

Paul Starkey

Animal-Drawn Wheeled Toolcarriers:

# Perfected yet Rejected



Vieweg

**Paul Starkey**

**Animal-Drawn Wheeled Toolcarriers:**

# **Perfected yet Rejected**

**A cautionary tale of development**

A publication of

**Deutsches Zentrum für Entwicklungstechnologien – GATE**

**in: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH**



**Friedr. Vieweg & Sohn Braunschweig/Wiesbaden**

**The Author:** Paul Starkey qualified in Natural Science at Oxford University and in Education at Cambridge University. He worked for some years in Malawi, before studying Tropical Agriculture Development at the University of Reading. He worked for seven years in Sierra Leone, where he initiated a national traction programme. At present he works as a consultant. His main professional interest is in the improved utilization of draft animal power and in stimulating closer international liaison in this field.

**Cover:** On-farm evaluation of Nikart in Mali, 1986.

**Photo:** Bart de Steenhuysen Piters.

CIP-Titelaufnahme der Deutschen Bibliothek

**Starkey, Paul:**

Animal-drawn wheeled toolcarriers: perfected yet rejected : a cautionary tale of development ; a publ. of Dt. Zentrum für Entwicklungstechnologien - GATE in: Dt. Ges. für Techn. Zusammenarbeit (GTZ) GmbH / Paul Starkey. - Braunschweig ; Wiesbaden : Vieweg, 1988  
ISBN 3-528-02034-2

The author's opinion does not necessarily represent the view of the publisher.

All rights reserved.

© Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Eschborn 1988

Published by Friedr. Vieweg & Sohn Verlagsgesellschaft mbH, Braunschweig  
Vieweg is a subsidiary company of the Bertelsmann Publishing Group.

Printed in the Federal Republic of Germany by Lengericher Handelsdruckerei, Lengerich

ISBN 3-528-02034-2

# Preface

This book did not start as a formal research study or a publication proposal. Rather it developed from a promise made to a colleague who was contemplating ordering wheeled toolcarriers for evaluation in a West African country. The promise was to contact professional colleagues and, by means of a "networking" approach, to track down information relating to the successful use of wheeled toolcarriers by farmers. The idea was that it would save much time and money if that country learned about existing experience before it started its own work. At that stage it was naturally assumed there were successful experiences to find. So started eighteen months of correspondence and literature review in the search of successful use of wheeled toolcarriers by farmers. It slowly became apparent that everyone contacted thought that these implements were indeed successful — but somewhere else! Therefore it seemed worthwhile to put all the detective work together so that people could learn from the obvious lessons. Following discussions with Eduardo Busquets of the German Appropriate Technology Exchange (GATE), GATE agreed to sponsor the preparation of this text, and their support is gratefully acknowledged.

A great deal of the information for this book was gathered through personal correspondence and discussions and the author would like to thank the very many people who readily responded to requests for facts, impressions, illustrations and comments on sections of the draft text. These include Akhil Agarwal, Alphonse Akou, N.K. Awadhwal, Mike Ayre, Mats Bartling, R.K. Bansal, Ste-

wart Barton, Hans Binswanger, David Gibbon, Michael Goe, David Horspool, Diana Hunt, David Kemp, Andrew Ker, Wells Kumwenda, Bill Kinsey, Harbans Lal, J.S. Macfarlane, Peter Munzinger, Fadel Ndiame, Jean Nolle, M. von Oppen, John Peacock, Bart de Steenhuisen Piters, K.V. Ramanaiah, Franz Rauch, Eric Rempel, Marc Rodriguez, Gerald Robinson, Andrew Seager, Philip Serafini, Brian Sims, Alan Stokes, Gerald Thierstein, Gérard Le Thiec, David Tinker and Dramane Zerbo. Some of these colleagues went to great trouble to assist in this work by finding and forwarding pertinent information, documents and illustrations, and searching for, or specially taking, relevant photographs. The major manufacturers were also most helpful and valuable information was provided by CEMAG, Geest Overseas Mechanization, Mekins Agro Products, Mouzon S.A. and SISMAR.

Further information was gathered during various consultancy missions and the support of the sponsoring organizations in both authorizing and facilitating this exchange of experience is gratefully acknowledged. Many of the recent details relating to India were obtained during a visit to the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and particular thanks go to ICRISAT for providing many documents and illustrations. Experiences and opinions from several African countries were also obtained during consultancy assignments financed by the International Development Research Centre (IDRC) of Canada, and the Farming Systems Support Project (FSSP) of the University of Florida, and the support of

these organizations is gratefully acknowledged. Special mention is also due to the Overseas Division of AFRC-Engineering (formerly NIAE) which has been helpful in providing photographs and commenting on the draft text.

Despite all the help received from many people, it seems inevitable that there will be some inaccuracies or errors in the text. For these the author has to be responsible himself and he apologizes in advance for any incorrect statements or impressions given. Should errors be noticed, the author would welcome factual corrections. He would also be happy to receive comments, observations and additional information on this topic. This would be particularly useful should any updated or translated edition be planned. Correspondence may be addressed to the author at the Centre for Agricultural Strategy, University of Reading, Earley Gate, Reading RG6 2AT, United Kingdom.

For those interested in the evolution of languages, it may be noted that, while standard English spellings have been used in this text, with each of two commonly used words draught/draft and plough/plow the simpler of the alternative spellings has been adopted. All four spellings have been used in the English language for several hundred years and there are both ancient and recent precedents for the shorter, simpler versions. Current North American standards arose from spellings in use in Britain two hundred years ago and there now seems little justification in

English for maintaining the "ugh" spellings for these words. It would simplify terminology if international publications used one spelling, and so *plow* and *draft* have been adopted here.

Finally several colleagues warned that the subject of wheeled toolcarriers would be a difficult one to tackle, as those involved might be very sensitive to any implicit criticism of the various wheeled toolcarrier programmes. However, as should be apparent, there is absolutely no intention of censuring individuals, organizations or the toolcarrier concept itself. The objective has simply been to analyse experiences, good and bad, positive and negative, and to try to draw lessons from these. As noted in the conclusions, the question of "failure" will only arise if people do not make good use of "negative lessons". This is unlikely to be the case with wheeled toolcarrier technology as the majority of researchers and institutions involved with wheeled toolcarriers during the past thirty years have directly or indirectly assisted and contributed to this study. This has been most stimulating and it is hoped that this publication may be of value to its many contributors as well as others involved in planning and implementing development programmes.

Paul Starkey

April 1987, Reading, UK.

# 1. A Summary

Historically and geographically most animal-drawn implements have been devised for one major purpose. Wheeled toolcarriers are multipurpose implements that can be used for plowing, seeding, weeding and transport. Many have been designed as ride-on implements using a "bullock-tractor" analogy. Careful distinction should be made between these implements and the much lighter, cheaper and more successful "simple toolbars" without transport wheels.

Pioneering work was undertaken in Senegal in 1955 by the French agricultural engineer Jean Nolle who has since designed many wheeled toolcarriers including the Polyculteur and Tropicultor. The British National Institute of Agricultural Engineering (NIAE) produced a wheeled toolcarrier prototype in 1960 and several original designs were developed in India and Africa from 1960 to 1975. As a result of British and French technical cooperation, early toolcarriers were tested in many countries in the world. They were actively promoted with credit and subsidies in Senegal, Uganda, The Gambia and Botswana. In all countries they were conclusively rejected by farmers as multipurpose implements and mainly became used as simple carts.

In 1974 the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) started a major programme of research involving the use of wheeled toolcarriers in a crop cultivation system based on broadbeds. This resulted in the development and refinement of two main wheeled toolcarriers, the Tropicultor and Nikart. The cropping system was very effective in the deep black soils of

the research station and was promoted in several states in India. It did not prove successful at village level. Up to 1200 toolcarriers were distributed to farmers through credit and subsidies of up to 80%, but they were rejected as multipurpose implements, and most now lie abandoned or are used as carts.

Encouraging reports of the on-station successes of wheeled toolcarriers increased during the 1970s and early 1980s and stimulated much wider international interest in the technology. Significant numbers of wheeled toolcarriers were imported into Mozambique, Angola and Ethiopia and smaller quantities were tested in Cameroon, Lesotho, Malawi, Mali, Niger, Nigeria, Somalia, Zambia, Zimbabwe and elsewhere. Large scale production was started in Brazil and Mexico, with smaller numbers produced in Honduras and Nicaragua.

To date about 10 000 wheeled toolcarriers of over 45 different designs have been made. Of these, the number ever used by farmers as multipurpose implements for several years is negligible. The majority have been either abandoned or used as carts. Present prospects for these implements in Asia and Africa seem very poor. Recent initiatives in Latin America have not yet been fully evaluated, but already many of the reasons for the equipment being rejected in Africa and India have been cited as constraints in Latin America, and there is little reason for optimism.

Wheeled toolcarriers have been rejected because of their high cost, heavy weight, lack of manoeuvrability, inconvenience in opera-

tion, complication of adjustment and difficulty in changing between modes. By combining many operations into one machine they have increased risk and reduced flexibility compared with a range of single purpose implements. Their design has been a compromise between the many different requirements. In many cases for a similar (or lower) cost farmers can use single purpose plows, seeders, multipurpose cultivators and carts to achieve similar (or better) results with greater convenience and with less risk.

Farmer rejection has been apparent since the early 1960s, yet as recently as 1986 the majority of researchers, agriculturalists, planners and decision makers in national programmes, aid agencies and international centres were under the impression that wheeled toolcarriers were a highly successful technology. These impressions derive from encouraging and highly optimistic reports.

All wheeled toolcarriers developed have been proven competent and often highly effective under the optimal conditions of research stations. Most published reports derive from such experience and individuals and institutions have consistently selected the favourable information for dissemination. Published economic models have shown that the use of such implements is theoretically profitable, given many optimal assumptions relating to farm size and utilization patterns. In

contrast there are virtually no publications available describing the actual problems experienced by farmers under conditions of environmental and economic reality.

The wheeled toolcarrier programmes have illustrated the dangers of research limited to research stations and domineering ("top-down") philosophies. They have also highlighted the problems of emphasizing technical efficiency rather than appropriateness, both to the needs of the farmers and to the realities of their environments. In future farmers should be involved (like consultants) at all stages of planning, implementing and evaluating programmes.

Most individuals and institutions are afraid of adverse public reaction if they report "failures". Attitudes must be changed so that disappointments are seen constructively as valuable "negative lessons". If the national programmes, the aid agencies and the international centres fail to accept this challenge, major opportunities for learning will be lost and more time and money will be wasted.

The wheeled toolcarrier story is remarkable, for the implements have been universally "successful" yet never adopted by farmers. If the lessons from this can lead to more realism in reporting, more appropriate programmes and more involvement of farmers, then the time and money spent may eventually be justified.