trends in energy and innovation, I see it as a distinct possibility.

Ross But that's what so many economists who've seen the problems, the flaws - the fatal flaws - in neoliberalism are screaming for. Jason Hickel is one of them. Kate Raworth is talking to the Dutch extensively now about - Doughnut Economics, Steady State, Circular Economies. This is what a lot of people who aren't rabid economic thinkers, Marxists, however you want to marginalise people, this is a very positive thing for them. So out of this conversation, we should have optimism?

Joseph Tainter Well, you misunderstand. I'm not advocating a steady state economy. I have a lot of concerns about it. Certainly, I can see that there would be positive aspects to it. But what does a steady state economy mean? It means that if someone ascends the economic ladder, someone else has to fall down by the same amount. It means that birth rates equal death rates, which means that you have to have a permit to have a child. These are all consequences of having a steady state economy, especially in a case where innovation is declining.

Ross So what is when you speculate with your students and when you do thought experiments, if steady state means that, what's the hybrid between what we have at the moment and something that's environmentally more sustainable and also something which is societally more palatable? Have you come up with that?

Joseph Tainter I used to think that innovation was the key to seeing us through this. I'm no longer sure that it is because of the problems I've discussed in the Productivity of Innovation. I don't have a simple answer to this. I like to say that we are a species that muddles through. That's all we've ever done and I think all we ever will do. And I'm not sure that we can actually plan the future in any precise way.

Ross So let me float this to you. Our greatest key here, our greatest strength, is adaptability?

Joseph Tainter Yes. Yes, that's absolutely true. We are I mean, other than cockroaches, we're the most adaptable species on Earth. In fact, I like to say we're the cockroaches of the mammalian world. Humans are highly adaptable and we will adapt. There's no doubt about it. I remember back when the prospect of a nuclear winter was being was being raised and people were talking about the extinction of the human race, and my response to that was, 'Oh, nonsense, we're a highly adaptable species. Of course, we would survive'. But this is the reason why we can't really predict the future. We are very adaptable. We will muddle through. I don't know if we will muddle through with the same standard of living that we have today.

Ross Leave us with a glimmer of hope. Out of all this thinking, you've been an absolute pragmatist. You've been a realist. You've confronted these things when many others have decided to turn their back on it. What's the one thing that you think, yeah, that looks pretty hopeful to me, I'm optimistic about that?

Joseph Tainter Well, I'll give you a couple of things. One, is I might be wrong. And there are times when I hope I am. But the other is that it was pointed out to me one time when I was giving a talk about The Productivity of Innovation, that a fellow who works in the technology sector pointed out to me that so many individual elements have been invented to this point that we can coast for decades simply combining them in new ways. And that is what innovation is. It's taking things that already exist and combining them in new ways. And you can see that clearly, for example, in the automobile industry where automobiles have essentially become rolling computers. So I think that for the next several decades, we are going to see a lot of combinations of things that already exist. But at the same time, we're going to be seeing avenues of innovation that industries are simply going to drop because they are no longer productive, government agencies are going to stop funding certain avenues of innovation because they're no longer productive. And so innovation is one of the two things to keep in mind to monitor for the future.

Ross So business schools and universities shouldn't be pumping out these MBAs, future CEOs of these legacy companies? They should be focusing on different skills, getting people to think differently? They should be pumping out maestros who can put different elements of a different supply chain together and come up with something new? That's the new value-add, that's our new model, if you like?

Joseph Tainter Yes. If people can make a living and generate profits by doing that, yes, absolutely.

Ross How do you teach that?

Joseph Tainter That is an excellent question. One of the things I teach my students is that humans did not evolve to think broadly in long-term. As a species, we'd simply never encountered conditions where there was natural selection for the ability to think broadly in terms of space and long-term, so naturally, we don't. Only a few individuals do and these are the individuals who we hope will invent the future.

Ross Dr Joseph Tainter, really wonderful to have you. Thank you so much for your time.

Joseph Tainter Thank you. My pleasure.