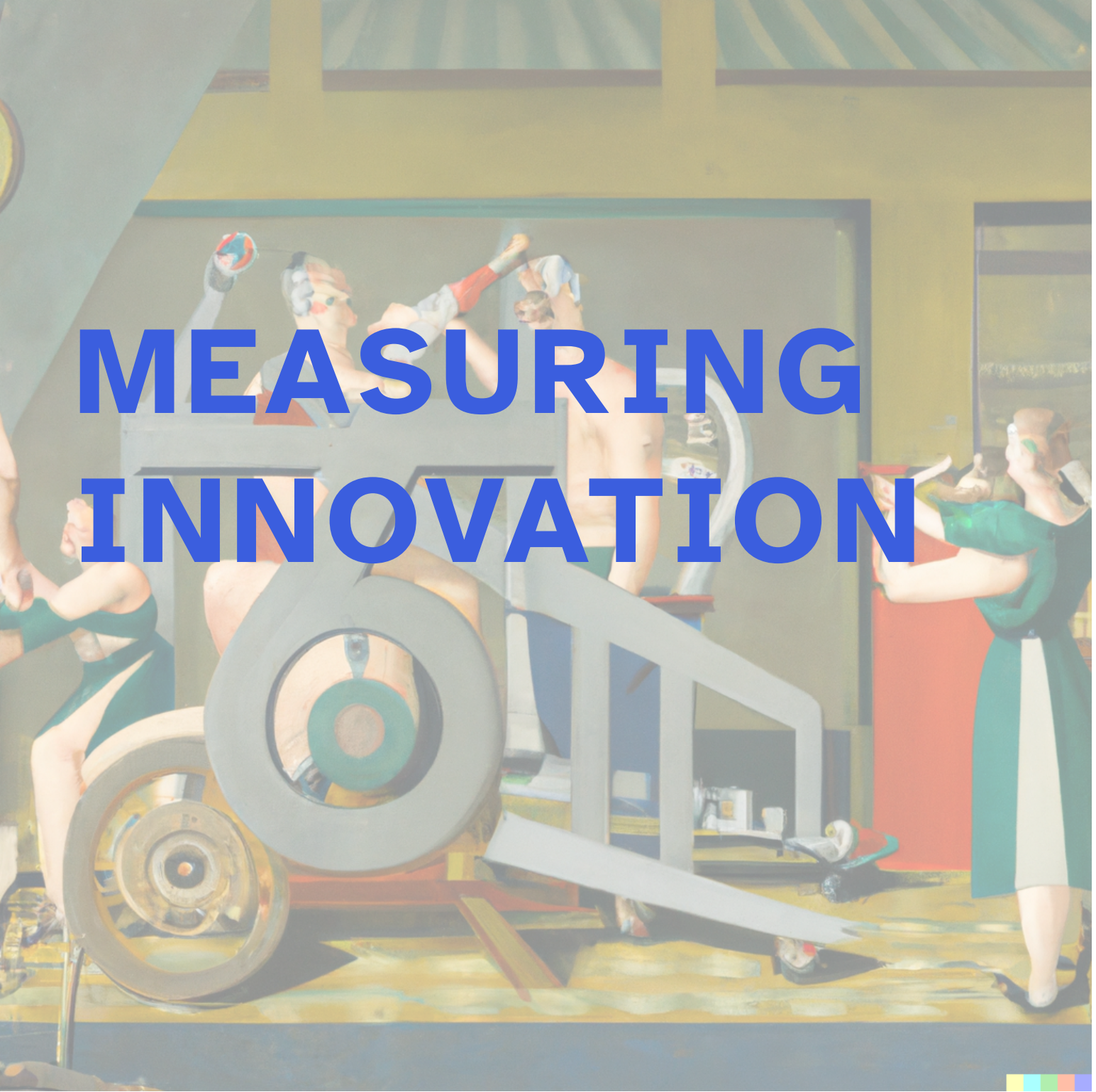


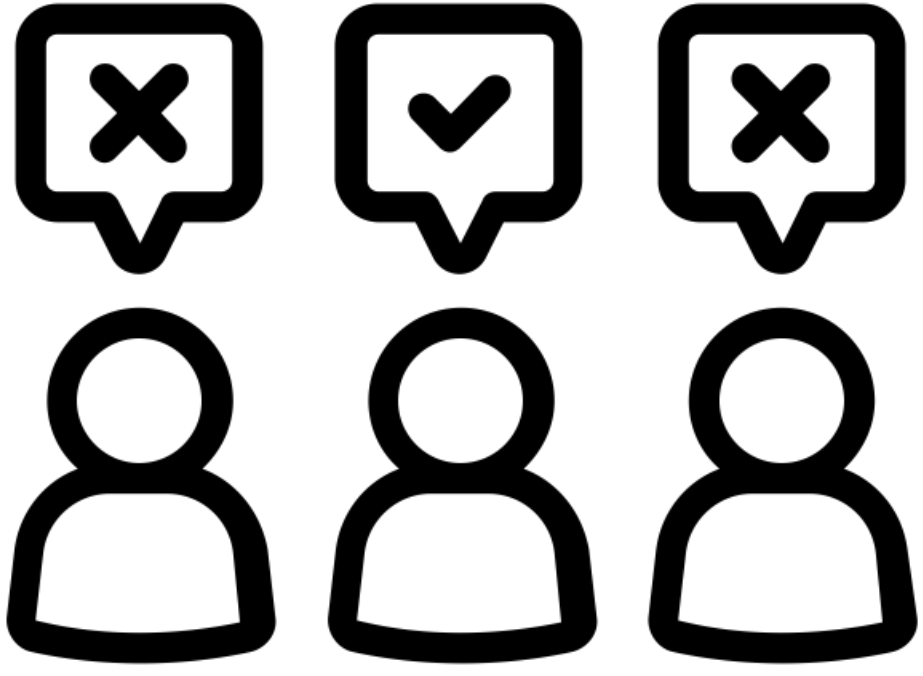
MEASURING INNOVATION

Jonas Kreutzer

2023-09-05

subject oriented measurements

surveys



Created by Adrien Coquet
from Noun Project

example: european community innovation survey

three main uses of surveys

1. Descriptive overviews
2. Studies for policy analysis
3. Econometric / statistical analysis

surveys summary

- ✓ Flexible
- ✓ Rich
- ✗ Response rate
- ✗ Delimination of innovation expenditure
- ✗ Subjectivity of novelty

r & d

> Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

types of r & d

Basic Research is experimental or theoretical work undertaken primarily to acquire new knowledge about observable phenomena and facts, **not directed toward any particular use**.

Applied Research is original investigation to acquire new knowledge **directed primarily towards a specific practical aim or objective**.

Experimental Development is systematic effort, based on existing knowledge from research or practical experience, **directed toward creating novel or improved** materials, products, devices, processes, systems, or services.

r & d summary

✓ Long Time Series

✓ Decomposable (Type of Research, Org)

✓ Available at Firm Level

✗ Not necessarily innovation

✗ Not the only innovation input

✗ Biased against small firms

✗ Biased against service / organizational innovation

✗ Measurement error due to false allocation of spending

object oriented measurements

patents

US006763791B2

(12) **United States Patent**
Gardner et al.

(10) **Patent No.: US 6,763,791 B2**
(45) **Date of Patent: Jul. 20, 2004**

(54) **CAM PHASER FOR ENGINES HAVING TWO CHECK VALVES IN ROTOR BETWEEN CHAMBERS AND SPOOL VALVE**

(75) Inventors: **Marty Gardner**, Ithaca, NY (US); **Michael Duffield**, Medina, NY (US)

(73) Assignee: **BorgWarner Inc.**, Auburn Hills, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/198,476**

(22) Filed: **Jul. 18, 2002**

(65) **Prior Publication Data**

US 2003/0033999 A1 Feb. 20, 2003

Related U.S. Application Data

(60) Provisional application No. 60/312,140, filed on Aug. 14, 2001.

(51) **Int. Cl.**[7] **F01L 1/34**
(52) **U.S. Cl.** **123/90.17**; 125/90.15
(58) **Field of Search** 123/90.13, 90.15

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,002,023	A		3/1991	Butterfield et al. 123/90.15
5,107,804	A		4/1992	Becker et al. 123/90.17
5,172,659	A	*	12/1992	Butterfield et al. 123/90.17
5,184,578	A		2/1993	Quinn, Jr. et al. 123/90.17
5,361,735	A		11/1994	Butterfield et al. 123/90.17
5,367,992	A		11/1994	Butterfield et al. 123/90.17
5,386,807	A		2/1995	Linder 123/90.17
5,497,738	A	*	3/1996	Siemon et al. 123/90.17
5,657,725	A		8/1997	Butterfield et al. 123/90.17
6,024,061	A		2/2000	Adachi et al. 123/90.17
6,053,138	A		4/2000	Trzmiel et al. 123/90.17
6,085,708	A		7/2000	Trzmiel et al. 123/90.17
6,182,622	B1		2/2001	Goloyatai-Schmidt et al. .. 123/90.15
6,481,402	B1	*	11/2002	Simpson et al. 123/90.17

FOREIGN PATENT DOCUMENTS

EP	0801212 A1	10/1997	..... F01L/1/344

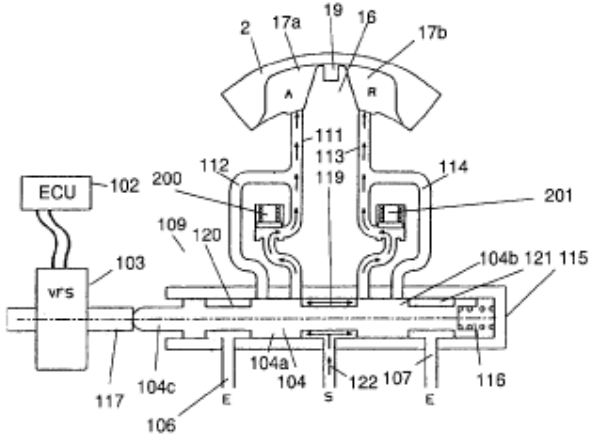
* cited by examiner

Primary Examiner—Thomas Denion
Assistant Examiner—Zelalem Eshete
(74) *Attorney, Agent, or Firm*—Brown & Michaels PC; Greg Dziegielewski

(57) **ABSTRACT**

An infinitely variable camshaft timing device (phaser) has a control valve located in the rotor. Since the control valve is in the rotor, the camshaft need only provide a single passage for supplying engine oil or hydraulic fluid, and does not need multiple passageways for controlling the phaser, as in the prior art. Two check valves, an advance chamber check valve and a retard chamber check valve, are also located in the rotor. The check valves are located in the control passages for each chamber. The main advantage of putting the check valves in the advance and retard chambers instead of having a single check valve in the supply is to reduce leakage. This design also eliminates high pressure oil flow across the spool valve and improves the response time of the check valve to the torque reversals due to a shorter oil path. In addition, the phaser of the present invention outperforms an oil pressure actuated device and consumes less oil.

14 Claims, 6 Drawing Sheets



patent office interfaces

OECD patstat: https://www.epo.org/searching-for-patents/business/patstat.html

USPTO: https://patentsview.org/

European Patent Office: https://worldwide.espacenet.com/

> **Tip**
>
> ChatGPT can help with SQL queries!

patents summary

- ✓ Long time series
- ✓ Accessible
- ✓ Detailed

- ✗ Differing propensity to patent
- ✗ Patenting motivation
- ✗ Possible Industry-Technology mismatch
- ✗ Multiple patent offices (EPO; USPTO; JPO)

lbio

article example

Example of an Innovation Article

Source: “Svensk Trävaru- och Pappersmassetidning 9 - 1985

Sweden’s timber volume can be increased

Sweden’s timber volume is currently estimated at approximately 2,600 million forest cubic metres, and growth in forest land is calculated to be some 82 million cubic metres annuallt, according to an interim report presented by a research team in Umeå, north Sweden.

The projekt, which is designated Felling Estimate 85, is being conducted at the request of the Swedish National Board of Forestry.

The researchers’ task is to estimate the probable growth and development of Sweden’s forests and, with this as a basis, to determine the correct amount of felling to balance the growth status and age-class distribution. The aim is to ensure that future felling levels never have to be reduced but rather can be increased.

Possible increase

One conclusion of the study is that it will be possible to increase the annual level of felling by 7–10 million cubic metres to a total of 70 million forest cubic metres during the 1990s and onwards, even when assuming a certain reduction for so-called economically doubtful resources, nature conservation and other factors.

In 40 years, it may be possible to increase the level of felling even more, to reach about 100 million cubic metres by the end of the 100-year period covered by the researchers’ calculations.

The report further says that it will not be possible to fell the entire annual growth without saving part of it. This is a result of the uneven percentage of ageclass distribution, with a relatively low level of mean-age forest.

Felling of older forest therfore must be restricted to avoid a downturn in future timber supply. As a result, annual growth will accumulate, especially in young and mean-age forest.

Private forestry

Large-scale forestry cannot increase Sweden’s total felling output very much during the next decades, and then only by thinning, the report says. The greatest opportunities for expansion of felling operations are to be found in private forestry, particularly in southern Sweden.

Decidous tree felling can and should be stepped up by several million forest cubic metres annually, the researchers say.

The research team at the Swedish Royal College of Forestry has concluded that the status of Sweden’s forests has improved continually since the first reliable estimates were made in the 1920s. Today’s timber volume of 2,600 million forest cubic metres is thought to be twice the level of forest resources a century ago.

AA

New bioenergy system converts forest residue into high-quality fuel

A fully automated bioenergy system which includes mobile bunch delimbers, chip harvesting machinery for logging slash and all kinds of brush wood, silo handling, and an energy generation plant, has been introduced on the international market by Bruks Mekaniska AB, a Swedish company specializing in forest industry equipment.

– Forest residue has become increasingly popular as an alternative source of heating, a spokesman of the company, based in Arbrå, central Sweden, says.

– Chip harvestings also facilitate earlier and easier reforestation.

Growing demand

The Growing demand for chips for energy production has led to the development of more efficient means to make use of the assets left in the forests after felling. In order to economize production users have found it less costly to take the machine to the raw material than taking the raw material to the machine.

The first stage in the new bioenergy production system is a bunch delimber, which has been developed jointly with the Swedish Forest Service (Domänverket) and the Billerud forest industries and will go into commercial production this autumn.

This machine will turn costly thinning operations profitable, as even young trees can be used for pulp or board.

The equipment, mounted on a trailer, consists of an infeed conveyor, the bunch delimber, a classifying conveyor, a crane and an operator’s cabin. The unit is hydraulically powered and driven by a 200 kW diesel engine.

All rejected material is fed onto a pile where a mobile Bruks chipper turns it into fuel. The fuel is fed into a silo and in the final phase into a boiler in an energy generation plant, which produces gas.

A full-size plant has recently been installed at the Avon Valley Greenhouses in Nova Scotia, one of Canada’s largest market gardens with 3.5 hectares of cultivated land under roof. The bioenergy system replaces previous oil heating facilities.

The order, worth about 10 million Kronor (1,200 000 Dollar), includes forest production machinery and the energy generation plant, plus six chip harvesters to the Stora Kopparberg industries in Nova Scotia.

The plant has a capacity of 9 MW. Its anual consumption of bio fuel is 15,000 tonnes, which replaces 3,600 cubic metres of oil. The Avon Valley Greenhouses expect to make a saving of 2 million Kronor in energy costs per year.

The company is currently negotiating with Bruks for a new contract to install the system in other greenhouses in Canada.

The environmental aspects is considered not least important. The plant has a special filtration equipment reducing smoke emissions to a minimum in the form of vapour from the moist in the wood chips.

lbio summary

✓ High data quality

✓ Captures actual innovation

✓ Reliable coverage due to expert filter

✗ Potentially biased against process innovations

✗ Biased against incremental innovation

✗ Labor intensive to produce

current and future trends

Linking of different measurements
Example: Johansson et al. (2022)

Computational data generation
Rammer & Es-Sadki (2022)

Computational text analysis

references

Johansson, M., Nyqvist, J., & Taalbi, J. (2022). *Linking innovations and patents - a machine learning assisted method* [{{SSRN Scholarly Paper}}]. https://doi.org/10.2139/ssrn.4127194

OECD. (1994). *The Measurement of Scientific and Technical Activities: Standard Practice for Surveys of Research and Experimental Development - Frascati Manual 1993*. Organisation for Economic Co-operation and Development.

Rammer, C., & Es-Sadki, N. (2022). Using Big Data for Generating Firm-Level Innovation Indicators A Literature Review. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4072590